REVIEW OF THE EDUCATION MANAGEMENT INFORMATION SYSTEM (EMIS) IN KHYBER PAKHTUNKHWA, PAKISTAN

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Acronyms

ADEO	Assistant District Education Officer
AEPAM	Academy of Educational Planning and Management
ALP	Adult Learning Program
ANER	Adjusted Net Enrolment Rate
API	Application Program Interface
ASC	Annual School Census
ASI	Adam Smith International
ASER	Age Specific Enrolment Rate
BAS	Biometric Attendance System
BI	Business Intelligence
BISE	Board of Intermediate and Secondary Education
BISP	Benazir Income Support Programme
CNIC	Computerized National Identity Card
CO	Country Office
CG-MIS	Conditional Grants Management Information System
CPD	Continuous Professional Development
CPD-MIS	Continuous Professional Development Management Information System
CRC	Child Registration Certificate
DCMA	Data Collection and Monitoring Assistant
DCTE	Directorate for Curriculum and Teacher Education
DEG	District Education Group
DEO	District Education Officer
DESE	Directorate of Elementary and Secondary Education
DFID	UK Department for International Development
DPMF	District Performance Monitoring Framework
DPRS	Director, Planning Research and Statistics
DQAF	Data Quality Assessment Framework
ECE	Early Childhood Education
EGMA	Early Grade Maths Assessment
EGRA	Early Grade Reading Assessment
EMIS	Education Management Information System
EMIS(ASC)	EMIS based on the Annual School Census
EMA	Education Monitoring Authority

EQ	Evaluability Questionnaire
ESED	Elementary and Secondary Education Department
ESP	Educational Sector Plan
ESPSP	Educational Sector Plan Support Programme
ESRU	Education Sector Reform Unit
ETS	E-transfer System
EU	European Union
EVS-MIS	Education Voucher Scheme Management Information System
EWS	Early Warning System
FATA	Federally Administered Tribal Areas
GCS-MIS	Girls Community Schools Management Information System
GDP	Gross Domestic Product
GER	Gross Enrolment Rate
GIR	Gross Intake Ratio
GIS	Geographic Information Systems
GPE	Global Partnership for Education
GPI	Gender Parity Index
GPS	Global Positioning System
GSM	Girls Stipend Management Information System
GTZ	German Agency for Technical Cooperation
HRMIS	Human Resources Management Information System
HT	Headteacher
ICT	Information Communications Technology
IDP	International Development Partner
IEE	International EMIS Expert
IEMIS	Integrated Education Management Information System
IMS	Induction Management System
IMU	Independent Monitoring Unit
IT	Information Technology
ISCED	International System for Classification of Education
JICA	Japan International Development Agency
KESP	Khyber Pakhtunkhwa Education Sector Programme
KP	Khyber Pakhtunkhwa
KPBOS	Khyber Pakhtunkhwa Bureau of Statistics
KPI	Key Performance Indicator

LDC	Less-Developed Country
MEA	Monitoring and Evaluation Assistants
MICS	Multiple Indicator Cluster Survey
MIS	Management Information System
MoE	Ministry of Education
MFEPT	Ministry of Federal Education and Professional Training
MM	Mott MacDonald
MPEF	Monitoring Participation in Education Framework
NADRA	National Database & Registration Authority
NEP	National Education Policy
NER	Net Enrolment Rate
NFE	Nonformal Education
NFEMIS	Nonformal Education Management Information System
NIR	Net Intake Ratio
NICOP	National Identity Card for Overseas Pakistanis
NSER	National Socio-Economic Registry
OAMS	Online Action Management System
OECD	Organization for Economic Co-operation and Development
OOSC	Out of School Children
PIRLS	Progress in International Reading Literacy Study
PISA	Programme for International Student Assessment
PQTR	Pupil per Qualified Teacher Ratio
PSA	Private School Authority
PTC	Parent Teacher Council
ROSA	Regional Office for South Asia
SABER	Systems Approach for Better Education Results
SDG	Sustainable Development Goals
SES	Socioeconomic Status
SIDS	Small Island Developing States
SIP	School Improvement Plan
SIS	Student Information System
SMIS	School Management Information System
SOP	Standard Operating Policies
SQMIS	School Quality Management Information System
SRSP	Sarhad Rural Support Program

SSP	Sehat Sahulat Program
STR	Student Teacher Ratio
TA	Technical Assistance
TIMSS	Trends in International Mathematics and Science Study
TMIS	Teacher Management Information System
TT-MIS	Teacher Training Management Information System
TOR	Terms of Reference
TOT	Training of Trainers
TT-MIS	Teachers' Training Management Information System
TVET	Technical and Vocational Education and Training
TVETA	Technical and Vocational Education and Training Authority
UIS	UNESCO Institute for Statistics
UNEG	United Nations Evaluation Group
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNICEF	United Nations International Children's Emergency Fund
USAID	United States Agency for International Development
WB	World Bank
WET	Waseela-e-Taleem
WFP	World Food Program

Executive summary

Review purpose, objectives and intended users

UNICEF Regional Office for South Asia (ROSA) selected Cambridge Education to carry out a comprehensive review of two EMIS experiences with sub-national and school level components in South Asia in order to identify key factors that influence the capacity of EMIS to impact on school efficiency, equity and quality.

The overall aim of this review is to identify attributes of EMIS systems that make them particularly strong in supporting the monitoring and development of education.

The approach proposed for the evaluability and review under this exercise aimed to identify best practices and good foundations for EMIS implementation especially at sub-national and school levels. The Evaluability assessment report concluded with the selection of EMIS experiences in the Province of Khyber Pakhtunkhwa in Pakistan as one of two EMISs to be reviewed.

Through a review of documentation, discussions with key stakeholders (including at school and sub-national level), examination of current and historic data, and on-site visits, the review allows the examination of how well the system is performing and how it could be strengthened. From this, the study identifies successful approaches and effective systems that could benefit future EMIS implementations.

Review Methodology

The review methodology had three phases:

Inception Phase

The Inception Phase[1] included an examination of existing international frameworks for review of EMIS relative to the objectives and focus of the current study, identification of a strategy for carrying out the evaluability phase, identification of stakeholders to be involved, and a draft questionnaire for use during the evaluability phase.

Evaluability Phase

The evaluability phase was conducted remotely by the Cambridge Education EMIS expert responsible for this phase. In this phase, six EMIS systems identified by UNICEF ROSA were examined in order to select two to participate in the Review Phase. A number of different Frameworks for assessment of EMIS were examined, including DQAF,[2] SABER,[3] and Monitoring Education Participation - Framework for Monitoring Children and Adolescents who are Out of School or at Risk of Dropping Out.[4]

[1] Mott Macdonald. (2019, July). "Evaluation of Education Management and Monitoring Systems at School and Sub-National Levels – Inception Report".

[2] World Bank and UNESCO Institute for Statistics. 2003. A Framework for Assessing the Quality of Education Statistics. http://dqaf.uis.unesco.org/images/a/a8/DQAF_Education_2004.pdf

[3] Abdul-Hamid, Husein. 2014. What Matters Most for Education Management Information Systems - A Framework Paper. World Bank. http://saber.worldbank.org/index.cfm?indx=8&pd=2&sub=0

[4] UNICEF and UIS. 2016. Monitoring Education Participation: Framework for Monitoring Children and Adolescents who are Out of School or at Risk of Dropping Out. http://uis.unesco.org/sites/default/files/documents/monitoring-education-participation.pdf.

The focus of the Review was on uses of EMIS data at school and local levels to improve school access, equity and quality. DQAF and SABER were developed at a time when EMIS tended to be based on the Annual School Census (ASC), and its uses were primarily at higher levels - district levels and above. In developing the TOR for the study, UNICEF ROSA developed a framework and guiding questions/methodology for the purpose of this study. This was done by combining SABER with the Framework for Monitoring Education Participation, and further refining it by adding a focus on use and impact at local and school levels through an equity lens. The approach followed in the review was to examine EMIS in relation to the review questions, as well as providing a descriptive overview of each element of EMIS, with identification of recommendations for strengthening the overall system, as well as its individual components.

The Evaluability Questionnaire was revised and finalized. It was designed to collect basic information on the EMIS system, on SMIS and its relationship to the ASC, equity variables included in individual student data, and uses of SMIS and EMIS at local and school levels (See Appendix D).

With support of local UNICEF offices and country offices, the Evaluability Questionnaires was sent to the director of EMIS (or equivalent) within the Ministry/Department of Education for each of the six EMISs. Once the questionnaires had been completed, the UNICEF local offices arranged, for each of the 6 EMISs, a SKYPE call between Cambridge Education and the Director of EMIS to clarify responses to the questionnaires.

Based on findings from the completed questionnaire and the review of documentation provided by authorities and found online, an Evaluability Framework was applied, in order to select two EMIS to participate in the Review phase. The UNICEF Steering Committee accepted the selection of the two EMISs – namely the state of Andhra Pradesh in India and the province Khyber Pakhtunkhwa in Pakistan.[5]

Review Phase

The Review Phase was carried out by a different international consultant working for each selected EMIS. The Review Phase built on the questionnaires and documentation obtained during the Evaluability Phase. It included a 2-3 weeks site visit to Ministry/Department responsible. Planning and arrangements for the Review of the Khyber Pakhtunkhwa EMIS was done with support UNICEF Pakistan Country Office, and the Peshawar Field Office. The site visit included face-to-face meetings with key stakeholders, planning visits to the EMIS and planning departments offices, focus group discussion with district and school representatives, and field visits to selected schools in Peshawar. The scheduling of meetings with all parties, with District Offices, was coordinated through UNICEF field office contact.

Main Findings

Evolution of EMIS - the Global Context

For this Review, EMIS has been defined as a mix of operational systems and processes, increasingly supported by digital technology, that enables the collection, aggregation, analysis and use of data and information in education, including for management and administration,

[5] Mott Macdonald. (2019, October). Evaluation of EMIS at school and sub-national levels - Evaluability Report.

planning, policy formulation, and monitoring and evaluation. In earlier decades, EMIS has centered around the collection of student, teacher and school data via an Annual School Census, yielding a database used to generate a comprehensive set of internationally accepted indicators, used mostly at central and to a lesser extent at district levels to monitor education access and efficiency: enrolment rates, survival rates, transition rates, completion rates, student teacher ratios, and data on teacher qualifications, and school infrastructure and supplies. These core indicators of education remain important today, but EMIS has evolved and is continuing to evolve due to a number of drivers of change.

First Driver of change: Today's increasingly digital world.

Education administration and management in today's digital world is becoming increasingly automated. EMIS is increasingly becoming an Integrated System, which manages and facilitates all work processes in the organization at central, district and school levels, and in which much of the data needed for management, planning and decision-making is increasingly a by-product of the operational systems.

Second Driver of Change: Greater emphases on education equity and quality.

Another driver of change by international communities as well as local governments has been greater emphases on equity and quality. Sustainability Development Goal 4[6] (SDG 4) emphasizes the need to "Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all". SDG 4 stresses the need to "ensure equal access to all levels of education and vocational training for the vulnerable, including persons with disabilities, indigenous peoples and children in vulnerable situations", which requires data that can be disaggregated by gender, location, wealth quintile and others, such as disability status, indigenous peoples and conflict-affected. To achieve this disaggregation, EMIS must collect data on individuals including data on the equity dimensions of interest. The emphasis on education quality requires data on learning outcomes, also linked to the equity dimensions.

Third Driver of Change: Need for EMIS to Manage Education at all levels – central, district and school.

There is increasing demand and need for EMIS systems at all levels of the education system. With increased decentralization and the devolvement of decision-making powers to sub-national levels, as districts and schools get more autonomy, they also need systems which collect and summarize the information they need at their level for targeting, monitoring, reporting needs. Under the old paradigm of EMIS based on the Annual School Census, consisting of data collected from schools and sent via districts to the central level, there has always been a problem with the reverse flow of data back to districts and schools, resulting in the lack of data for managing education at the lower levels. Fundamental to the new concept of EMIS is a database which users at all levels can access and use. At the school level, the School Management Information System (SMIS) will be used to automate work processes previously carried out manually.

Situational Analysis of EMIS in Khyber Pakhtunkhwa

The review examined where EMIS for Khyber Pakhtunkhwa is situated on the continuum between the old paradigm of an EMIS based solely on ASC, and a fully integrated EMIS that functions as an integrated system for central department, for districts, and for schools. The finding is that EMIS

[6] United Nations Statistics Division. n.d. Sustainable Development Goal Indicators Website, Goal 4. https://unstats.un.org/sdgs/report/2017/goal-04/.

in Khyber Pakhtunkhwa is in transition, it is no longer based solely on the old paradigm, but it has yet to arrive at the new paradigm.

The ASC-based EMIS remains the central EMIS vehicle at this juncture – but an SMIS has been developed with a partial implementation for Higher Secondary schools. SMIS will eventually become the core of the Integrated EMIS (IEMIS) of the future. Other parts of a future IEMIS have also been developed, but currently exist as standalone systems. The disadvantage of the standalone systems is that they have less potential to realize the equity focus required for SDGs as they tend to collect only the data directly needed for the particular programme they were designed for, and as they are independent of one another, this results in duplication of collection. The future SMIS will be a central vehicle containing individual student data with all the required equity dimensions. SMIS will be integrated with other MISs (modules of the IEMIS), such that other systems requiring use of individual student data will access it via linkage with SMIS, eliminating duplication and enable monitoring and analysis by all the systems across the equity dimensions included in SMIS.

Conclusions

Below, requirements to conceptualize, develop and implement the needed Integrated EMIS, are considered in relation to the objectives established by UNICEF ROSA for the current review[7]:

> Review Objective i. *To determine the strengths and limitations of the systems, from which lessons can be drawn for the improvement of the system as well as other monitoring and management systems in the region.*

Strengths

- EMIS based on the Annual School Census is currently the central EMIS vehicle of the Department. providing an annual snapshot of students, teachers and schools at provincial and district levels. It has been strengthened in recent years by: having IMU verify and collect data from schools using a mobile app, improving data accuracy and timeliness of release; and extension of coverage of EMIS to private schools.
- The Independent Monitoring Unit was introduced in 2014. IMU has over 500 Monitors, who visit all public schools each month to take teacher and student attendance and verify the status of: boundary walls, water, toilettes, and electricity. IMU has an online publicly accessible dashboard, that is updated in real-time, displaying results of monitoring at national and district levels.
- EMIS is a dynamic system evolving on many fronts, including IMU Monitoring, use of biometrics for teacher attendance in Higher Secondary Schools, development of an SMIS and its roll-out to Higher Secondary Schools, program-specific MISs, a Census of Out of School Children, and an assessment of literacy and numeracy learning outcomes of Grade 2 students.

Limitations

- The development of the different EMIS modules it is not being done in integrated way. There is a need for an overall vision, architecture, and design of an Integrated EMIS in which SMIS will be the central vehicle, and a road map of how existing modules will fit into the Integrated EMIS, and what further modules are required.
- SMIS has been developed to date without considering its role as a central vehicle in a future Integrated EMIS. As such the existing SMIS lacks a number of features that will be needed,

[7] Objectives v. and vi. are considered under lessons learned and recommendations respectively.

such as a dissemination capacity, and mechanisms for linkage with other modules of IEMIS. The work needed on architecture and design of the IEMIS, needs to address the best approach to incorporate these functions, whether via enhancing the existing SMIS or a complete redevelopment of SMIS.

> Review Objective ii. *To determine the requirements and constraints of the systems for scale-up and wider use, especially at the lowest level admin and school levels, and in contexts with limited ICT infrastructure.*

SMIS, and the Biometric Attendance System (BAS) for teachers have both been implemented for Higher Secondary Schools, which already had computers, electricity, and in most cases internet connectivity. Upgrades included solar/ and or battery backup to allow for continuous use of the biometrics during periods of power outages.

Plans are to scale up both systems to other levels of education. For each level, an analysis is needed of IT and infrastructure procurements and upgrades to meet the requirements of the systems. The systems will need internet connectivity, grid electricity and back-up. Hardware requirements include biometric devices for BAS and tablets for SMIS.

It is recommended to pilot BAS for student attendance. Potential benefits are substantial. It would yield daily attendance per student, while minimizing the time spent by teachers in taking and capturing attendance. Also, it would free up IMU from monitoring of attendance, to concentrate on other data collection and monitoring activities, for which there is already a great demand. Taking student attendance would require multiple biometric devices per school (likely one device per 150-200 students).

> Review Objective iii. *To determine the key technical aspects required (existing and yet to be developed) for the successful implementation of the system and more broadly – extrapolating from the evaluation findings – for other monitoring and management systems.*

It is recommended that an EMIS Steering Committee comprising senior ESED leadership to be established:

- To oversee and guide the IEMIS development process, including development and approval of a road map for moving from the existing EMIS environment to the future IEMIS, and providing overall direction to its implementation, including commissioning studies and taking decisions with respect to recommendations of the studies on:
  - A needs analysis to examine data needed to satisfy policy and operational requirements at all levels of the education system, and to identify data gaps where current MISs are not providing the required data. Policy requirements include the data needed for monitoring ESP 2020, the Tribal Strategy, Sustainability Development Goals, as well as requirements and potential opportunities for interoperability with Information Systems of other Government departments.
  - Design of the system architecture for an Integrated EMIS to meet the needs. The systems architecture will feature SMIS as a central vehicle or backbone to the Integrated EMIS and will identify other modules required (existing or new), and how they will be linked to SMIS.
  - Whether ESED should adopt a Unique Student Identifier. As SMIS and other EMIS modules are increasingly based on individual student data, use of a Unique Student Identifier will greatly facilitate linkages between SMIS and other modules, and will facilitate tracking of students over time and across levels of education.

  - Development of a road map for development and implementation of the Integrated EMIS. The road map will define the steps and activities to be undertaken, starting from the current status of EMIS to arrive at the goal of the Integrated EMIS.
- To engage an Implementation Partner with expertise and experience in large scale EMIS development projects to work closely with ESED throughout all phases of the needs analysis, architecture and design of the Integrated EMIS, and the preparation and implementation of the Roadmap, through support of International Development Partners.
- To ensure efficient and effective functioning of existing MISs that comprise the existing EMIS environment:
  - by ensuring information needs and objectives of each MIS are being met via dialogue between data users and data producers to identify data collection and data analysis priorities;
  - by ensuring roles and responsibilities of EMIS unit and IMU are clearly defined in relation to each MIS
  - by commissioning comprehensive reviews of individuals MISs, including SMIS, LITNUM, OOSC Census, and taking decisions with respect to recommendations of the reviews.

> Review Objective iv. *To determine the key institutional, technological, financial and socio-cultural aspects which have positively or negatively shaped the use and impact of the two systems.*

ESED leadership recognizes the need to strengthen the analysis and use of EMIS data at all levels of the education system. This involves technical aspects to increase access to data, and socio-cultural aspects to build capacity in analysis and use of data creating a culture of data use.

Technical

- **Strengthen the Annual Statistical Report**, by: increasing its analytical content; reducing the volume of raw data; inclusion of key indicators currently missing such as Student Teacher Ratio, and Adjusted Net Enrolment Rate; including analysis of trends over time; introducing a complementary website containing data tables currently in the Report for download in Excel or other formats that will enable users carry out their own analysis of the data.
- **Develop and implement an online data dissemination system**, enabling users to retrieve standard indicator or data tables, as well as to query the EMIS data base to generate customized retrievals. To date, users wanting customized data had to request the EMIS cell to generate it for them, which has limited the access to and use of the data.
- **Development of a school report card**, containing key school level data from EMIS and teacher and student attendance data from IMU, to be provided to schools in print form, as well as being available online.

Socio-cultural

- **Building Skills in Data Analysis and use of data for Evidence based Decision Making across ESED.** The need to build skills within ESED for data analysis and use of data for evidence-based decision making was identified as an important and urgent issue by all ESED leadership.

  A capacity development programme is needed to build the needed skills in data analysis and use of data. The capacity building is needed at all levels within the department – provincial, district, and school levels, geared to the needs at each level. It is recommended that the EMIS unit be the focal point for this capacity-building programme. A first order will be to build-up these skills within the EMIS unit itself. It is recommended a statistician position be created

within the EMIS unit, whose responsibility will be to build these skills within the EMIS unit. Consideration can be given to staffing it via secondment from the KP Bureau of Statistics. Once its skills in data analysis and data use are built, the EMIS unit will become the focal point to build these skills across the department. The EMIS unit would also be responsible for carrying out baseline analysis of EMIS data each year, according to priority theme and issues identified in the ESP and other key departmental documents. In this way the EMIS unit will not just be producing data, but information based on analysis of the data, in a format ready for use by decision makers.

- The skills needed across the rest of the department will be less on detailed techniques of data analysis, rather covering basic descriptive data analyses. More focus will be on the use of data for decision making, include the definition, use and interpretation of data and indicators. Efforts at the province level need to be focused use of data in carrying out provincial roles of policy development, monitoring and evaluation of system performance, budget preparation and planning. Likewise, efforts at the district level will to focus on use of data in carrying out district responsibilities, such as monitoring teacher and student attendance, and school improvement plans. Capacity building at school and local level will be in use of the School Report Card and in use of the SMIS. It will include training of headteachers and EMIS focal points on multiple occasions as different modules of SMIS are introduced. Headteachers will in turn build capacity of SMC members and PTCs. Training will include use of SMIS to prevent dropouts, use in preparation of school improvement plans, etc.

> Review Objective v. *To evaluate the impact of the system's use on school efficiency, by reviewing progress made in terms of teacher and student attendance, student survival rates and drop-outs, or any other relevant progress which could be attributed to the system's use*

The Independent Monitoring Unit system for collection, dissemination and use of monthly data from all public schools on teacher and student attendance, and school facilities has led to the following improvements in school efficiency:

- When the IMU was initiated in 2014, it discovered a number of schools with no teachers, leading to staffing the schools.
- The teacher and student attendance rates feed into cross sectoral district performance indicators. The District Education Group meets monthly to review the data, and take decisions are taken, for example including salary deductions and dismissal of chronically absent teachers. As a result, teacher absenteeism has dropped to 13% in 2019, from 19% in 2014. Over the same period, student absenteeism fell to 22% from 26%.
- One of the 10 policy goals of the ESP 2015 was to equip schools with the following functional facilities: boundary wall, water, toilets, and electricity. IMU reports on these on a monthly basis for every school. The use of the IMU data to monitor and follow-up has been important in the progress made towards meeting these goals, which have been met or are close to being met in most cases.

Lessons Learned for Application to Other Environments in South Asia

> Review Objective vi. *To capture in the evaluation report all these lessons learned, covering technical, institutional, financial and socio-cultural dimensions, which would enable development partners to better support the development and effective use of existing and emerging education monitoring and management systems in South Asia.*

The approach in the current review has been on examining the current status of EMIS production and use, at each level of the education system, and on making recommendations for strengthening the overall system and each of its modules. Lessons learned – what has worked, what has not worked, and ways of strengthening going forward - are implicit in this approach, and as such are appear throughout the current report. While most lessons learned relate to Khyber Pakhtunkhwa, hopefully they can also be informative to other jurisdictions wanting to strengthen EMIS.

Below specific instances of lessons learned are considered where experiences to date suggest different approaches to EMIS strengthening would be beneficial:

Simplify Implementation of SMIS tied directly to Uses at the school level

Implementation of SMIS is a major undertaking. The SMIS will be the central component of the Integrated EMIS going forward. The initial implementation of SMIS for Higher Secondary Schools has been problematic.

A second phase of implementation is needed incorporating the following ingredients for success that were missing in the initial implementation: starting with a simplified version of the system tied directly to uses at the school level; sufficient initial training, follow-up support and further training by District offices; and strong support of senior most Departmental leadership. Comparison of SMIS experiences with those of the Girls Stipend MIS, provides a lessons learned opportunity. The GSM is simple system that has been successfully implemented. It collects individual student data for all students enrolled in Girls Middle Schools, attendance data on each student, and is used for awarding and distributing grants to qualifying students. Implementation of the Girls Stipend MIS had all the ingredients for success that SMIS implementation lacked – it was simple, and directly tied to a use that was made easier by use of the system, and its use – the payment of stipends to female students - was highly important to the students and also to headteachers. In contrast, in the SMIS implementation, schools captured the individual student data, but no uses were made of this data at the school level. It is a complex system with numerous modules, and all modules of the system were introduced at once, overwhelming those being trained.

Drawing on these lessons learned, a simplified implementation of SMIS can start with modules for individual student data, and development of methodologies for capture of individual student attendance daily. The system introduced should include a dropout prevention module for use by schools. The module automatically sends parents an SMS in the case of unexcused student absences, with escalation to follow-up via a phone call from the principal, student and parent

counselling with increasing instances of absenteeism. The Maldives EMIS[8] gives an example of such an “early warning system (EWS)” for dropouts.

IDP Technical Assistance in Overall Support of EMIS Strengthening

Design, development, implementation and use of EMIS is a complex undertaking, especially an Integrated EMIS designed to meet the information and management needs of ESED at all levels – provincial, district and school level. It is difficult for any organization to possess all the skills internally to accomplish all aspects of this. Khyber Pakhtunkhwa has had Technical Assistance from the DFID education project in strengthening of its EMIS, and previously from GTZ. With the DFID Education Project drawing to a close, further IDP support for EMIS strengthening will be needed going forward.

Partnership with Khyber Pakhtunkhwa Bureau of Statistics

KPBOS has expertise in survey design, collection, compilation, analysis and dissemination. There are a number of ways in which a partnership with KPBOS would be beneficial to ESED:

- In the 2017 OOSC census, ESED carried out the census without the involvement of KPBOS. There appear to have been issues with the methodology, interviewer selection and training that may have resulted in problems with the data collected. Consistent with its mandate and expertise, KPBOS could carry out any future OOSC Census, with ESED as a client.
- KPBOS would gain a better understanding of the information needs of ESED and be positioned to identify existing data from the Census of Population and from Household surveys such as MICS to address some of these needs. Further, the partnership would position KPBOS to improve education content of future survey and census instruments. For example, a question added to the Census of Population on school attendance using standardized international best-practice methodology developed by MICS[9],could potentially replace the need for a separate OOSC Census in the future.
- KPBOS has expressed openness to the secondment of a statistician with expertise in survey design and data analysis to work in the EMIS cell of ESED. Having a statistician in the EMIS cell will help to apply statistical design mentality to the development of MIS and will help in the building of data analysis skills in initially in the EMIS cell, and then more broadly to senior leadership of ESED.

Partnerships in Use of GIS

Development and use of GIS requires highly specialized expertise, yet the requirement for GIS exists across a number of sectors, Education, Health, and others. This makes GIS ideal for parentships. Existing and potential partnerships and benefits are as follows:

- In Khyber Pakhtunkhwa, an integrated GIS system is being developed by the Planning Department as a GIS hub for all departments. Line departments such as Education and Health provide the GPS coordinates for different layers of the system and are also end users of the system. An important use of GIS in education is to find locations underserved by existing schools, to help in locating new schools. Currently political criteria currently feature

[8] Interventions on student absence and out of school children in Maldives, Internal Presentation, Maldives Ministry of Education.

[9] Bureau of Statistics Khyber Pakhtunkhwa; Planning & Development Department, Government of the Khyber Pakhtunkhwa and UNICEF Pakistan; Multiple Indicator Cluster Survey, Khyber Pakhtunkhwa, 2016-17; Final Report; KP-MICS; Peshawar Pakistan

prominently in these decisions, at times to the detriment of system efficiency and equity. To demonstrate the power of GIS tools and to promote greater use of objective criteria, a GIS analysis of the efficiency of the current distribution of schools could be undertaken.

- GIS efforts underway in a number of other provinces, so there is potential for coordination, and potentially a uniform GIS system, for use by provinces and districts, while also facilitating roll-ups to a national level. AEPAM and FME could potentially take this up with ministries at the Federal level, if it is not already being looked into. Any considerations towards a national/provincial cross sectoral GIS, could also examine use of open source platforms. GIS has excellent open source libraries, which can avoid expensive license fees. UNICEF ROSA is developing an open source GIS platform[10] which can be freely used by government, building on multiple open source libraries.

Recommendations on EMIS Improvement and Strengthening at Province Level

Strengthening EMIS Usage, usefulness and impact

Department- wide strengthening of capacity in data analysis and use of data for decision making is needed at the province, district, school and local levels. This has been discussed under Conclusions for Review Objective ii.

Road Map for development and implementation of IEMIS

ESED needs a vision, architecture and design for an Integrated EMIS, and a road map identifying steps and activities needed to move from the current EMIS to the desired IEMIS. The managerial structures and measures required for this have been described in Conclusions for review objective iii.

The current situation is a departmental EMIS, whose central vehicle is EMIS based on the Annual School Census, which yields annual, mostly aggregate data. There are a number of programme specific MISs, developed in a “silo” or stand-alone fashion. An SMIS system has been developed, but to date, efforts to implement it in higher secondary schools have been problematic and will need to be strengthened in a number of respects. Central to the IEMIS will be an SMIS containing a database of individual student data with equity variables, including gender, disability, and others, that will be accessed and used by other system modules. For example, a provincial examinations module (yet to be developed) will access the student list from SMIS and use it to obtain student identifiers need for registration and for student verification when appearing for exams. The linkage of the two systems at an individual student level will permit analysis of examination results by the equity dimensions contained in SMIS. At present, while the need for the IEMIS is recognized, there is no comprehensive plan or road map on how to get there from where things stand at present. It is important to start with a vision of IEMIS and proceed to a high-level design and architecture of IEMIS. The Road Map will be a plan for development of individual components, and how and when to integrate the standalone MISs with SMIS. In the past, ESED has benefitted from expert TA support in development of EMIS. The preparation of overall system design and

[10] Development of an Open Source GIS platform, Internal Report, UNICEF ROSA, 2019

architecture, and preparation and implementation of the Road Map, are major undertakings that would similarly benefit from expert TA under future IDP support programmes.

Strengthening Existing EMIS Modules

MIS systems already in place or being developed and that will be part of a future IEMIS, were examined and recommendations made on how each of them could be strengthened, as summarized below.

ASC-based EMIS

The ASC-based EMIS is still the central EMIS vehicle of ESED. The data being collected correspond to international best practices for an EMIS. Since 2017 when the IMU took responsibility for data collection using mobile devices, the quality and timeliness EMIS data has improved. ASC-based EMIS can be further strengthened in the following ways:

As per Conclusions for Review Objective iv:

Strengthen the Annual Statistical Report.

Develop a Data-dissemination System.

Develop a School Report Card.

Additionally:

Historical Revision of EMIS Indicators using School-aged Population in the denominator.

The problem of inaccurate population projections, and how to deal with this issue was one of the core policy areas of ESP 2015. Once detailed age data are available from the 2017 Census of Population, estimates of the school aged population for the period 1998 to 2017 can be revised by the Khyber Pakhtunkhwa Bureau of Statistics, anchored at both ends by Census data, and used for historical revision of EMIS indicators such as Net and Gross Enrolment Rates, and EMIS-based indicators of OOSC, for the period 1998 to 2016. Also, revisions of EMIS indicators can be carried out for 2017-18 and 2018-19, using population projections based on the 2017 Census. The revisions will prevent big breaks in time series at the point at which 2017 Census based population estimates are introduced. Without the revisions, the breaks would make analysis and interpenetration of trends in these key indicators problematic.

School Management Information System (SMIS)

SMIS will be the core or “back-bone” of the future IEMIS. Its development and implementation to date in Higher secondary schools was problematic in a number of respects, as discussed below.

Further analysis is needed on the path forward for SMIS. In particular, in terms of the issues related to the functionality of the SMIS, there is a fundamental question of what is the best route to follow: (i) making the changes to the existing SMIS, or (ii) redeveloping SMIS from scratch taking into account from the outset a full analysis of requirements of SMIS and requirements for integration needed with other modules. This further analysis should be undertaken as part of the development of the Road Map for IEMIS.

Issues with implementation to date included: First, implementation was not tied to any direct use of the system at the school level. Second, the attempt to introduce all modules of the complex system at once was overwhelming, rather efforts should have concentrated initially on a few key modules. Third, as a backbone of the future IEMIS, there will be a need for integration of modules and data at an individual student level. Fourth, the SMIS system did not have a dissemination module capable of generating the indicators required at school, district and province levels.

To address these issues, the following is recommended:

Issues related to functionality of SMIS system

- **Develop a Dropout Prevention Module** featuring monitoring of student attendance daily, distinguishing approved from unapproved absences, automatic generation of SMS message to the parent on cases of unauthorized absence, and escalation to other means of personal follow-up for repeated absences. Such Modules have had success in reducing dropout in other countries, thus reducing one of the principal causes of OOSC. The Maldives EMIS provides an example of such an "early warning system (EWS)" for dropouts.[11]
- **Develop a Dissemination Module for SMIS.** This module will generate all the indicators and summary data needed at all levels - at school, district and Provincial level. It can be specific to SMIS, or an overall dissemination system for all modules of the future IEMIS.
- **Incorporation of Unique Student Identifier, and its use in SMIS and other IEMIS modules containing Student level data.** This pending an ESED decision on Adoption of a Unique Student Identifier A unique student identifier will greatly facilitate the integration of different student-level modules.
- **Develop a strategy for Linkage between SMIS and other MISs.** The MIS should be the source of individual student and teacher data, that would be accessed by all other MISs using individual student or teacher data. A systems design is needed for what student and teacher data is contained within SMIS, and additional student variables are contained in other systems, and how these are linked.

Operational Issues related to how the SMIS is rolled out and training needs

- **Re-launch SMIS in Higher Secondary schools.** Once the Dissemination and Dropout Prevention modules have been developed, SMIS should be re-launched in Higher Secondary Schools, with the re-launch including the following: high level support from ESED leadership; uses of the system focusing initially on capture of individual student data, capture of daily attendance, the dropout prevention module; the report generation module and use of SMIS for production and reporting of indicators at school, district and provincial levels, including equity indicators required under SDG 4; a revamped training programme supporting these uses; introduction of broader functionality of the system when the above functions have been successfully implemented.
- **Sequential roll-out to other levels of education**, once SMIS has been successfully implemented for Higher Secondary.

[11] Interventions on student absence and out of school children in Maldives, Internal Presentation, Maldives Ministry of Education.

Independent Monitoring Unit

Continuous improvement of monitoring is part of IMU's mandate. IMU can undertake a needs analysis on priorities of senior leadership for monitoring of schools now and in the future, as a basis for improving and optimizing the monitoring in the future. The monitoring of schools should be a dynamic process, evolving as needs and circumstances change.

Strengthening of the IMU online dashboard by extending it to include teacher and student attendance and facilities data at a school level; allowing for display of results disaggregated by level of education, and by boys' versus girls' schools.

Biometric Attendance System

Use of biometric devices has been successfully introduced for teacher attendance in Higher Secondary Schools. Biometrics should be extended sequentially for Teacher attendance at other levels. Extension should begin with small scale pilots for each level in order to identify and solve problems unique to each level relating to availability of electricity, internet, etc., before full scale implementation. Additionally, use of Biometrics for student attendance would be very beneficial, and should be piloted.

Directorate of Elementary and Secondary Education

Development of a District EMIS Module. DESE is responsible for the delivery of Elementary and Secondary Education, based on the standards and curriculum developed by the Secretariat and DCTE. Within future Integrated EMIS centred around the SMIS, there is a need for district module, accessing the SMIS data but having different views and options relevant to district needs, including tracking school visits, observation of teachers and recommendations, management of budgets and SIPs, etc.

Creation of an EMIS Focal-point posts, Centrally and in DEOs. Actions to seek approval and staffing of an EMIS focal point posts within DESE at central and District levels should also be undertaken.

Directorate of Curriculum and Teacher Education

Development of a DCTE EMIS module to manage teacher assessment activities, which include the Teacher Competency Survey examining management of the classroom, and the Teacher Content Survey examining teacher of subject matter knowledge, both carried out in a 5-10 % sample of schools annually. Data are collected using an app developed by IMU, but thereafter all processing and analysis within DCTE is currently done manually.

Development of a unified MIS for School board examinations linked to SMIS. Currently, school boards develop their own examinations for grades 9 to 12 examinations, even though the curriculum is the same for the whole province. It is recommended a uniform system be developed with linkages to SMIS allowing for: registration of students by schools, using the SMIS master student lists; verification of students at check-in for examinations, using student identifiers from the SMIS such as photos, registration number, and unique student numbers; check-in using biometrics, once Biometric Attendance System has been introduced for taking school attendance; linkage of results by individual student to SMIS, permitting analysis and reporting of results by the equity dimensions included in SMIS.

Recommendations on EMIS Improvement and Strengthening at School and Local Levels

Development of Data and Information Products for Use at School and Local Level

A current weakness of EMIS is the lack of information products generated and available to schools and local levels for use in planning or managing operations. The following are needed:

- School Report Card from EMIS based on the Annual School Census (already planned for)
- Monthly School Attendance report from IMU
- Report on results of classroom observation from District EMIS module (as this module is developed)
- LitNum - feedback on results and how use and interpret it (to be developed)
- School level reports that can be generates on demand via SMIS (to be developed)

Capacity building in EMIS Modules and in Use of EMIS Data at School and Local Level

As the above system modules and products are rolled-out to schools, they need to be accompanied by a capacity building programme. Training will focus the dual role of headteachers and schools as **data collectors** - use the various modules to collect data, and as **data users** - the interpretation and use of the data and information products to manage school operations, and for planning purposes.

Recommendations concerning further work which may result from this review

Review to inform strengthening of LitNum

LitNum, launched in October 2019, is an assessment of literacy and numeracy learning achievement to be conducted at multiple points during the school year on a sample of Grade 2 students. IMU monitors administer the assessment to a sample of nine Grade 2 students in every public school each time the assessment is conducted.

It is recommended to conduct a review, supported by TA expertise in assessments, with a view to identification of improvements that can be implemented to strengthen the vehicle when the opportunity arises to do so. The review should include: examination of the purpose of LitNum; what data is needed at different levels – province, district, school; how to design LitNum in a cost-effective manner to meet these data requirements; the methodology for sampling of students; pros and cons of using LitNum as a performance indicator; and how LitNum can be used to monitor and analyse equity gaps in learning outcomes; how LitNum can be used to analyse and identify factors influencing learning and barriers to learning; and how and by whom these findings can be translated into measures to improve teaching practices and learning conditions in schools.

Review of Measures for Collection, Analysis and Use of Data on Out of School Children

An Out of School Children Census was carried out by ESED in 2017. There has been some debate about the resulting estimates of OOSC, which were lower than figures from household surveys such as MICS. ESED carried out the survey without Involvement of the Khyber Pakhtunkhwa Bureau of Statistics who have both a mandate and expertise in the conduct of such surveys. The observed discrepancies may be attributable to methodological issues in data collection.

It is recommended to conduct a review that will have as an objective to define a strategy for collection and use of data on OOSC. The review will examine: what data is needed on OOSC at provincial, district and local levels; what are existing or potential data sources; what actions will be undertaken based on the data and does ESED have the capacity to undertake these actions; should another OOSC should be conducted in 2020, and if so what improvements and changes should be made, or whether a sample survey or another course of action is recommended. The review can also examine incorporation of EMIS-based indicators of OOSC into the set of indicators produced by EMIS and included in the Annual Statistical Report.

Recommendations concerning role of UNICEF in supporting EMIS

> **Review Objective vii.** *To determine UNICEF's relative strengths and weaknesses in supporting Governments in the design, development and adoption and use of such systems, and thus to outline on which aspects UNICEF is well positioned to lead, and on which others UNICEF is not yet where it needs to be.*

This Review has taken stock of the current state of EMIS in Khyber Pakhtunkhwa and what is needed to strengthen it. UNICEF should be proactive in working with ESED and Education IDPs to ensure that the review is used as a starting point for preparation of an action plan and EMIS roadmap as described in the report.

UNICEF can also consider extending reviews such as the current one to other jurisdictions. For a relatively small investment in resources and time, such studies can help identify both short term improvements as well as help to identify longer term efforts needed to strengthen EMIS, and to increase awareness among Education Ministries, and well as IDPs supporting education.

UNICEF can also consider means of disseminating and making available findings of such reviews to other countries and states/provinces responsible for EMIS, within the ROSA region and beyond. Lessons learned and best practices from such studies can be of help to others planning and undertaking programmes of EMIS strengthening.

UNICEF possesses good expertise at regional, national and sub-national levels in EMIS and can continue to play an important convening role in getting key stakeholders and experts together, technical and strategic advice with a focus on equity, bringing in best practices from other provinces and countries. Drawing on its management and technical expertise in EMIS, UNICEF can play a management role in EMIS Strengthening Projects funded by IDPs to procure and

manage an implementing partner to carry out the EMIS development as it has done on a number of occasions.[12,13]

UNICEF plays an important role at national and global levels in supporting member states to collect, analyse and report on child-related SDG indicators, for which UNICEF has been identified as custodian, co-custodian, or supporting agency for the purposes of global reporting. In this role, UNICEF supports countries and provinces/states to identify existing or potential data sources to produce SDG indicators, and strategies for developing the required data, such as embedding the collection of equity variables into EMIS and SMIS, and for augmenting traditional EMIS with data from other sources, such as Household Surveys and Population Censuses. This is a crucial role for UNICEF to play both in Khyber Pakhtunkhwa and internationally, now and in the future, providing a crucial input into EMIS strengthening efforts.

Recommendations relating to the Review methodology

Ensure adequate time and resources for a full review. EMISs are becoming increasingly complex and now include consideration for School based systems, Student Tracking, Human Resource Development, Financial Management and greater interoperability with other government systems. A comprehensive review can help form a wholistic picture of how such EMISs have been developed and function to serve all areas of the education system, but such systems also require substantial resources to review and evaluate effectively.

Need to revise the methodologies for the review and evaluation of EMIS. As EMIS evolves to become increasingly complex, often being comprised of multiple operational systems and sometimes involving a large number of stakeholders spread across different agencies, there is a need to regularly revise and add to tools such as SABER[14] and DQAF[15] for review and evaluation of EMIS. The Framework for Monitoring Out of School Children and Children at Risk of Dropping Out[16] presents an extension of EMIS standards considering the need for data on Out of School Children. The need for EMIS to respond to SDG monitoring requirements, especially SDG 4 on education, the methodologies being developed by UIS for SDG 4 indicators, and efforts by UNICEF to support countries in adaptation of EMIS systems and other means of production of these indicators, represent a further example of new and emerging standards for EMIS. The approach to this review complemented SABER, and DQAF methodologies. The evaluation questions developed by UNICEF ROSA are organized into several dimensions based on the above-mentioned UNICEF and UIS framework grouped under ‘technical’ and ‘use and impact’. They are focused on design and use of EMIS at school and local levels, and on identifying factors in the EMIS leading to improve school access, equity and quality. Further development of the methodology used in this review may prove a useful complement to enhance existing methodologies such as DQAF and SABER.

[12] UNICEF Annual Report 2015 Sierra Leone, p. 32.

[13] UNICEF Annual Report 2013 South Sudan, p. 20.

[14] Abdul-Hamid, Husein. 2014. What Matters Most for Education Management Information Systems - A Framework Paper. World Bank. http://saber.worldbank.org/index.cfm?indx=8&pd=2&sub=0

[15] World Bank and UNESCO Institute for Statistics. 2003. A Framework for Assessing the Quality of Education Statistics. http://dqaf.uis.unesco.org/images/a/a8/DQAF_Education_2004.pdf.

[16] UNICEF & UIS (2016). Framework for Monitoring Out of School Children and Children at Risk of Dropping Out, Geneva: UNICEF. https://www.unicef.org/eca/reports/monitoring-education-participation

1 Background and Context

1.1 Background

This section covers the importance of monitoring and management systems, their evolution and recent international developments as well as trends in South Asia, and the diverse contexts of South Asia where these systems are being implemented.

In South Asia there are a total of 10.3 million out-of-school children of primary school age and 18.2 million children of lower-secondary school age who do not attend school and are thus deprived of their right to education.

In the recent past, considerable funding and efforts have gone into improving national education monitoring systems, specifically education management information systems or EMIS. However, these efforts have largely focused on improving the development of the EMIS at national level, and not its use or usefulness at sub-national and school levels. This is problematic, because it is at sub-national and school levels where information collected on children at risk of dropping out can actually be put to use, and where equity gaps (such as inequities in school resources and availability of qualified teachers) can be addressed.

In addition, many countries are devolving more and more decision power to the sub-national administration levels and grant more and more autonomy to schools themselves (such as in Nepal and Pakistan). This reinforces the need for efficient information management systems that should be user-friendly enough in their design to encourage and facilitate their use for local-level management, while minimising requirements for capacity development and placing unreasonable expectations of ICT and data expertise on local level stakeholders.

There have been several notable developments in South Asia regarding the development and implementation of education monitoring and management systems by governments used at sub-national/local and school levels, some of them with significant support and/or funding from UNICEF.

The overall purpose of these systems is to improve education management, monitoring and planning at national, sub-national and school levels, and subsequently improve efficiency, quality and equity

1.2 EMIS in the Global Context

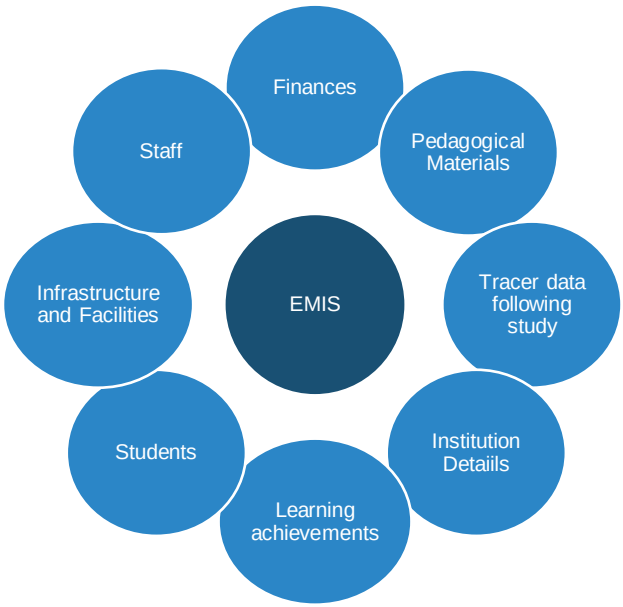
EMIS can be defined as the ensemble of operational systems and processes, increasingly supported by digital technology, that enable the collection, aggregation, analysis, and use of data and information in education, including for management and administration, planning, policy formulation, and monitoring and evaluation. This definition insists on the systemic nature of EMIS — a fact which is often overlooked in efforts to reinforce government information systems.[17]

A comprehensive EMIS is defined as not only including administrative and pupil data, but also financial, human resources, and learning data, as well as data on graduates and non-graduates after completion of study. This information should be available both at the individual and aggregate level, and should be used for policy analysis and formulation, planning, monitoring and

[17] UNESCO. 2018. “Working Papers on Education Policy Reorienting Education Management Information Systems (EMIS) towards inclusive and equitable quality education and lifelong learning (Working Paper 5).”

management at all levels of an education system.[18] An EMIS is a system of people, technology, models, methods, processes, procedures, rules and regulations that function together to provide education leaders, decision-makers and managers at all levels with a comprehensive, integrated set of relevant, reliable, unambiguous and timely data and information to support them in completion of their responsibilities.[19]

Figure 1.1: Elements of an EMIS covering all subsectors of the education sector



The type of data entered into the system needs to follow a clear logic and a defined methodology and have a well-defined purpose. A successful EMIS is credible, operational in planning and policy dialogue, as well as in teaching and learning. It produces and monitors education statistics within an education system and has a multifaceted structure, comprising the technological and institutional arrangements for collecting, processing and disseminating data.[20] It is crucial for tracking changes, ensuring data quality and timely reporting of information, and facilitating the utilization of information in decision-making.

An MIS is designed to assist managerial and professional workers by processing and disseminating vast amounts of information to managers organization wide.[21] An MIS provides information for management activities carried out within an organization. The information is selected and presented in a form suitable for managerial decision-making and for the planning and monitoring of the organization's activities. An MIS in the education sector (i.e. an EMIS) can be used to support education managers to make strategic, tactical and operational decisions.

EMIS can help provide accurate, comprehensive and timely data collection, which can promote more rational and effective education policy making. This can result in improved decision-making regarding: the volume and allocation of public financing, the best way to reach children most in

[18] Abdul-Hamid, Husein. 2014. What Matters Most for Education Management Information Systems - A Framework Paper. World Bank. http://saber.worldbank.org/index.cfm?indx=8&pd=2&sub=0

[19] UNESCO. 2008. "Education for All by 2015: will we make it? EFA global monitoring report."

[20] Abdul-Hamid, Husein. 2014. What Matters Most for Education Management Information Systems - A Framework Paper. World Bank. http://saber.worldbank.org/index.cfm?indx=8&pd=2&sub=0

[21] Alavi, M., and Leidner, D. 1999. "Knowledge management systems: Issues, challenges, and benefits" Communications of the Association for Information Systems, 1(7).

need (due to socioeconomic circumstances, special needs, etc.), staff recruitment and training, and quality and adherence to standards.[22]

1.3 The Sustainable Development Agenda and the expanded vision of EMIS[23]

The post-2015 Sustainable Development Agenda marks a substantial shift from the preceding Millennium Development Era. This is also true for the overall education agenda. The main focus for the education sector under the Millennium Development Goals was on ensuring access, participation and completion of primary education, as well as achieving gender parity in primary, secondary and higher education.[24] In contrast to this, the three main focus areas for the education sector under the SDGs are the measurement of learning outcomes, improved measurement of equity in education, and a focus on lifelong and alternative means of learning.[25] The explicit focus on **equity in education** implies that, in addition to reporting national averages, the selected education indicators should also be reported across different sections of the population, such as by wealth, religion, gender, ethnicity and disability status, amongst others.[26] EMIS should be sufficiently dynamic to enable the monitoring of groups that are often overlooked in administrative systems, such as street children, refugees, stateless children and children of migrant workers.

The indicators measuring progress towards the education goals specified in the SDGs are reported at four different levels[27]: global, thematic, regional and national. Given the priorities stated in the SDGs, as well as the multiple levels of monitoring and evaluation, it is necessary to invest in better data and monitoring and evaluation systems. Currently, there are two main issues with data. Firstly, there is not enough high-quality data available, and, secondly, much of the data that are produced are either not used or are not in a format/state that allows the data to be used.[28]

Many countries are adopting the 'expanded vision of education', which incorporates the vision encapsulated in SDG 4: 'Quality education and lifelong learning opportunities for all are central to ensuring a full and productive life to all individuals and to the realization of sustainable development.[29] It is therefore important that EMIS manage information on all subsectors of education, ranging from early childhood education, to vocational education and nonformal education. Detailed information should be accessible in order to enable predictions concerning the potential workforce, and to ensure that all people have access to education at any age. This places an increasing requirement on EMIS to be able to track an individual's progress through the whole education system and emphasizes the need for systems to be able to report on data

[22] Ishimine K., Tayler C., Bennett J. 2010. "Quality and Early Childhood Education and Care: A Policy Initiative for the 21st Century" International Journal of Child Care and Education Policy, Volume 4, Issue 2, pp. 67–80

[23] This section draws on information contained in the following report in publication: Shoobridge, Jim. 2019. "The Role of Education Management Information Systems in Supporting Progress towards SDG 4: Recent Trends and International Experiences." UNESCO, Global Partnership for Education.

[24] UIS. "Laying the Foundation to Measure Sustainable Development Goal 4." UIS Sustainable Development Data Digest.

[25] Such as non-formal education and TVET.

[26] UIS. 2016. "Country readiness to monitor SDG 4 education targets: Regional survey for the Asia and Pacific region."

[27] Leadership Council of the Sustainable Development Solutions Network. 2015. "Indicators and a Monitoring Framework for the Sustainable Development Goals: Launching a data revolution for the SDGs (Revised working draft (no. 6)."

[28] United Nations Secretary-General's Independent Expert Group on Monitoring SDGs. 2014. "Report on data gaps – A world that counts: mobilising the data revolution for sustainable development" retrieved from http://www.undatar.

[29] United Nations Statistics Division. n.d. Sustainable Development Goal Indicators Website, Goal 4. https://unstats.un.org/sdgs/report/2017/goal-04/.

longitudinally. The resulting design of EMIS is likely to be more complex and more integrated in terms of subsector data.

The drive to achieve global targets and participate in education in global initiatives such as the International Standard Classification of Education (ISCED) and SDG 4 has influenced both the structure of education plans, the use of key concepts and targets, and the goals by which a plan is measured. Global goals and targets help illustrate how far from a global target a country is, and national standards provide a frame of reference for progress at the country level. This places increasing requirements on EMIS to be developed to respond to local planning, budgeting, monitoring, evaluation and administrative needs, whilst at the same time conforming to international standards so as to enable comparison of data obtained through the EMIS with other regions and countries through globally recognized education indicators. EMIS should conform with international standards for data and education indicators, such as internationally recognized definitions of indicators of indicators[30], the education data standards of ISCED[31] and the requirement to monitor core SDG 4 indicators.

Emerging evidence shows that large numbers of children are in school, but are not learning, despite considerable investment in school infrastructure, training teachers, and learning materials.[32] SDG 4 presents huge opportunities as regards meeting this challenge, through a strategic shift towards equitable quality education for all. This shift is essential. There has already been substantial work undertaken to determine how SDG 4 can be measured and which countries are prepared and able to effectively monitor against the indicators required as part of SDG 4.[33]

There is also greater recognition that a complex interplay of socioeconomic factors influences learning outcomes. These include but are not limited to: individual and family characteristics of students, such as gender, age, language spoken at home, preschool attendance, activities prior to attending school, engagement and out-of-school tuition, parental literacy and local governance, school management, community engagement and social accountability. In addition, the type of school, the location of the school and the resourcing available to the school that the student attends also contribute to child learning outcomes.[34] Also important to the broader scope of child learning is information concerning child nutrition, clean water and sanitation.[35]

The SDG agenda has also focused on the need to view social development holistically. For example, many countries are now starting to monitor early childhood development, which includes indicators derived from child protection, health, education, water, and sanitation and other sectors.[36] This emphasizes the need for a coordinated and rationalized approach to data, and emphasizes inter-sectorial coordination and cooperation. Schools can play a focal role in

[30] OECD. n.d. OECD Indicators database. http://www.oecd.org/education/database.htm.

[31] UIS. 2011. International Classification of Education, http://uis.unesco.org/en/topic/international-standard-classification-education-isced. ISCED belongs to the United Nations International Family of Economic and Social Classifications, which are applied in statistics worldwide with the purpose of assembling, compiling and analysing cross-nationally comparable data. ISCED is the reference classification for organizing education programmes and related qualifications by education levels and fields. ISCED is a product of international agreement and is adopted formally by the General Conference of UNESCO Member States.

[32] Australian Council for Education Research. 2016. “Improving Quality Education and Children’s Learning Outcomes and Effective Practices in the Eastern and Southern Africa Region Report.” UNICEF ESARO.

[33] UIS. 2016. “Country readiness to monitor SDG 4 education targets: Regional survey for the Asia and Pacific region.”

[34] Australian Council for Education Research. 2016. “Improving Quality Education and Children’s Learning Outcomes and Effective Practices in the Eastern and Southern Africa Region Report.” UNICEF ESARO.

[35] Grantham-McGregor S.M, Powell C.A, Walker S.P, Himes J.H. 1991. “Nutritional supplementation, psychosocial stimulation, and mental development of stunted children: the Jamaican Study.” Lancet., Jul 6;338(8758):1-5.

[36] Examples include Chile, Belize and Uganda. UNICEF has developed a framework of early childhood development indicators derived from SDG indicators and other research to help guide and focus countries on the monitoring of early childhood development.

supporting services for other ministries,[37] and can also report on key indicators relevant to other ministries.[38]

Therefore, in order to properly monitor child learning and address barriers preventing effective child learning, analysis of detailed information concerning the child and their family, the learning environment, as well as the national and regional socioeconomic factors, is required. According to the OECD, better data can help reduce inequity in education, including early childhood education, in multiple ways, including.[39]

- identifying and providing systematic help to children at risk of not achieving academic and social goals;
- directing resources to the schools, students and teachers with the greatest needs;
- setting concrete targets for more equity in education, not only in access but also in quality and learning outcomes.

These requirements are placing increasing demands on systems to track individual children as they progress through the education system. Systems should enable the disaggregation of data to allow for analysis of complex socioeconomic factors affecting a child's progress through the education system, or exclusion from it.

UIS recently reported the availability of global and thematic indicators across all countries reporting in the UIS database in 2017.[40] They noted that 10 of the 43 indicators were unavailable in all countries, while eight global indicators and 11 thematic indicators were reported in 50 percent or fewer countries. Only one global indicator and six other thematic indicators had more than 75 percent coverage. UIS concluded that countries are struggling to report and, in many cases, even to collect the data needed for calculating key indicators for the follow-up and review of SDG 4.

1.4 Changes in global education and the impact on EMIS

The recent years have seen an increased emphasis on delivering quality education to all. The past two decades have seen a growing interest in strengthening systems for the measurement of learning. International learning assessment instruments such as Trends in International Mathematics and Science Study (TIMSS) and Progress in International Reading Literacy Study (PIRLS),[41] the Programme for International Student Assessment (PISA),[42] have increasingly been adopted in developing countries, supplemented by the more recent Early Grade Reading Assessment (EGRA) and Early Grade Maths Assessment (EGMA),[43] or adapted to become part of a national assessment system. In addition, UNICEF has also developed a new learning module

[37] Examples include reporting deworming and vaccination programmes to the ministry of health and reporting incidents of violence against children to authorities monitoring child protection.

[38] For example, reporting the quality and source of water supplies in schools to the ministry of water and sanitation.

[39] OECD. 2012. "Equity and Quality in Education: Supporting Disadvantaged Students and Schools, retrieved from http://dx.doi.org/10.1787/9789264130852-en, referenced on 31 March 2019." OECD Publishing.

[40] UIS. 2017. "The Quality Factor: Strengthening National Data to Monitor Sustainable Development Goal 4." SDG 4 Data Digest.

[41] IEA and Boston College. n.d. Website for TIMSS and PIRLS. https://timssandpirls.bc.edu/index.html.

[42] OECD. n.d. Web site for PISA. https://www.oecd.org/pisa/.

[43] Gove, A., and Wetterberg, A. 2011. "The Early Grade Reading Assessment: Applications and Interventions to Improve Basic Literacy." RTI International, North Carolina.

in its Multiple Indicator Cluster Survey (MICS 6) to capture the quality of student learning. MICS 6 has been conducted in countries including Mongolia.[44]

Access to education is increasingly being defined as 'access to quality education' and education plans are including facilities for encouraging and measuring the quality of the education system. The Global Alliance to Monitor Learning[45] has been designed to improve learning outcomes by supporting national strategies for learning assessment and developing internationally comparable indicators and methodological tools to measure progress towards key targets of SDG 4. New initiatives such as the Global Alliance to Monitor Learning will place increasing pressures on EMIS to be able to report locally and internationally on learning outcomes using comparative standards. This is reflective of a broader shift in EMIS from simply monitoring inputs to measuring and monitoring outcomes such as learning outcomes.

Both international communities and local governments have driven a change towards a greater emphasis on equity and equality whereby the needs of marginal and disadvantaged groups are clearly addressed in education planning. SDG 4 emphasizes the need to "Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all" and SDG 4 stresses the need to "ensure equal access to all levels of education and vocational training for the vulnerable, including persons with disabilities, indigenous peoples and children in vulnerable situations", which requires "all data that can be" to be disaggregated by gender, location, wealth quintile and others, such as disability status, indigenous peoples and conflict-affected. Thus, EMIS must increasingly be capable of storing data on individuals and be able to disaggregate by a wide range of socioeconomic factors.

There is a global recognition that enrolling a child in school is no longer sufficient to ensure a child completes the education cycle. Students cannot perform well academically when they are frequently absent. Intermediate or continuous assessments help inform teachers and administrators of a child's progress and can ensure learning is adjusted to a child's specific needs. This places increasing emphasis on an EMIS being able to record and report on a child's ongoing progress.

In many countries there has been a growth of private and partially funded schools. Private schools often do not fall under the direct responsibility of MoEs and ensuring the private sector is properly captured in education statistical systems can be challenging for many MoEs. Barriers to the capture of private institution data can include: poor communication within the system and amongst stakeholders; inadequate human and material resources; the registration of private schools not being strictly enforced or taking time; inadequate advisory personnel at the education division; transport issues; and financial constraints.[46]

Funding mechanisms for education have become increasingly complex. After 2000, there was a growing trend within the international development community away from project-based support towards general sector and budget support.[47] In many cases, different government programmes may be funded by different partners, who all require detailed information in order to be able to

[44] UNICEF. n.d. MICS 6 Tools. http://mics.unicef.org/tools.

[45] UNESCO. n.d. Global Alliance to Monitor Learning (GAML). http://gaml.uis.unesco.org/.

[46] Mkandawire, J.K. 2002. "The Growth of Private Secondary Schools in Malawi: Its Implications on the Registration and Quality Monitoring Systems." University of Massachusetts Amherst.

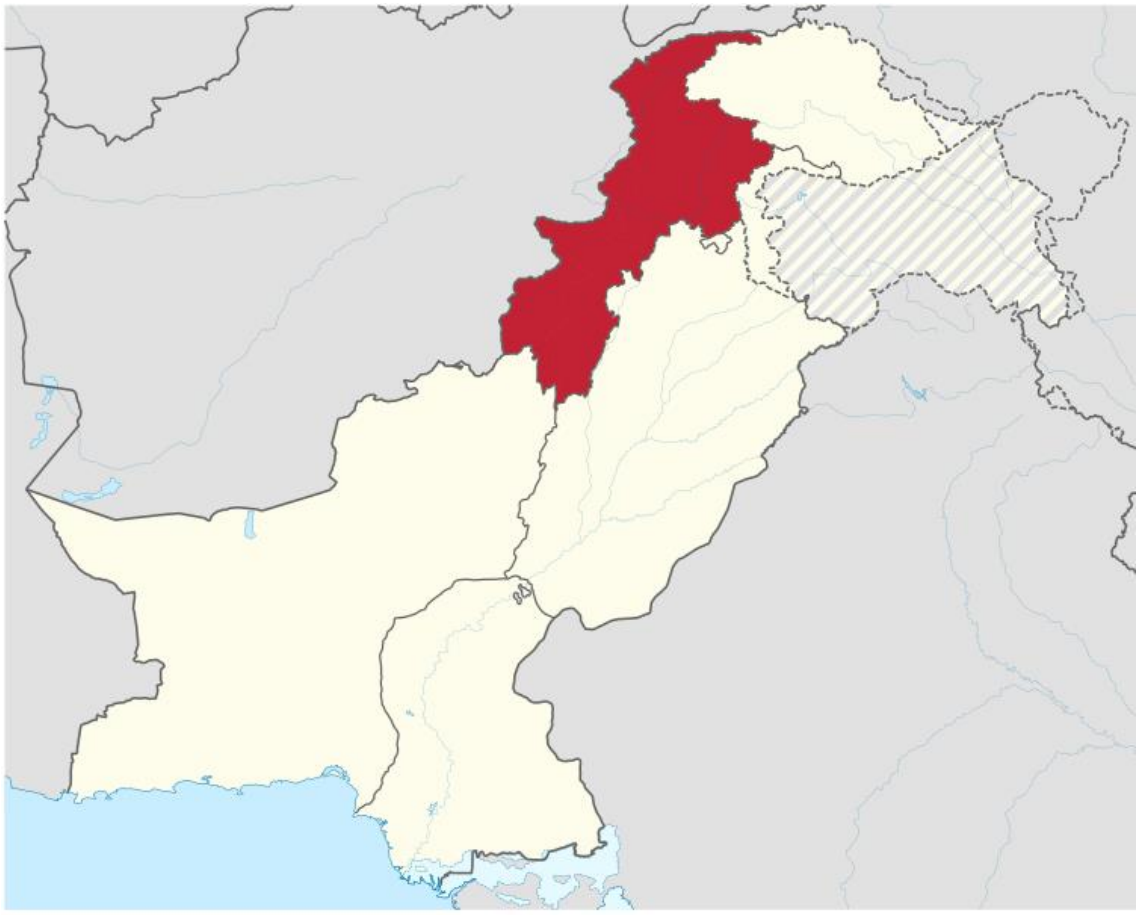
[47] Kharas, H. 2007. "Trends and Issues in Development Aid." Brookings Institute.

monitor and evaluate programme effectiveness in achieving goals. This places even greater emphasis on the availability of robust and precise education and budget plans, as well as flexible modalities of monitoring funding to schools. [48] [49]

These shifts place an emphasis on the development of robust systems that can inform well-structured sector plans and expenditure frameworks, and that can monitor flexible funding arrangements. The growth of private education increasingly requires governments to develop information systems that monitor both the public and private education sectors.

1.5 Overview of Khyber Pakhtunkhwa Province

Figure 1.2: Khyber Pakhtunkhwa Province



Source: Wikipedia, https://en.wikipedia.org/wiki/Khyber_Pakhtunkhwa

[48] Many Asian countries are in the process of shifting responsibilities for the provision of basic education from the central government to subnational governments, or to the schools themselves. This process is referred to as education decentralization. EMIS can help subnational administrative authorities and schools to better allocate and monitor the distribution and effectiveness of funds under decentralization.

[49] UNESCO, Bangkok. 2012. "Education Micro Planning Tool Kit, Module 5, Data and Information for Decision-Making and Planning."

Khyber Pakhtunkhwa is one of the four administrative provinces of Pakistan, located in the north-western region of the country. Its population, based on the 2017 Census of Population is 35.5 Million, representing 17.9% of Pakistan's total population.

In 2018, the National Assembly of Pakistan voted in favour of an amendment to the Constitution of Pakistan to merge the Federally Administered Tribal Areas, remote areas close to the border with Afghanistan, with Khyber Pakhtunkhwa province. The proposal was subsequently accepted by the government of Khyber Pakhtunkhwa. This merger has provided a challenge to extend government services to the newly merged districts, and to improve economic and social conditions, in what are now termed the Newly Merged Districts. In May 2019, the Planning and Development Department of the Government of Khyber Pakhtunkhwa released the Tribal Decade Strategy, 2020-2030,[50] a multi-sectoral strategy for building of government institutions, and for achieving the economic and social development of the former tribal areas.

Education is a key sector under this strategy, with planned expenditures of 245 Billion PKR, representing 18.5% of total for implementation of the 10-year strategy - the most for any sector. A sector review identified the need for across-the-board strengthening education, to bring it on a par with the rest of Khyber Pakhtunkhwa, addressing challenges in terms of access, participation, dropout rates, Out of School Children and education quality. Strengthened EMIS was recognized under the strategy as vital for monitoring and managing progress in addressing these challenges.

Khyber Pakhtunkhwa, in both the NMDs and already existing districts, faces challenges in providing all children with access to quality education that are particular to its geography and social fabric. Many districts are characterised by remote and scattered communities, often cut off for part of the year by harsh weather.

In addition, the province has suffered a large number of both natural and conflict generated disasters in recent years affecting a range of districts and divisions. Where schools have been destroyed through earthquake, flood, or the efforts of militants, it is costly to repair or replace them, with the result that many are still in a state of partial or total disrepair several years after disruptive events have taken place.

Where large numbers of families enter a district and its villages from elsewhere in the province, or neighbouring parts of Pakistan and other states, it is difficult to provide for sudden influxes of children into public schools. Since the start of Operation Zarb-e-Azb in June 2014 alone, approximately a million people have left North Waziristan (part of FATA at the time) for other districts, of whom more than 400,000 are children.

The above taken together create enormous challenges for the Elementary and Secondary Education Department, challenges which have been recognized and are being addressed via the Khyber Pakhtunkhwa Education Sector plan 2015-19[51] and a successor 5-year plan currently in development, which will be harmonized with the Tribal Decade Strategy.

[50] Planning and Development Department, Government of Khyber Pakhtunkhwa. 2019. “Tribal Decade Strategy 2020-2030.”

[51] Elementary and Secondary Education Department, Government of Khyber Pakhtunkhwa. 2014. “Education Sector Plan 2015-19.”

1.6 Overview of School System in Khyber Pakhtunkhwa

1.6.1 Elementary and Secondary Education, TVET and Nonformal education

The education system in Khyber Pakhtunkhwa follows the structure defined in the National Education Policy 2009:[52]

- **Pre-primary (Katchi) level.** The pre-primary or Katchi grade is the entry level in the education system. The typical entry age for Katchi is 3–4 years, and it is a 1-year curriculum. Katchi typically is incorporated within primary schools.
- **Primary level (grades 1–5).** The primary level consists of 5 years of schooling from grade 1 to grade 5. It is meant for children aged 5–9.
- **Middle level (grades 6–8).** The middle level spans 3 years and includes grades 6–8 and is meant for children aged 10–12. Most middle schools are the result of primary schools being upgraded rather than teaching solely grades 6–8. Schools that include the primary and middle levels are classified as elementary schools.
- **High school level (grades 9 and 10).** The high school level includes grades 9 and 10, spanning 2 years, aimed at children aged 13–14. Students take a Secondary Schools Certificate public board examination both in grades 9 and 10, conducted by the BISE.
- **Higher secondary (grades 11–12).** This level comprises grades 11 and 12, theoretically for children aged 15-16. In the public system, it is offered either in higher secondary schools or in intermediate colleges. Students take a Higher Secondary School Certificate board examination in both grades 11 and 12.
- **TVETA – Technical and Vocational education.** In Pakistan, presently there are over 3,581 public & private TVET institutions with an enrolment of 314,188 students working in the country and providing technical skill to the labour force. These include technology colleges, polytechnic institutes and mono-technic institutes, whereas commerce education for business sector is provided in over 200 commercial training institutes. In addition, vocational institutes also operate throughout the country. The Khyber Pakhtunkhwa Technical Education and Vocational Training Authority was established in 2015, by the Government of Khyber Pakhtunkhwa, “to impart such technical education and vocational skills through institutions under its administrative and regulatory control…and is responsive to market needs”.[53] While data on TVET enrolments are not currently available, they should be developed, and factored into estimations of OOSC.
- **Nonformal education.** Nonformal education offers two programmes – the Adult Learning Program (ALP) in which primary education is compressed to 3 years of study, and a literacy program of 8 months duration. Nonformal education is offered by a mix of public and private providers. It offers education opportunities to persons who have missed out on attending formal education, and it also serves as an alternative to formal education, in areas where there are obstacles to establishing a formal school.

[52] Ministry of Education, Government of Pakistan. (2009). National Education Policy.

[53] Government of Khyber Pakhtunkhwa. (2015). The Khyber Pakhtunkhwa Technical Education and Vocational Training Authority Act. http://www.pakp.gov.pk/2013/acts/the-khyber-pakhtunkhwa-technical-education-and-vocational-training-authority-act-2015/.

1.6.2 Brief Analysis of Education in Khyber Pakhtunkhwa

Table 1.1 shows enrolments in government schools in 2014-15 at the beginning of the 2015 Education Sector Plan, and in 2018-19,[54] nearing the end of the ESP. Enrolments in government primary schools has changed little over this period, increasing by 3%. Enrolments in government middle and high schools have seen a moderate increase of 11% and 12% over the period, with enrolments of girls increasing at twice the rate of those for boys. Enrolments in higher secondary education have more than doubled over the period, increasing by 119% for boys and 94% for girls.

Table 1.1: Enrolment in Government Schools by Level of Education, 2014-15 and 2018-19

Enrolment in Government schools				
2014-15				
	Boys	**Girls**	**Total**	**GPI**
Primary	1647878	1355963	3003841	0.82
Middle	491140	296175	787315	0.60
High School	216966	119656	336622	0.55
Higher Secondary	29470	17121	46591	0.58
2018-19				
	Boys	**Girls**	**Total**	**GPI**
Primary	1676407	1420840	3097247	0.85
Middle	529245	342602	871847	0.65
High School	235644	142433	378077	0.60
Higher Secondary	64595	33256	97851	0.51
	% change 2015-15 to 2018-19			**Change**
	Boys	**Girls**	**total**	**GPI**
Primary	2	5	3	0.02
Middle	8	16	11	0.04
High School	9	19	12	0.05
Higher Secondary	119	94	110	-0.07

Source: Annual Statistical Report, 2014-15; 2018-19, Elementary and Secondary Education Department, Government of Khyber Pakhtunkhwa. 2015; 2019

Gender parity has improved at all levels except higher secondary where it worsened. In 2018-19, gender parity declined with each increasing level of education, with the GPI decreasing from 0.81 for primary to 0.51 for higher secondary. At these levels, lack of gender parity remains an important inequity in the education system.

[54] Education Management Information System, Annual Statistical Report, 2014-15; 2018-19, Elementary and Secondary Education Department, Government of Khyber Pakhtunkhwa. 2015; 2019.

Table 1.2 gives the Student Teacher Ratio (STR) for each level of education. The STR is high for Primary education at 42 in 2018-19, little changed from 2014-15. For Middle Schools, the STR is even higher, and has worsened from 52 to 59 over the period. In contrast, the STRs are very low for high schools and higher secondary schools – 11 and 5 respectively in 2018-19. It is unclear if these STRs reflect policy targets for the different levels. On the surface, it would seem there is potential for some redistribution of teachers to lower levels, to achieve some reductions in STRs for those levels.

Table 1.2 also shows the percentage of teachers who possess at least a university degree. There have been significant increases since 2014-15. Improving the education credentials of teachers was one of the priorities of the 2015 ESP, and there has clearly been progress on this front. For example, the percentage of primary teacher with a university degree has increased from 59% to 75% over the period.

Table 1.2: Teachers in Government Schools, 2014-15 and 2018-19

Teachers in Government Schools				
	2014-15			
	teachers	**enrolment**	**STR**	**% Univ Degree**
Primary	72110	3003841	42	59
Middle	15238	787315	52	84
High School	26471	336622	13	91
Higher Secondary	9561	46591	5	93
	2018-19			
	teachers	**enrolment**	**STR**	**% Univ Degree**
Primary	72848	3097247	43	75
Middle	14694	871847	59	92
High School	33059	378077	11	95
Higher Secondary	19433	97851	5	97

Source: Annual Statistical Report, 2014-15; 2018-19, Elementary and Secondary Education Department, Government of Khyber Pakhtunkhwa. 2015; 2019

Table 1.3 below show mapping of Khyber Pakhtunkhwa education system into the International System for Classification of Education (ISCED).[55] The ages correspond to the “theoretical” age for which the program is designed. In practice, due to phenomena such as early and late entry into the school system, and repetition, the actual ages of students may differ from the theoretical age, with the most common situation being over-aged students in the system at each level.

For the International reporting of Education data, the UIS has developed the international system for classification of education. ISCED effectively maps each country’s education system into ISCED levels, and this allows for comparative analysis of education data internationally.

[55]UIS. (2011). International Classification of Education. http://uis.unesco.org/en/topic/international-standard-classification-education-isced.

Table 1.3: Mapping of Pakistan Education System into ISCED

ISCED Levels for Basic Education	Levels of Khyber Pakhtunkhwa Education System
ISCED 0 – pre-primary education	Pre-primary programs (ages-3-4)
ISCED 1 – Primary education	Primary education: Classes 1-5 (ages5-9)
ISCED 2 – Lower Secondary Education	Middle Education: Classes 6-8 (ages 10-12)
ISCED 3 – Upper Secondary Education	High school: Classes 9-10 (ages 13-14) Higher Secondary School: Classes 11-12 (ages 15-16)

Source: UIS. (2011). International Classification of Education. http://uis.unesco.org/en/topic/international-standard-classification-education-isced

The ISCED levels are mentioned since international studies, some of which are examined in this report, use this classification system when presenting results for Pakistan.

Table 1.4: Enrolment in all Schools, GER and NER

Enrolment in all schools (Public, Private and Denii), GER and NER						
	Primary			Middle and High School		
Enrolment	Boys	Girls	Total	Boys	Girls	Total
2014-15	2510748	1757496	4268244	1067303	545527	1612830
2018-19	2817450	2017609	4835059	1226982	651883	1878865
Change	306702	260113	566815	159679	106356	266035
% change	12.2	14.8	13.3	15.0	19.5	16.5
% change annualized	3.1	3.7	3.3	3.7	4.9	4.1
School Age population	Population aged 5-9			Population Aged 10-14		
	Boys	Girls	Total	Boys	Girls	Total
2014-15	2507810	2293628	4801438	2066668	1848307	3914975
2018-19	2804754	2562548	5367302	2319066	2067038	4386104
change	296944	268920	565864	252398	218731	471129
% change	11.8	11.7	11.8	12.2	11.8	12.0
% change annualized	3.0	2.9	2.9	3.1	3.0	3.0
GER						
2014-15	100	77	89	52	30	41
2018-19	100	79	90	53	32	43
NER						
2014-15	81	60	71	52	30	41
2018-19	75	55	65	53	32	43

Source: Annual Statistical Report, 2014-15; 2018-19, Elementary and Secondary Education Department, Government of Khyber Pakhtunkhwa. 2015; 2019

Table 1.4 shows enrolment in all schools – Government, Private and Denii, for Primary education, and for Middle and High School Combined, again for 2014-15 and 2018-19.[56] It also shows the population aged 5-9 corresponding to the "typical age" for primary, and aged "10-14" corresponding to the typical age for Middle and High School combined. Rates of change in enrolment over the 4 years, as well as an annualized rate of growth are shown for both enrolments and population. For both levels considered, enrolments have grown faster than population, resulting in an increase in the GERs over the period – albeit small increases. The NER for primary education has dropped over the period for both boys and girls. The growth in GER and reduction in NER can be explained by an increase in the number of overaged students and a decrease in the number of students of typical age over the period.

Table 1.5: International Comparison of Net Enrolment Rates for Primary Education

Country/province	Net Enrolment Rate Primary education					
	2014-15			2018-19		
	Male	Female	Both Sexes	Male	Female	Both Sexes
Khyber Pakhtunkhwa	81	60	71	75	55	65
Pakistan	71	60	66	73	62	67
South East Asia	94	95	94			
Global	90	88	89	91	88	89

Source: Annual Statistical Report, 2014-15; 2018-19, Elementary and Secondary Education Department, Government of Khyber Pakhtunkhwa.

To help place the Khyber Pakhtunkhwa education system in context, Table 1.5 compares the net enrolment rates for primary education in Khyber Pakhtunkhwa[57] with those for Pakistan as a whole, South East Asia, and the global rate. The source of the international data is the UIS Statistical Database.[58]

The table shows that net enrolment rates for Khyber Pakhtunkhwa are similar to those for Pakistan as a whole in 2018-19, although the NER is lower for girls in Khyber Pakhtunkhwa. The NER for girls has dropped for 60 to 55 over the period, as previously noted. The NERs in Pakistan and Khyber Pakhtunkhwa are low in comparison to those for SE Asia region, and low compared to the global rates. While not shown here, the NERs would also be low for Khyber Pakhtunkhwa and Pakistan compared to the region for other levels of education. The low enrolment rates are one indicator of the challenge faced by Khyber Pakhtunkhwa in terms of access and participation in education.

[56] Education Management Information System, Annual Statistical Report, 2014-15; 2018-19, Elementary and Secondary Education Department, Government of Khyber Pakhtunkhwa. 2015; 2019.

[57] Education Management Information System, Annual Statistical Report, 2014-15; 2018-19, Elementary and Secondary Education Department, Government of Khyber Pakhtunkhwa. 2015; 2019.

[58] UIS. (n.d.). UIS Statistics, http://data.uis.unesco.org/.

Nonformal Education. According to NFEMIS,[59] there are 22,960 male and 30,936 female learners in Nonformal Education (NFE) in Khyber Pakhtunkhwa, with 125 male and 256 female teachers in 1343 schools. The Elementary and Secondary Education Foundation, a private organization is by far the largest provider in Khyber Pakhtunkhwa, with 40,276 students enrolled in 1078 schools. Enrolment is NFE is small, when compared to the number of OOSC, estimated at 1.8 Million (see below). It would appear there is potential to make greater use of Nonformal education as an alternative to formal education, particularly in regions where there are obstacles to the establishment of formal schools.

1.6.3 Out of school children in Khyber Pakhtunkhwa

Out of School Children (OOSC) is a large issue for education in Pakistan. The UIS Statistical Database[60] reports an estimated 19.1 million OOSC of primary and secondary age (5-16 years of age) in Pakistan. A high rate of OOSC, combined with its large and rapidly growing population, place Pakistan among the countries worldwide with the highest numbers of OOSC.

Khyber Pakhtunkhwa is making efforts to better understand the magnitude of, the causes of, and distribution of OOSC, and distinguishing between those who never attended school versus those who have dropped out of school. The largest effort was the 2017 OOSC Census[61] – a census of the population of Khyber Pakhtunkhwa to measure the above, undertaken with financial assistance of the DFID Education Project, and the UNICEF Country Office.

The OOSC Census estimate of OOSC for Khyber Pakhtunkhwa was 1.8 Million, representing 23% of children of school going age. The flip side is that the OOSC Census found that 77% of children of school going age were reported to be currently enrolled.

Comparative household survey data from the Pakistan MICS 2017-18,[62] yielded higher rates of OOSC: 26.7% and 34.4% for children of primary and secondary age respectively.

Table 1.6 below gives OOSC estimates for Pakistan by province with OOSC rate of 36% for Khyber Pakhtunkhwa in both 2015 and 2016.[63]

[59] JICA and AEPAM. n.d. Non-Formal Education Management Information System, http://nfemis.net/Default.aspx?ReturnUrl=%2f.

[60] UIS. (n.d.). UIS Statistics, http://data.uis.unesco.org/.

[61] Elementary and Secondary Education Department, Government of Khyber Pakhtunkhwa. 2019. “Out of School Children Survey 2017-18”

[62] Bureau of Statistics Khyber Pakhtunkhwa; Planning & Development Department, Government of the Khyber Pakhtunkhwa and UNICEF Pakistan; Multiple Indicator Cluster Survey, Khyber Pakhtunkhwa, 2016-17; Final Report; KP-MICS; Peshawar Pakistan, pp. 151, 154

[63] National Education Management Information System, Pakistan Education Statistics 2014-15; 2015–16, Government of Pakistan Islamabad, 2015; 2017.

Table 1.6: Distribution of out-of-school Children by Gender and Region

	Population (Ages 5-16) (million)	OOSC (million)		OOSC (%)	
		2015	2016	2015	2016
Pakistan	50.787	24.023	22.6	47	44
Punjab	25.979	11.415	9.9	44	38
Sindh	11.99	6.662	6.7	56	55
Khyber Pakhtunkhwa	6.833	2.454	2.5	36	36
Balochistan	2.656	1.846	1.9	70	70

Source: Government of Pakistan, *Pakistan Education Statistics 2014-15; Pakistan Education Statistics 2015-16*

While there is variation among the sources on the precise magnitude of the OOSC population, it is clear that the numbers are large, and that it is an important issue for the education system of Khyber Pakhtunkhwa to deal with.

The OOSC Census is discussed further in Section 3.2.8.

1.7 Education Sector Plan 2015

1.7.1 Core Areas of Policy Focus

The overview of Khyber Pakhtunkhwa presents a number of factors that create enormous challenges for the Elementary and Secondary Education Department. Khyber Pakhtunkhwa has recognized its educational challenges and has been at the forefront of educational change in Pakistan. The Elementary and Secondary Education Department (ESED) published its first Education Sector Plan (ESP) in 2008, the first province to do so. A further plan was developed in 2010, with revisions made in 2012. The current ESP 2015,[64] covering the five-year period 2015-16 to 2019-20 is set in the context of the Post-2015 Development Agenda, and is the first of three plans, designed to achieve international education goals in the province by 2030. A successor 5-year plan is currently in development, which will be harmonized elements pertaining to education in the Tribal Decade Strategy, which is a Government of Khyber Pakhtunkhwa cross-sectoral plan for the actions needed for building of institutional capacities to achieve full integration of the former Federally Administered Tribal Areas.[65]

The current ESP seeks to create the underlying conditions required to achieve international education goals by 2030, through focusing on 10 core policy areas, presented in Table 1.7.

[64] Elementary and Secondary Education Department, Government of Khyber Pakhtunkhwa. 2014. “Education Sector Plan 2015-19.”

[65] Planning and Development Department, Government of Khyber Pakhtunkhwa. 2019. “Tribal Decade Strategy 2020-2030.”

Table 1.7: Policy Areas in Education Sector Plan 2015

ESP 2015 policy area	ESP 2015 core policy
More effective teachers	1. Redevelop approach to training and selecting new teachers
	2. Develop a consolidated, needs based, high quality approach to CPD
	3. Redevelop teaching cadre employment rules
Better schools and facilities	4. Establish a sustainable approach to provision of facilities
Every child's right to education	5. Launch new benefits aimed at children most at risk of educational deprivation
	6. Scale up partnerships with the private sector
	7. Launch a draw down fund for use in emergency situations
Good governance and management	8. Testing and updating of population data
	9. Development of district officials' management skills
	10. Peg education budget to inflation

Source: Elementary and Secondary Education Department, Government of Khyber Pakhtunkhwa. 2014. "Education Sector Plan 2015-19."

In addition, through the focus on core policy areas, the ESP 2015 remains committed to achieving 5 of the 10 draft Post-2015 Development Agenda sub-goals. Table 1.8 presents these draft sub-goals, and the MISs that will be used to monitor them.

Table 1.8: Draft Post-2015 Development Agenda sub-goals to be addressed by ESP 2015

Sub-goal	Applicable MISs
Ensure that all girls and boys complete free, equitable and quality primary and secondary education leading to relevant and effective learning outcome	• EMIS indicators: GER, NER and ANERs, can be used to measure participation in education • EMIS can measure equity in access to education by geography, by distribution of teachers (by geography and level of education (using teacher education levels, STRs) • Learning Outcomes – LitNum[66] will provide information, as will TIMSS[67] data nationally • Learning outcomes data to be developed more in ESP 2020
Eliminate gender disparities in education and ensure equal access to all levels of education and vocational training for the vulnerable, including persons with disabilities, indigenous peoples, and children in vulnerable situations;	• SMIS, once implemented, will be able to analyse access and participation and education outcomes for disadvantaged groups • Current EMIS enables monitoring of gender disparities. As noted in Section 1.6.2, gender disparities increase by level of education, and there has been little change in gender disparity between 2014-15 and 2018-19.

[66] See Section 3.2.7

[67] National Education Assessment System, Government of Pakistan. http://www.neas.gov.pk/. National Education Assessment System is the lead agency for Participation of Pakistan in the Trends in International Monitoring of Mathematics and Science Study (TIMSS) in 2019, a policy action agenda of National Education Policy (2009)

Sub-goal	Applicable MISs
Ensure that all youth and at least x%[68] of adults, both men and women, achieve literacy and numeracy;	• Focus of ESP 2020 will look to development of data on this • The 2017 Census of Population[69] long-form contains data on literacy. There are limitations to collection of such data via population Censuses, but nevertheless it provides a measure that will be available at low geographic levels, and which can also be cross classified with other variables of interest. MICS[70] also provides data on literacy, with break downs by equity groups.
Build and upgrade education facilities that are child, disability and gender sensitive and provide safe, non-violent, inclusive and effective learning environments for all;	• IMU monthly monitoring of Boundary wall, water, lavatories, and electricity. • Annual or biennial EMIS data on other school facilities
Increase by x%[71] the supply of qualified teachers, including through international cooperation for teacher training in developing countries, especially LDCs and SIDS	• EMIS reports annually on individual teachers and their education and professional qualifications • TMIS being developed as an MIS on teachers

Source: Elementary and Secondary Education Department, Government of Khyber Pakhtunkhwa. 2014. "Education Sector Plan 2015-19."

Policy focus of ESP 2020

"Learning assessment, teaching and learning materials, and the school curriculum are closely linked issues, with important interdependencies. The Department therefore plans to make these three important aspects of teaching and learning the principal policy focus of ESP 2020, once it has tackled the groundwork that is required to create conditions where improvements in these areas can flourish, driving up the quality of teaching, and with it children's ability to learn effectively in schools."[72]

1.7.2 Summary of Focus on Monitoring in ESP and implications on EMIS Development

Table 1.9 examines the milestones under the ESP Joint Review Framework, for 5 of the 10 core policy areas, with comments on the use of the framework for monitoring implementation of ESP.

The Joint Review Framework for the ESP describes actions to be undertaken for the 10 core policy areas under the policy, with milestones to be achieved by year. Mechanisms for monitoring the implementation of the ESP include monthly stock taking meetings chaired by the Secretary ESED with the person responsible for each of the 10 core policy areas (to be determined after the launch of the plan), quarterly review meetings jointly chaired by the Secretary ESED and an IDP representative chosen by the IDPs, and an annual joint review meeting.

[68] In the ESP 2015, the "x%" is not quantified.

[69] Pakistan Bureau of Statistics, Government of Pakistan, http://www.pbs.gov.pk/content/population-census

[70] Bureau of Statistics Khyber Pakhtunkhwa; Planning & Development Department, Government of the Khyber Pakhtunkhwa and UNICEF Pakistan; Multiple Indicator Cluster Survey, Khyber Pakhtunkhwa,2016-17; Final Report; KP-MICS; Peshawar Pakistan

[71] In the ESP 2015, the "x%" is not quantified.

[72] Elementary and Secondary Education Department, Government of Khyber Pakhtunkhwa. 2014. "Education Sector Plan 2015-19"

Observations on the Joint Review Framework are that milestones in a number of cases are in terms of implementation of a policy action, and not the results achieved. Where milestones are based on results achieved, quantitative baselines and targets are not provided.

Core Policy No. 8 is concerned with EMIS and use of EMIS for planning purposes. It is centred on development of improved estimates of the school-aged population, and once these were produced, an evaluation of EMIS and IMU data, followed by implementation of changes to improve the data.

The OOSC Census was developed with one of its objectives being the improvement of the population estimates. As a result of problems in the implementation of the OOSC, it appears not to have provided the accurate data on the school aged population sought. An evaluation of EMIS data focusing on data quality and timelines of the results of the Annual School Census was carried out, leading to an improved methodology, with IMU verifying and collecting the data using mobile devices. A broader evaluation of EMIS was not carried out.

In recent years under the Education support programme, there has been a good deal of support to EMIS development, which has led to development and implementation of SMIS, and development of programme specific EMISs, as described in Section 3.2.10. What has been lacking is an overall roadmap so that the developments could take place in the context on an overall plan for development of an integrated EMIS, in which programme specific needs are addressed through modules of an integrated system.

In the planning of the 2020 ESP, establishment of quantitative baselines for policy areas should be established, either at the time of preparing the plan (where data is available), or early during the implementation of the plan. And quantitative targets, which can be stated as “x%” improvements relative to the baselines should be given. Examination of the information needs for monitoring of the plan should be undertaken, sources of the data (existing or new) identified, and this analysis should guide the development or enhancements needed to EMIS systems.

Table 1.9: Use of Joint Review Framework for Monitoring Implementation of ESP 2015

ESP 2015 core policy	Milestones under Joint Review Framework	Comments on use of the framework for Monitoring Implementation of ESP
No.1 Redevelop approach to training and selecting new teachers - Redeploy surplus teachers to schools with teacher shortages - Improved teacher recruitment	75%, 80% and 85% of schools with optimal STRs Better qualified teachers	Good, but existing EMIS data could have been analysed to establish the baseline of STR by school. Definition of the optimal STRs should have been given. Would have been good to establish one or more indicators, and targets to meet. An indicator could have looked at % of teachers with a university degree, and given the baseline based on EMIS data, and specific targets to be met.
No.2 Develop a consolidated, needs based, high quality approach to CPD	Teacher Management Information System develop to inform CPD strategy	No specific indicators or targets given. ESP could have stated policy goals for example in terms of hours of CPD, % of teachers who meet targets under the policy, as measured via new Teacher Management Information System
No.4 Establish a sustainable approach to provision of facilities	Explicit targets were given as follows: by the end of year 2 to have water, lavatories, boundary walls in all schools, and to build additional classrooms in all primary schools with less that 6 classrooms; and by end of year 3 to repair or install electricity in all schools.	Good quantitative targets, and a regular mechanism built into IMU for monitoring school facilities (see analysis below). Not clear how the building of extra classrooms to have a least 6 classrooms per primary school is being monitored.
No. 5 Launch new benefits aimed at children most at risk of educational deprivation	Review of approach to transfers, and thereafter indicator is % of funds disbursed	The need for better targeting of disadvantaged populations was raised as an issue in the ESP. However no mention was made of development of SMIS, with individual student data and equity variables as a means both of targeting the disadvantaged; and indicators of impact of programmatic interventions, such as % of disadvantaged students reached by the programme, retention of out of school children entering school on vouchers.

ESP 2015 core policy	Milestones under Joint Review Framework	Comments on use of the framework for Monitoring Implementation of ESP
No.8 Testing and updating of population data ESP makes case that education planning cannot be done because of a lack of reliable population data, and further that an evaluation is needed of the reliability and timeliness of existing EMIS and IMU data. It proposed a survey – the Out of School Census – to establish reliable data on the school-aged population for use by EMIS in calculation of GER and NERs, and detailed data on the number, location and characteristics of out-of- school children.	year 1: OOSC Census is conducted and EMIS/IMU data are evaluated, year 2: recommendations to improve EMIS are implemented; years 3-5: "Timely robust data made available in an accessible format, and Improved use of data for planning, budgeting and school management"	This core policy area is focused on the need for better estimates of the school aged population as a prerequisite for reliable estimates of GERs and NERs, and in turn for establishing estimates of enrolment growth, and demands for all education services. A review or evaluation of EMIS needs to examine a number of factors. The reliability of population estimates is but one of these factors. In the absence of reliable population data, other sources of education data such as the Multiple Indicators Survey can provide data on attendance rates, which can be used to triangulate against GERs and NERs produced via EMIS, to see of the data are roughly consistent. Additionally, the ESP, in planning to develop its own source of Population estimates, did not take into account the 2017 Population Census of Pakistan, which in due course would provide accurate data on the school aged population. The evaluation of EMIS timeliness and reliability resulted in the new collection methodology to address both issues, whereby IMU Monitors use mobile devices to collect and verify the data from schools.

Source: ESP core policies and Milestones under joint review framework from Elementary and Secondary Education Department, Government of Khyber Pakhtunkhwa. 2014. "Education Sector Plan 2015-19."

1.7.3 Examination of Progress under Core policy on Provision of Facilities to Schools

Figure 1.3 examines the progress under Core Policy Area 4 over the period 2014 to 2019, by comparing the percentage of schools without functioning water supply, lavatories, boundary walls, and electricity, versus the targets under the ESP Joint Review Framework.[73.] The actual data for this analysis were downloaded month by month from the IMU dashboard[74] (see Section 3.2.3).

There have been significant reductions in the percentage of schools without key infrastructure over the period – with steady improvement year by year. The percentage of schools without functional facilities fell between 2014 and 2019 as follows: w/o electricity from 40% to 12%, w/o water from 30% to 8%, w/o lavatories from 18% to 3% and w/o boundary walls from 21% to 4%.

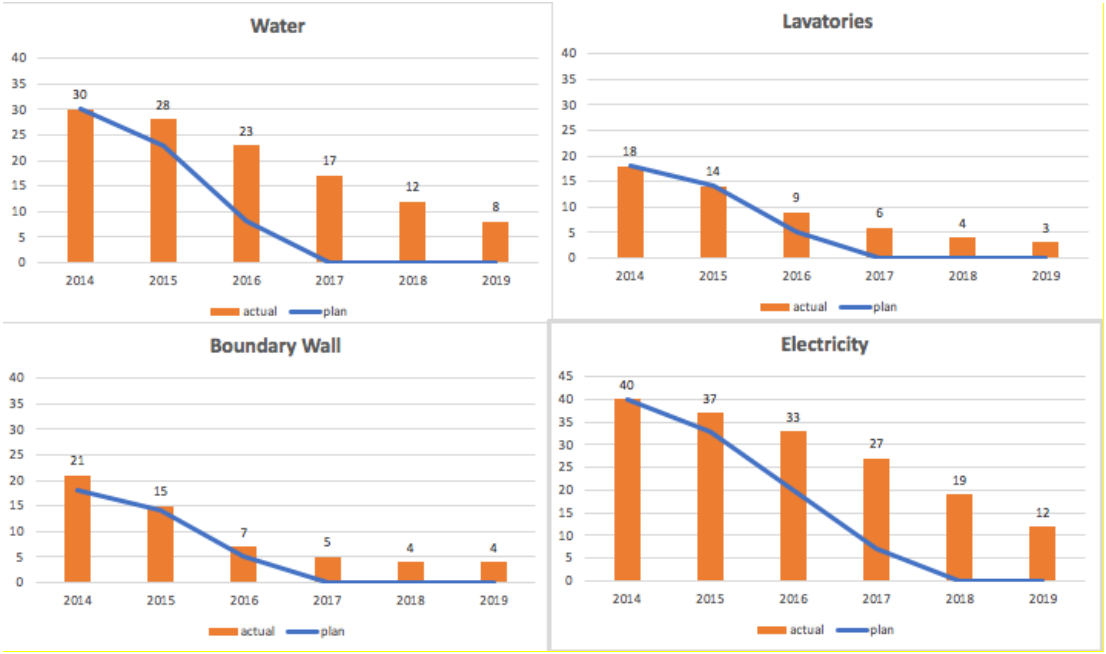
Improvements have fallen short of targets for water and electricity. The shortfalls should have been observed in the monitoring of the Joint Review Framework, prompting examination of the

[73] Elementary and Secondary Education Department, Government of Khyber Pakhtunkhwa. 2014. "Education Sector Plan 2015-19."

[74] Elementary and Secondary Education Department, Government of Khyber Pakhtunkhwa. (n.d.). Independent Monitoring Unit Dashboard. http://175.107.63.45/NewIMUSite/index.aspx

reasons for the shortfalls – are the problems localized to certain Districts, and whether the targets were overly ambitious and overlooked certain barriers or whether implementation efforts have fallen short for other reasons.

Figure 1.3: Planned versus Actual Percentage of Schools Without Functioning Facilities



Source: Planned figures as per Elementary and Secondary Education Department, Government of Khyber Pakhtunkhwa. 2014. “Education Sector Plan 2015-19.”, actual figures downloaded from Elementary and Secondary Education Department, Government of Khyber Pakhtunkhwa. (n.d.). Independent Monitoring Unit Dashboard. http://175.107.63.45/NewIMUSite/index.aspx

2 Purpose, Objectives, Scope and Methodology of the Review

2.1 Purpose and Objectives

The objectives of the review were as follows:

i. *To determine the strengths and limitations of the systems, from which lessons can be drawn for the improvement of the system as well as other monitoring and management systems in the region.*

ii. *To determine the requirements and constraints of the systems for scale-up and wider use, especially at the lowest level admin and school levels, and in contexts with limited ICT infrastructure.*

iii. *To determine the key technical aspects required (existing and yet to be developed) for the successful implementation of the two systems and more broadly – extrapolating from the evaluation findings – for other monitoring and management systems.*

iv. *To determine the key institutional, technological, financial and socio-cultural aspects which have positively or negatively shaped the use and impact of the two systems.*

v. *To examine the impact of the system's use on school efficiency, by reviewing progress made in terms of teacher and student attendance, student survival rates and drop-outs, or any other relevant progress which could be attributed to the system's use*

vi. *To capture in the review report all these lessons learned, covering technical, institutional, financial and socio-cultural dimensions, which would enable development partners to better support the development and effective use of existing and emerging education monitoring and management systems in South Asia.*

vii. *To determine UNICEF's relative strengths and weaknesses in supporting Governments in the design, development and adoption and use of such systems, and thus to outline on which aspects UNICEF is well positioned to lead, and on which others UNICEF is not yet where it needs to be.*

2.2 Scope of the Review

Inception Phase[75]

In the inception phase, the methodology for the evaluability and review phases was developed, including which stakeholders to involve, identification of the relevant quantitative and qualitative information to obtain, protocol for interviews / focus group discussions, potential bottlenecks and how to address them. The inception report also outlined a plan and timeline for meeting the stated objectives in a timely manner, including country visits.

[75] Mott Macdonald. (2019, July). "Evaluation of Education Management and Monitoring Systems at School and Sub-National Levels – Inception Report".

Evaluability phase

UNICEF identified six monitoring and management systems from the region. The evaluability phase investigated and reported on the following aspects to inform the decision on which two systems to review:

i. *Given existing documentation and responses to queries from key stakeholders, the feasibility of collecting the required information and engaging with stakeholders/users at different levels to draw out the lessons learned and meet the review objectives.*

ii. *The availability of data allowing for comparison of the situation before and after implementation of the system, to enable some measure of impact of the introduction of the system (e.g., in terms of better identifying out-of-school children, reducing dropout, improving learning outcomes, improvements to equity in resource allocations, reduction of absenteeism, improvements in terms of school infrastructure or teacher allocation, etc.).*

iii. *The extent to which the system has been institutionalized, utilized, and integrated into routine education monitoring, planning, budgeting and management processes at various administrative levels including at the school level.*

Review Phase

A key feature of the review included a 2-3 week site visit to the Ministry or Department responsible for EMIS, to meet with officials at all levels, from the state/province, district and school, involved in: (i) the collection, processing and/or dissemination of data, and (ii) the use or potential use of the data. In addition, the review included examination of documentation and reports collected during the evaluability phase or collected during the site visit.

2.3 Review Questions

The review questions developed by UNICEF ROSA (see Annex 3) reflected the focus of the current study on EMIS at the school and local levels, and were divided into questions on technical issues, which are considered in Chapter 4, and questions on use and impact, which are considered in Chapter 5.

2.4 Methodology

2.4.1 Overview of Methodology

This section presents the methodology, both quantitative and qualitative, used for the review, including assumptions and limitations

2.4.1.1 Inception Phase

The Inception Phase[76] included an examination of existing international frameworks for review of EMIS relative to the objectives and focus of the current study, identification of a strategy for carrying out the evaluability phase, identification of stakeholders to be involved at both phases, and a draft questionnaire for use during the evaluability phase.

[76] Mott Macdonald. (2019, July). "Evaluation of Education Management and Monitoring Systems at School and Sub-National Levels – Inception Report".

2.4.1.2 Evaluability Phase

The evaluability phase was conducted remotely by the Mott MacDonald EMIS expert responsible for this phase. A number of different Frameworks for assessment of EMIS were examined, including DQAF,[77] SABER,[78] and Monitoring Education Participation - Framework for Monitoring Children and Adolescents who are Out of School or at Risk of Dropping Out.[79]

The particular focus of the review was on uses of EMIS data at school and local levels to improve school access, equity and quality. DQAF and SABER were developed at a time when EMIS tended to be based on an Annual School Census (ASC), and uses were primarily at higher levels - district levels and above. For the current study, UNICEF ROSA developed a framework and guiding questions/methodology, by combining SABER with the Framework for Monitoring Education Participation, and further refining it by adding a focus on use and impact at local and school levels, through an equity lens. The methodology for the review phase was to examine each EMIS in relation to the review questions, to identify best practices and lessons learned, while also providing a descriptive overview of each element of EMIS, with identification of opportunities and recommendations for strengthening of the overall system and its individual components.

The draft evaluability questionnaire developed for the inception report was revised and finalized (see APPENDIX 4). The questionnaire collects basic information on the EMIS system, on SMIS and its relationship to the ASC, equity variables included in individual student data, and uses of SMIS and EMIS at local and school levels.

With support of local UNICEF offices and Country Offices (Cos), the questionnaires were sent to the individual responsible for EMIS within each Ministry/Department of Education. UNICEF offices liaised with authorities responsible for these systems, explaining the objectives of the study and the two phases involved, and facilitating the completion of the questionnaires. Once the completed questionnaires had been received, the UNICEF local offices arranged a SKYPE call for each EMIS between the EMIS authorities and the Cambridge Education expert, to clarify responses to the questionnaires.

Based on the questionnaire findings and the review of documentation provided by authorities and found online, an Evaluability Framework was applied, to select two EMIS to participate in the Review phase. The UNICEF Steering Committee accepted the selection of the two EMISs – namely Andhra Pradesh State in India and Khyber Pakhtunkhwa Province in Pakistan. (See Evaluability Report.)[80]

[77] World Bank and UNESCO Institute for Statistics. 2003. A Framework for Assessing the Quality of Education Statistics. http://dqaf.uis.unesco.org/images/a/a8/DQAF_Education_2004.pdf.

[78] Abdul-Hamid, Husein. 2014. What Matters Most for Education Management Information Systems - A Framework Paper. World Bank. http://saber.worldbank.org/index.cfm?indx=8&pd=2&sub=0

[79] UNICEF and UIS. 2016. Monitoring Education Participation: Framework for Monitoring Children and Adolescents who are Out of School or at Risk of Dropping Out. http://uis.unesco.org/sites/default/files/documents/monitoring-education-participation.pdf.

[80] Mott Macdonald. (2019, October). Evaluation of EMIS at school and sub-national levels - Evaluability Report.

2.4.1.3 Review Phase

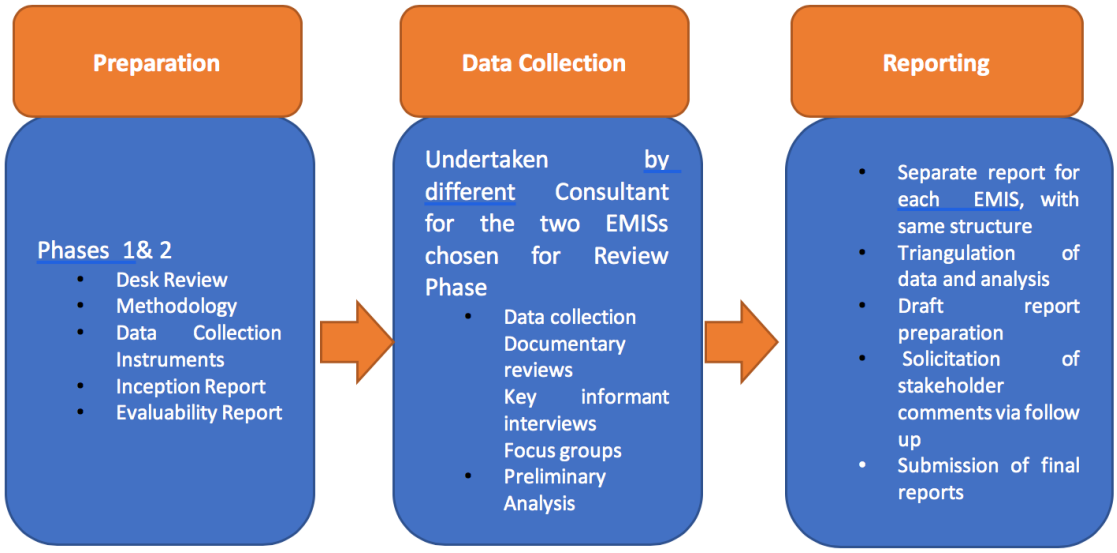
The Review Phase featured an in-depth study of the two selected EMISs to identify the strengths and weaknesses of systems, how well established and embedded they are, and lessons learned with potential applicability to other EMIS within the ROSA region and beyond.

The EMIS review built on the questionnaire and documentation obtained during the Evaluability Phase. It involved stakeholders' interviews including users of EMIS data (for example in policy or research) as well as those involved in collection, processing and dissemination of EMIS data. It looked for evidence covering all areas set out in the review questions.

Each of the two reviews was carried out by a different international consultant working in close cooperation and with support of the local UNICEF offices.

The first step of the Review Phase was for each international consultant to check and confirm that documents and information requested during the evaluability phase had been provided and if not effort to obtain it at this stage.

Figure 2.1: Methodology for In-depth Review



Source: Mott Macdonald. (2019, October). Evaluation of EMIS at school and sub-national levels - Evaluability Report

The second step was to plan the in-country visits in collaboration with the UNICEF Country Office and Local Office. This included planning face-to-face meetings with key-stakeholders, planning visits to the EMIS and planning departments offices, organizing focus group discussion with key informants, and organizing field visits to collect information at district and school levels. The scheduling of meetings was coordinated through UNICEF local office contact, and a designated Ministry/Departmental focal point.

Primary data collection focused on interviews with EMIS administrators at the different levels as well as with school directors/head teachers and teachers in selected schools. Interviews with PTC chairperson and members as end users of EMIS information were included depending on the EMIS features.

Summary of Officials met onsite in Peshawar and Islamabad

- Elementary and Secondary Education Department
  - Secretary, for initial briefing, and debrief on findings
  - EMIS cell – meetings with Director and Deputy Director, and review of different EMIS systems with responsible EMIS team members
  - ESED leadership – meetings with Assistant Secretary, Director Planning, Director Education Sector Reform Unit, Director Curriculum and Teacher Evaluation, Director Elementary and Secondary Directorate, and Deputy Director Independent Monitoring Unit.
- Focus group meeting with 3 districts and schools
- Two school visits to Higher Secondary schools in Peshawar
- Meeting with other stakeholders
  - UNICEF Field Office and Country Office
  - Khyber Pakhtunkhwa Bureau of Statistics
  - Sarhad Rural Support Programme (SRSP)
  - Adam Smith International (ASI)
  - Academy of Educational Planning and Management (AEPAM)
  - Japan International Development Agency (JICA)
  - UK Department for International Development (DFID)

2.4.2 Primary Data Sources

Primary data sources included documentation resulting from the Evaluability Phase – the completed evaluability questionnaire, documentation provided by Deputy Director EMIS, and information gathered during the site visit.

2.4.3 Secondary Data Sources

This included examination of EMIS data available on ESED website,[81] and viewing of SMIS system and IMU dashboard via links and login credentials provided, and other reports found online shedding light on different aspects under study

2.4.4 Qualitative and Quantitative Data Analysis Methods

The study was mainly qualitative. Quantitative data analysis, such as analysing EMIS data for consistency and quality, was beyond the scope of this Review.

Some analysis of trends in the ASC data were carried out, as the Statistical Reports produced by the EMIS cell do not contain such time series analysis. The analyses examined changes in a number of key ASC-based indicators over the period 2014-15 to 2018-19,[82] the period preceding the start of the current ESP to the most recent year, which corresponds to year 4 of the 5-year plan. A similar analysis was also carried out of student and teacher attendance rates, obtained from the IMU dashboard.[83]

[81] Elementary and Secondary Education Department, Government of Khyber Pakhtunkhwa. https://www.kpese.gov.pk/

[82] Elementary and Secondary Education Department, Government of Khyber Pakhtunkhwa. (n.d.). Independent Monitoring Unit Dashboard. http://175.107.63.45/NewIMUSite/index.aspx

[83] Education Management Information System, Annual Statistical Report, 2014-15; 2018-19, Elementary and Secondary Education Department, Government of Khyber Pakhtunkhwa. 2015; 2019.

2.5 Ethical Considerations and Inclusiveness

The Review has considered throughout issues of equity, gender equality and human rights, in line with UNICEF's Evaluation Policy[84] and the United Nations Evaluation Group Norms and Standards.[85] The consultant adhered to UNICEF's Procedure for Ethical Standards in Research, Evaluation, Data Collection and Analysis.[86]

There are three main tenets of research ethics that the consultant aims to uphold in the Review:[87]

i. Ensure informed consent from all respondents.
ii. Ensure the sensitive treatment of vulnerable respondents, especially children, or data pertaining to such persons.
iii. General data confidentiality.

Efforts were made to ensure all respondents understood exactly how the information they have provided was to be used.

A gender lens cut across all stages and components of the Review, to assess whether interventions affect one gender more than others, as per UNICEF Guidance on the Integration of Human Rights and Gender Equity in Evaluation (2014).[88] Various dimensions of equity were examined to see if the interventions have differential impacts on distinct categories of beneficiaries, such as disability, wealth and location. Training materials, guidelines and policy documents, where feasible, were evaluated to determine the extent to which they promoted gender equality and inclusiveness, and the extent to which they contribute towards promoting equality.

2.6 Review Limitations

All Reviews are limited by resources. The Review Phase was conducted over a period of three months which included 13 days of field work. These efforts were supported by inputs from UNICEF ROSA. The time constraints limited the extent to which the consultant could undertake fieldwork and analyse results. In Khyber Pakhtunkhwa, the EMIS involved many systems and processes. The depth of the Review, as in all reviews, is reflective of the time that was available.

For Khyber Pakhtunkhwa, due to security considerations the visits to schools were limited to 2 Higher Secondary schools, and also there were no visits to district or local office. Instead a

[84] UNICEF, Revised evaluation policy of UNICEF (UNICEF, 2018), https://www.unicef.org/about/execboard/files/UNICEF_Revised_Evaluation_Policy-2018.01.30.pdf, accessed on 15 April 2019.

[85] UNICEF, United Nations Evaluation Group, (*UNEG) Norms and Standards for Evaluation* (UNICEF, 2016), http://www.unevaluation.org/document/detail/1914, accessed on 15 April 2019.

[86] These are often adopted in UN evaluations. Director, Division of Data, Research and Policy, 'UNICEF procedure for ethical standards in research, evaluation, data collection and analysis' Document Number: CF/PD/DRP/2015-001 (Director, Division of Data, Research and Policy, 2015).

[87] Likewise, conventional ethical guidelines have been followed during the Review. Specific reference has been made to the United Nations Evaluation Group Norms and Standards and Ethical Guidelines (2008), as well as to UNICEF's Evaluation Policy (2016), the United Nations Evaluation Group Guidance on Integrating Human Rights and Gender Equality in Evaluation, the UN SWAP Evaluation Performance indicator, the UNICEF Procedure for Ethical Standards in Research, Evaluation and Data Collection and Analysis, and UNICEF's Evaluation Reporting Standards. Good practices not covered therein were also followed.

[88] UNICEF, United Nations Evaluation Group (*UNEG) Guidance on Integrating Human Rights and Gender Equality in Evaluation* (UNICEF, August 2014), http://www.unevaluation.org/document/download/2107, accessed on 15 April 2019.

session was held where representatives from a number of districts and schools came to ESED. This was helpful but was not as informative as site visits would have been.

3 Main Findings

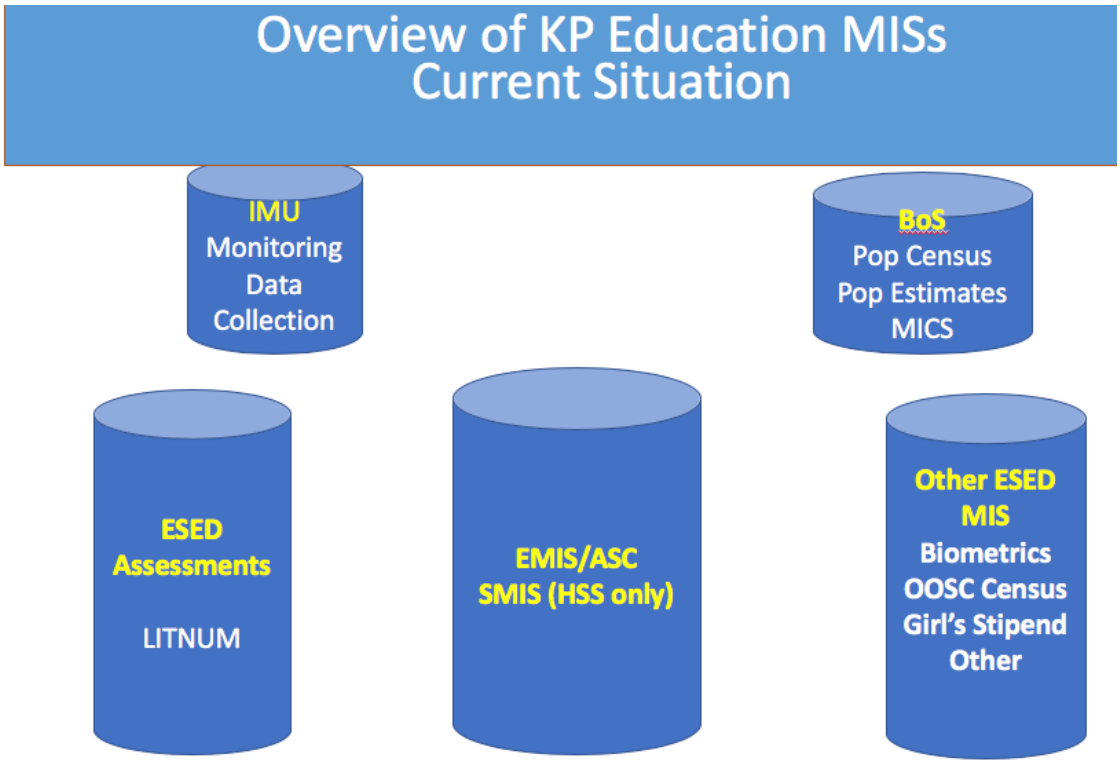
3.1 Overview of the Khyber Pakhtunkhwa EMIS

3.1.1 Current Situation of EMIS

Figure 3.1 provides an overview Khyber Pakhtunkhwa Education MISs – the current situation.

EMIS based on the Annual School Census is the currently the central MIS. This EMIS corresponds to a traditional EMIS, based on questionnaires completed annually for each school. Results are stored in a database, with historical data available since EMIS began in 1992. The main product from EMIS is the Annual Statistical Report. Since 2017, the Independent Monitoring Unit has been responsible for collection of EMIS data from schools using a mobile collection app.

Figure 3.1: Overview of Khyber Pakhtunkhwa Education MISs - Current Situation



Notes: Synthesis of information gathered by EMIS expert during meetings with ESED senior leadership.

The School management Information System (SMIS) is being developed to eventually replace EMIS as the central vehicle to which other MISs would be linked. SMIS involves collection of individual student data by schools, including collection of equity variables, such as disability, member of religious or ethnic minority, language spoken at home, etc, and maintaining this information up to date. SMIS also includes individual teacher data and data on the school similar to what is currently collected in the ASC. To date SMIS has been implemented for Higher Secondary Schools. There have been some issues that need to be addressed before SMIS is rolled out further.

To support implementation of various actions under the 2015 ESP, a number of program-specific MISs were developed. One example is the Girls Stipend MIS, which involved capture of individual student data for Girls' Middle Schools, tracking of individual student attendance and direct disbursement of stipend to students maintaining an 80% attendance rate monthly. The program specific MISs are described in Section 3.2.10. Ideally had SMIS been implemented and operational, the program-specific MISs would have been linked to SMIS. For example, if an MIS required use of individual student data, this would be achieved via linkage to SMIS. However, in the absence of a fully implemented SMIS, the programme-specific MISs were developed as standalone systems, allowing for later linkage to SMIS at such time as SMIS is implemented. This has not been an ideal approach to development of an integrated EMIS, but it did allow for the programme-specific MISs to be introduced as needed.

The Independent Monitoring Unit is responsible for monthly monitoring of teacher and student attendance in all public schools. Its staff of 500 Monitors is also responsible for data collection of the Annual School Census.

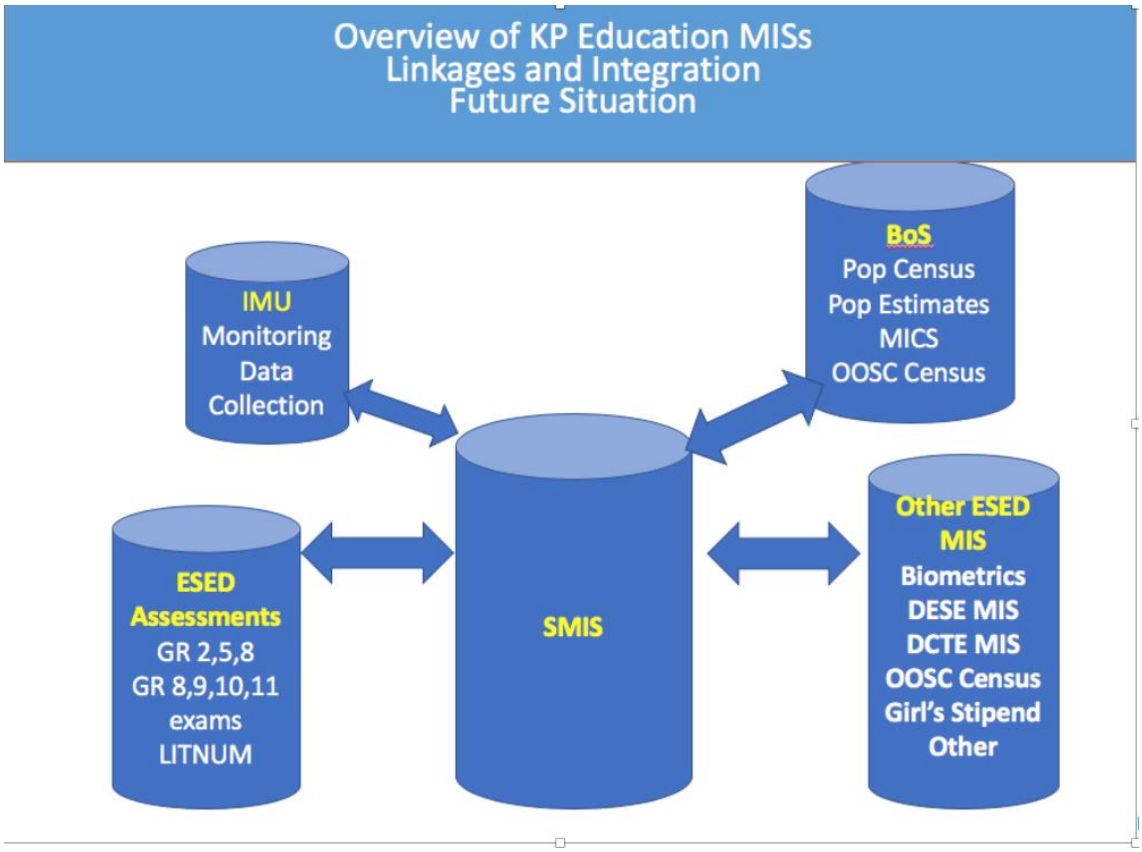
The result is that the current situation follows a silo approach – a number of independent systems with little or no linkages between them.

3.1.2 View of a Future Integrated EMIS

In the future, it is anticipated that SMIS will replace the EMIS based on the Annual School Census as the central MIS. SMIS will be an MIS that functions in real-time and that is fully accessible to and is used for both Management and Information purposes at all levels - schools, districts, and the provincial level. At its core will be individual student level data, and individual teacher level data, which are continuously updated at the school level. The individual student and teacher data will contain data on equity variables. SMIS currently contains data on disability status, member of ethnic minority, language spoken at home, and orphan status. Occupation of father (a proxy for socioeconomic status), and attendance at pre-school/ECE are not currently included in SMIS but are in the school registers and could be added to SMIS. The equity variables will permit the analysis of the performance of the education system by equity dimensions, to see how disadvantaged groups fare in education – which is at the core of the Sustainable Development Goal 4 on education, and which is not possible with the aggregate data in the EMIS based on the ASC.

SMIS will also contain individual data on teachers, and data on schools similar to that currently collected in the ASC, and these data will be kept up to date as changes occur.

Figure 3.2: Overview of Khyber Pakhtunkhwa Education MISs: Future Integrated EMIS



Notes : EMIS expert's view of desired future evolution of EMIS based on situational analysis carried out during site visit and literature review.

SMIS will contain all the data currently collected on an annual based via the ASC, so once SMIS has been successfully implemented (for a sub-sector) there will be no need to conduct an ASC as is currently done. It will still be useful to have an annual snapshot of the education system, and this can be achieved by archiving a copy of the SMIS at the reference time for the ASC, and using it to derive all the indicators and analysis reported on the education system on an annual basis.

It is anticipated that there will be a phased implementation of SMIS by level of education, starting with Higher secondary (already done), and ending with primary education. The implementation at each level should be preceded by piloting, in order to iron out problems prior to large scale implementation.

In addition to the programme-specific MISs, the two Directorates of ESED, the Directorate of Elementary and Secondary Education and the Directorate for Curriculum and Teacher Education require MISs modules to manage their work processes which have yet to be developed. These MISs should be developed to be fully integrated with SMIS, and not as standalone systems.

As SMIS gets implemented sub-sector by sub-sector, it will provide the occasion where other currently standalone MISs can be integrated with SMIS. Taking the example of the Girls Stipend MIS (GSM), at its core is a list of all students in Girls Middle Schools, which needs to be

maintained, and attendance kept for the students. Up to date student lists and student attendance data will both core features of SMIS. Integration would be achieved by having GSM access the student lists and attendance data maintained by SMIS, while GSM would deal with functions unique to the Girls' Stipend Program.

Another example of integration is LitNum (Sect 3.2.7). LitNum is an assessment of literacy and numeracy learning conducted on a sample of Grade two students. In the future, integration with SMIS can be achieved in the sampling of students for the assessment, and in the analysis of results. SMIS will have individual data on Grade 2 students. The student lists can be accessed, the sampling methodology applied, and the selected students for each occasion LitNum is carried out can be pre-loaded to the mobile devices used to administer the assessment. Since LitNum will be conducted on multiple occasions within the same Grade 2 classes, sampling from the SMIS student lists will permit use of selection methodologies that minimize the chances of the same students being selected on repeated occasions. Also, the assessment app will include the SMIS student identifier in the results it reports. This will create a student level linkage between LitNum database and SMIS, and will permit richer analyses of LitNum, by being able to analyse the LitNum results disaggregated by equity status of students, and by teacher and school characteristics contained in SMIS.

These examples point to another potential way to prioritize the implementation of SMIS. After it has been successfully implemented in Higher Secondary, next priorities could be Girls Middle schools, and the grade 2 class of primary schools – in order to begin the integration with GSM and LitNum at the earliest juncture possible.

Other MISs need to be examined, in terms of how they will be integrated with SMIS. The principal will be that in an integrated system, there will be only one master list of students, and only one master list of teachers in schools. SMIS will contain core identifying information on each student and teacher, such as a unique student id (if adopted), name, age/sex, and photo. SMIS will also include attribute data, for example for students' data on disability, grade, etc. Other MIS modules will be able to access the SMIS student (teacher) data, and so never have to generate their own lists of students (teachers). Other MISs will contain additional attribute data collected by those systems – for example, the biometrics attendance module will contain teacher attendance data; and a future Girls Stipend Module would contain data on girls attendance, qualification for stipend, account data, and would transfer the stipend to the student account. Linkage of individual MISs to SMIS will permit analysis of relationships between one or more other MISs and student, teacher and school characteristics contained in SMIS.

A roadmap needs to be developed, expanding on these principles, identifying an overall systems architecture and indicating how and in what sequence SMIS will be implemented, new MIS needed will be developed, and integration of the program specific MISs with SMIS will be achieved.

3.2 Description of Main Elements of EMIS and opportunities for strengthening

3.2.1 EMIS (ASC)

EMIS based on the Annual School Census is currently the principal MIS for ESED. It has been conducted annually from 1990 to present, and the EMIS cell has a repository of all EMIS data collected over this period.

The ASC collects comprehensive data of on students, teachers and schools. Tables 3.1 and 3.2 summarize the information collected on each, distinguishing between individual versus aggregate data.

Table 3.1: Student and teacher data collected in Annual School Census

Aggregate Student information	Individual Staff Data
- Enrolment by age, class and gender - Enrolment non-Muslim by class and gender - Repeaters by class and gender - Enrolment and number of sections by subject (science, arts, computer science) for classes 9 and 10 - Enrolment and number of sections by detailed subject for classes 11 and 12	**Personal identifiers:** - Name - father or husband's name for female teachers - Accounts Office Personal Number - National Identity Card (NIC) number - Date of birth - Dates of appointment – first appointment, to current post - Highest professional qualification - Highest academic qualification - Details of transfer

Source: Data collected for this report through the evaluability questionnaire

Table 3.2: School data collected in Annual School Census

Baseline information	Annual Data: infrastructure and text books
School identifiers - EMIS Code - School Name, Gender, level - Telephone number - Ownership - Date of establishment, upgrading **Geography** - district, tehsil,…., street name - Urban or rural - Coordinates	- Boundary wall - Other security measures - Free textbooks by class and subject - office furniture
Bi-annual Data: Infrastructure/ IT	**Biannual Data Parent Teacher Council and Stipends**

- **Infrastructure (Y/N)** :
  ○ HT office
  ○ science lab
  ○ staff room
  ○ library
  ○ clerk room
  ○ examination hall
  ○ playground
  ○ interactive white board
- cleanliness
- area covered and open (for potential to add new classrooms)
- nature of construction
- number of classrooms and other rooms requiring re-construction or major repair
- desks, chairs for students
Information Technology
- Computer lab
- Internet connectivity
	Parent Teacher Council
	- Existence Y/N
	- Date established, date of last election
	- Met last month Y/N
	- Trained Y/N
	- Chairperson's name
	- Financial Information
	  - Bank account
	  - Amount received this year
	  - Amount spent
	  - Balance
	Stipend
	- No. students by stipend program

Source: Data collected for this report through the evaluability questionnaire

In 2018-19 the ASC was extended to include private schools for the first time. Previously only government schools were covered. A special study of private schools had been carried out in 2013,[89] and data from this survey have been projected forward, for example when deriving EMIS based estimates of OOSC.

[89] Information collected via the Evaluability Questionnaire.

Prior to 2017, the method of collection was via a paper questionnaire distributed to schools, with the head teacher completing the questionnaire. Completed forms were returned to the District Education Office, where data entry took place.

In 2017-18, a different collection methodology was introduced. Questionnaires are still distributed to schools, ahead of the 31 October Reference date, and are completed by headteachers. During the months of November and December, IMU monitoring activities are suspended, and the DCMAs visit each school, verify the data collected by the headteacher, and enter into a mobile collection app.

Data verification is via physical inspection. In order to streamline the data entry, for some data elements such as baseline school and teacher data (such as teacher name, identifiers, education, etc.) are prefilled in the app, and these fields are updated only as needed to reflect changes.

The data are sent to the IMU database, where IMU does further editing of the data. The data are then provided to the EMIS cell who are the custodians of the data, and who undertake further cleaning and of the data, and production and dissemination of the Annual Statistical Report. The new data collection methodology has significantly improved the timeliness of the ASC. Previously the results were available in April, but this was too late for Departmental budgeting exercises. Results are now available by February or sooner, in time for budgeting purposes.

3.2.1.1 Annual Statistical Report

The principal product resulting from the ASC based EMIS is the Annual Statistical Report. This report is available in PDF format on the ESED website, both the most recent version, and historical reports dating back to 2009-10.[90] In addition to the reports, there are a few tables of data for each of the last two years, also in PDF format. Users within ESED wanting data to work with, make a request to the EMIS cell, who produce the requested data. The same holds for non-ESED users.

The ASC report includes numerous tables of education data and indicators, but also has gaps in the indicators presented. The data and indicators presented are pretty much the same each year, with little change over time. For example, there have been no new sections added containing indicators tracking priorities of the ESP. Also, while there is increased policy interest in Out of School Children (OOSC), no indicators shedding light on OOSC have been added to the report.

Moreover, the report should not be just a report on the ASC, but a report based on data from any and all sources shedding important light on issues in education. These issues are discussed in more detail in Section 6.3.1.3.

3.2.1.2 Accessibility of ASC data

The Annual Statistical Report is an outdated mode of data dissemination, which has the net effect of reducing access to the data. A data dissemination system is needed, that features a dashboard, allowing users to easily select predefined tables of key indicators, and well as to specify customized tables to be generated by the system. Such a data dissemination system can be public, or internal to ESED. To provide data to all education stakeholders, and in the interests of transparency and accountability, it would be preferable to make the data dissemination system

[90] Elementary and Secondary Education Department, Government of Khyber Pakhtunkhwa. https://www.kpese.gov.pk

public, or there could be public and internal versions. A public system should not permit access to data on individuals, either teachers or students.

A new **Business Intelligence (BI)** Initiative by the Home Department in which EMIS Unit is representing ESED has potential to fulfil this need. Other Departments participating include Health, Higher Education, Finance and Taxation. Business Intelligence software[91] is a powerful tool for query of databases. Preliminary results to date from the BI initiative, show it can be used to query EMIS data. An important feature needed in this development, will be to allow queries with a time dimension, displaying indicators over a specified number of years.

Another feature needed is a user-friendly interface, allowing the user to select a table from a pre-defined list, or to create a customized table, by selecting the topic of interest, and the dimensions required (time period, breakdown by gender, level of education, etc.), using a point and click approach.

It would be useful to demonstrate the system and obtain feedback from eventual users of the system, during the development phase of this initiative.

Other potential tools that can be part of an eventual solution that ought to be examined are the Integrated EMIS developed by ASI, and which is being taken over by EMIS Unit, and a Decision Support System developed earlier by EMIS cell, but which has fallen into disuse in recent years. Due to time constraints, these could not be examined during the site visit.

3.2.2 School Management Information System

In the future, as per Figure 3.2, the School Management Information System is planned to replace the EMIS based on the Annual School Census as the central EMIS vehicle.

Table 3.3 below examine the features of EMIS (ASC), the data collected by the Independent Monitoring Unit (see Section 3.2.3), and the desired features of SMIS, some of which are yet to be developed.

[91] Wikipedia. n.d. Business Intelligence software. https://en.wikipedia.org/wiki/Business_intelligence_software

Table 3.3: Comparison of EMIS vs IMU vs Desired Contents of SMIS

Features	EMIS based on Annual School Census	Independent Monitoring Unit	School Management Information System (Desired Contents)
Purposes	• MIS for Management of Education System at Provincial and District Levels	• Monitoring of Key Indicators of System Performance at Provincial and District levels	• MIS for Management of Education System at Provincial and District and School levels
Frequency	• an Annual Snapshot relative to an 31 October reference data	• Monthly (each school is visited once per month)	• real-time database – updated as changes occur
Data Products	• Annual Statistical Report • 4-5 months after start of school Year	• Online dashboard • Updated In real-time as monitoring is done	• Online indicators available in real time, at school, district and provincial levels • Reporting capability to be developed
Student Data	• aggregate data by school: - enrolment by age, gender, grade - disability, repeaters, and by gender, grade	• aggregate data by school: - enrolment by gender	• Individual student data by school: - age, gender, grade - personal identifiers such as CNIC of parents - equity variables: disability, language spoken at home, parental SES • Equity variables will permit examination of education data by equity group as required for SDG 4
Staff Data: Teachers	• Individual data by school with: qualifications, education, subject taught, age, …	• aggregate data by school: - number of teachers	• Individual data by school with: qualifications, education, subject, age, …
Staff Data: Non-Teachers	• Individual data by school: by gender and position	• Aggregate data by school: number of non-teaching staff	• Individual data for non-teaching staff per school: by gender and position
School Facilities and Supplies	• School supplies • School infrastructure (collected biannually)	• Status of 4 facilities: toilets, water, electricity, and boundary walls	• School facilities and supplies • details as per ASC/IMU, but continuously updated
Attendance Data	• None	• Aggregate Teacher and Student Attendance - on day of monthly school visit	• Individual daily attendance for teachers and students • To be reported via Biometric Attendance System (BAS), where implemented • Otherwise via capture results of manual attendance taking
Data Products available to Schools	• Student report card (yet to be developed/implemented) - can be used in preparation of School Improvement Plan (SIP)	• Latest status of facilities can feed into SIPs • Regular attendance data can help in managing attendance	• Detailed facilities and supplies data can feed into SIPs. • Daily individual attendance data of teachers and students can help in managing attendance • Individual student and attendance data used to manage program activities at a school, such as: Drop-out prevention, Girls' stipend

Source: Information on EMIS based on Annual School Census and on Independent Monitoring Unit obtained via meetings with leadership of EMIS and IMU during site visit, and review of literature, websites and dashboards. Information on uses of desired contents of SMIS based on analysis by EMIS expert.

Some of the key differences are further discussed below:

- **Individual Student data under SMIS versus Aggregate student data under ASC based EMIS.** Increasingly under the Sustainability Development Goal Indicator SDG 4, there is interest in addressing equity issues in education. With collection of aggregate data under ASC based EMIS, it was possible to do a first order analysis of equity. For example, taking the example of Disability under EMIS, the number of students with each type of disability by grade is collected. This allows reporting of disability rates by grade level, which can show the progression of disabled students through the system. However, when disability status is collected at an individual level in SMIS, then most education indicators can be examined by disability status – for example dropouts, examination results, attendance. Such deeper analysis can help to identify where barriers are occurring for the disabled populations, and once identified, to find ways to address them. Under EMIS based ASC, the number of equity

dimensions on which data are collected is few, but under SMIS, additional equity variables will be added such as language spoken at home vs language of instruction, religion, parental SES, distance from school, etc.

- **Real Time data to improve ease of school management and monitoring tasks**. SMIS will include daily attendance data on students and teachers. Efforts will be made over time to collect as much of this data as feasible using the Biometric Attendance System, reducing the time spent by teachers in collecting this data, and allowing more time for teaching. SMIS will make all school data and reports accessible to schools. It will be used for ongoing management of programmes and activities, at school and higher levels. This will need to go hand in hand with capacity building on use of the system, generation of reports, and use of the data for school planning purposes. Providing feedback to schools on their own data and how to use it has always been a weak point of ASC-based EMIS, which is the common situation and is not unique to Khyber Pakhtunkhwa.
- **Real Time data to improve District and Provincial management and monitoring tasks**. Because it will contain real-time data, for example, on teacher and student attendance, and in use of school budgets, and this data will be accessible to district offices, it can be used for real-time follow-up and monitoring by Districts. Likewise, SMIS will provide real-time view of education for management and monitoring purposes at the Provincial level. All senior leadership will have access to SMIS data and will receive training in report generation and its uses for management and decision making.
- **Annual Snapshot of Education System.** SMIS can become the principal Departmental MIS as it is successfully implemented at different levels of education, replacing the EMIS based on the Annual School Census. All the data collected in ASC (and more) will reside in SMIS. Even as the Annual School Census is phased out, there will still be a need for a point-in-time snapshot of the Education System, as the basis for annual reporting. This can be achieved by deciding on a reference date (currently for the ASC it is 31 October), and taking a copy of SMIS database on that date, for use in annual reporting purposes.

3.2.2.1 Early experiences in Implementation of SMIS and Lessons Learned

Khyber Pakhtunkhwa undertook to implement SMIS in Higher Secondary schools in 2017-18. The rationale for this choice was that Higher Secondary schools typically have electricity and availability of computers for administrative purposes, and individuals at the schools with basic computer skills in use of computers. Also, as part of the initiative to introduce biometrics for teacher attendance in Higher secondary schools, internet connectivity is being established for these schools.

The implementation of SMIS for this sub-sector involved step-down training of 4 days duration, with a designated school SMIS-focal person.

The status of the SMIS implementation was examined during the mission via a round table session with District and School officials, via visits to two advanced schools to view their implementation and use of SMIS, and through review of the system and status of implementation with officers in the EMIS cell.

The findings were: individual student data had been entered for 2017-18 for most higher secondary schools, little other data such as teacher or school data had been entered, the student data had not been updated to reflect the 2018-19 school year (with new students, etc), the SMIS focal points in both schools visited were not familiar with report generation and other modules of

the system, the principals had very little knowledge of the system, and no uses were being made of the system. Clearly, the implementation to date has been problematic.

One lesson learned emerged, in contrasting the situation of SMIS with that of the successful implementation of the Girls Stipend MIS (GSM). The GSM is a program-specific MIS that is fully operational and was introduced to monitor and administer Girls Stipends for Girls Middle schools. Under the program, monthly stipends are awarded to students maintaining an 80% attendance rate.

The system involved collection of individual student level data for all Girls' Middle schools, the tracking of individual attendance and calculation of monthly attendance rates. For qualifying students, the system generated money orders for distribution to the students.

Ingredients of success for the GSM were as follows:

- It is built around an application that is important to students and headteachers
- It is simple, but does what it is intended for
- No tablets or mobiles were provided, schools found way to implement it using personal devices
- Districts provided a backup for schools that couldn't do themselves.

In contrast, the implementation of SMIS:

- It is a complex system, too much to comprehend and make use of all at once.
- It was introduced with no programmes or usages depending on it.

3.2.2.2 Path forward for SMIS

SMIS remains of high strategic importance. Building on the lessons learned, a strengthening of both the functionality of SMIS and its implementation are needed.

Further analysis is needed on the path forward for SMIS. In particular, in terms of the issues related to the functionality of the SMIS, there is a fundamental question of what is the best route to follow: (i) making the changes to the existing SMIS, or (ii) redeveloping SMIS from scratch taking into account from the outset a full analysis of requirements of SMIS and requirements for integration needed with other modules. This further analysis should be undertaken as part of the development of the Road Map for IEMIS.

Issues related to Functionality of SMIS system

Development of New SMIS Module on Dropout Prevention

Development of a dropout prevention module within SMIS will give schools a tool that they can use to help reduce the number of dropouts. Dropouts are an important factor in OOSC and represent a lost opportunity for both the school system and the individual involved. This module will tie the SMIS to an important use of at the school level, something that has been missing to date. Key features of the dropout prevention module will be : (1) to automatically generate an SMS text to parents whenever a student is absent with an excuse (2) for cases of multiple absences exceeding an initial threshold, generation of a list, for the principal or other authorized person to make a phone call to parents, and (3) for cases exceeding a second thresholds, generation of a list for follow-up up action such as student counselling, parental visit. Such

measures would be difficult to do manually, but aided by SMIS have been proven feasible, and shown to reduce dropouts.

Consideration by ESED of a Unique Student Identifier and its use in SMIS and other EMIS modules

The 2009 National Education Policy[92] had as one of its policy actions, that has yet to be implemented:

> "Every child, on admission in Grade I, shall be allotted a unique ID that will continue to remain with the child throughout his or her academic career."

For the School Management Information System (SMIS), the availability of a unique student identifier is an important consideration. Its use by SMIS would permit tracking of students within education. It would enable identification of students who transfer between schools, and also the transition between different levels of education. It would also facilitate linkages of student level data between different modules of a future Integrated EMIS.

There would appear to be good potential for adoption of the Child Registration Certificate (CRC)[93] number as a unique student identifier. The CRC is a unique 13-digit ID issued to each child at the time of birth registration. Adults with a Computerized National Identity card (CNIC) issued free of charge by the National Database and Registration Authority (NADRA), can apply for CRCs for their children under the age of 18. An issue to examine is what percentage of new entrants to elementary school have a CRC, and to identify workarounds for those without a CRC. Those without a CRC include those whose birth was never registered and whose parents never requested a CRC from NADRA. Being in possession of and presenting a birth certificate (which also carries the CRC number) or a CRC issued by NADRA could be made a requirement for enrolment in school. A workaround could be to have parents provide this information later when not available at the time of registration, so that lack of documentation does not become a barrier to entering school. Use of CRC as a unique Student ID will also facilitate linkages of student level data in the future Integrated EMIS with other government of Pakistan databases, as discussed in Section 4.7.1.2.

Data Dissemination Module/System for IEMIS

The future Integrated EMIS needs to have a data dissemination capability built into it. Data dissemination capabilities could be built into each module of the Integrated EMIS, or a Data Dissemination System could be developed for IEMIS as a whole. The latter would be more powerful, as it could permit data outputs that combine data from different modules.

The data dissemination capability needs to feature dashboards, allowing users to easily select predefined tables of key data or indicators. At each level: provincial, district and school level, a number of standard reports will be defined to meet the needs of users. Additionally, there will be a capability for users to create customized tables, by clicking on data elements to be tabulated.

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[92] Ministry of Federal Education and Professional Training, Government of Pakistan. 2009. National Education Policy.

[93] National Database and Registration Authority, Government of Pakistan. n.d. Child Registration Certificate (CRC). https://www.nadra.gov.pk/identity/identity-crc/.

As noted in Section 3.2.1.2, the Business Intelligence initiative underway has potential to provide the tools and approaches to building this dissemination capacity.

Linkage and Integration of SMIS to other MIS modules

The SMIS should be the source of individual student and teacher data, that would be accessed by all other MISs using individual student or teacher data. A systems design is needed for what student and teacher data is contained within SMIS, and additional student variables are contained in other systems, and how these are linked.

As SMIS is implemented for different levels of education, the linkage of other MISs applicable to specific levels of education and SMIS should be considered. Two examples of linkages have already been described in section 3.1, for the Girls' Stipend MIS and LitNum, and the DCTE module is considered below. Other modules need to be similarly examined. Implementing the desired linkages will entail changes to both the individual MISs as well as to SMIS. The adoption of a Unique Student Identifier and its use in all modules containing individual student data will facilitate the linkages.

For the DCTE Examinations module (yet to be developed), linkage to SMIS individual student data would permit streamlining of procedures for registration of students, and for verification of IDs of those sitting for exams, as SMIS contains all student identifiers needed for these purposes, including name, student number, and photos. Pre-printed labels for each student's examination will contain codes permitting linkage of individual examination results to SMIS individual student data. This in turn will permit analysis of assessment results together with school and teacher characteristics, and equity background of student. This can permit the identification of factors associated with learning outcomes, then leading to design of targeted policy measures.

Operational Issues related to how the SMIS is rolled out and training needs

Relaunch SMIS in Higher Secondary Schools

Due to the problems associated with the initial introduction of SMIS to Higher Secondary Schools, it is recommended that the SMIS be relaunched at this level of education, with a version that includes the new modules above. The relaunch should be limited to selective modules of SMIS – including individual student and teacher data, collection of daily student and teacher attendance data, including the means of distinguishing between approved vs unapproved absences; and the introduction of a new drop-out prevention module.

The relaunch should be made with full support of Senior-most Departmental leadership, underscoring the importance of the initiative, uses and expected benefits. Its implementation and usage should also take the form of a directive, to be monitored as a performance measure.

Phased implementation to Other levels of Education

The approach of a phased implementation should be continued, starting with Higher Secondary, and once working, introduction to High Schools, then to Middle Schools, and finally to Primary. As each level is introduced, there is a need for sufficient training and support during start-up phase. Finally, part of the phase-in strategy should address the introduction and use of core modules of the system first, and introduction of further modules later, once core modules are fully operational.

3.2.2.3 Needs for IT equipment, Internet access, electricity in support of SMIS implementation

Higher Secondary schools were chosen as the first to implement SMIS, as there were no issues for them as regards equipment, internet or electricity. Higher Secondary schools have computers for administrative uses, they have grid electricity, and internet access. In addition, with the implementation of Biometric for teacher attendance, they were provided with solar back-up to the grid electricity, to provide uninterrupted electricity and internet access even in times of grid power outages.

To deal with these issues as SMIS is extended to school at lower levels, a first step will be to develop an inventory on availability of computers for administrative purposes, and the availability and reliability of grid power and internet access. These questions could be addressed in a future ASC, by expanding on the existing questions on these topics.

Consideration also needs to be given on what level of Internet connectivity is required for SMIS. Can the system function in an off-line mode within a school, and later sync with the online SMIS when an internet connection is available? The uploading could be either direct uploading from the School once there is internet connectivity at the school, or a two-step uploading, with a first step being uploading of copy of SMIS for the school into the District Officer's device (tablet or mobile), and then an uploading and syncing to the online SMIS database once back at the district office, and in the presence of a rapid and stable internet connection.

Such a method would mean that there would be delays in information from some schools getting reported to the online database but providing the visits by District officials are fairly frequent, the updates would be reasonably timely.

An ongoing requirement will be a reliable power source for whatever devices will be used for SMIS at the school level. If a tablet is being used, then solar chargers can be used as a back-up to grid power, or as the power source for schools that are off the grid.

Given the large amounts of data that need to be entered into SMIS (individual student data, and daily teacher and student attendance data), a computer (in schools already having a computer for administrative purposes) or a tablet with a physical keyboard would seem to be preferred equipment. In contrast, mobile phones have limitations for data entry and for viewing larger amounts of data.

Piloting of different approaches at early phases can help to identify successful approaches. Also, there is much to be learned from experiences in other jurisdictions that have adopted SMIS, in terms of their approaches to these issues. The advantage of an approach informed by lessons learned of others, and by piloting of promising approaches, is workable ensure that both workable and cost-effective solutions can be found early on and can inform the implementation planning and the budgeting and procurement of equipment.

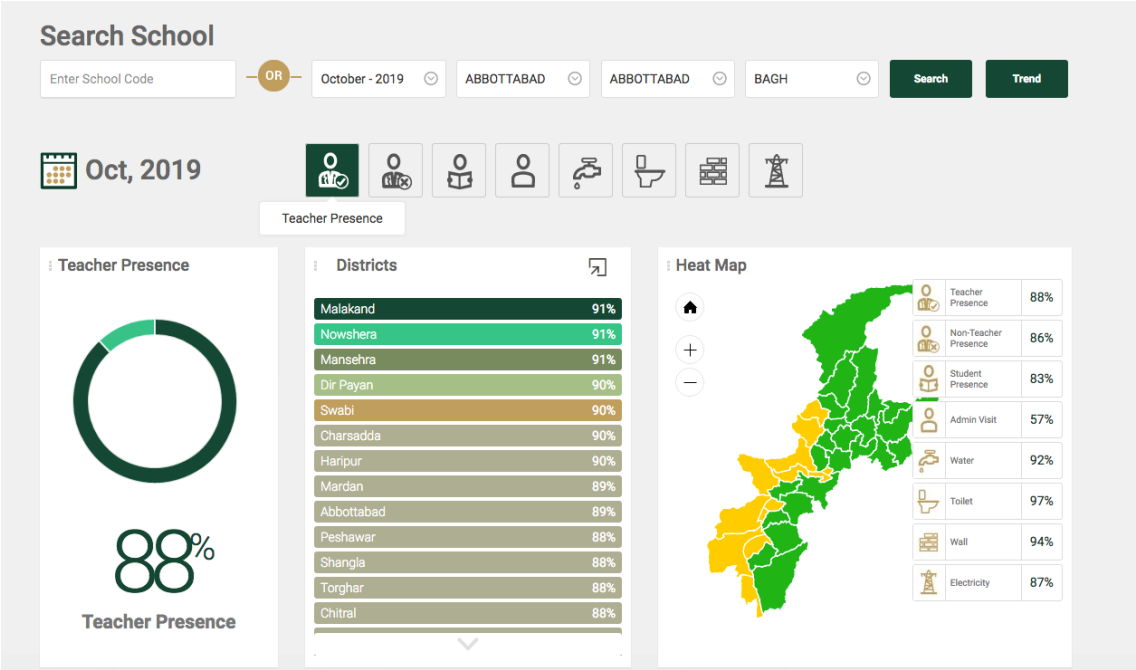
3.2.3 Independent Monitoring Unit

The Independent Monitoring Unit was established on a project basis in 2014. It has a field force of about 650 Data Collection and Monitoring Assistants (DCMAs). Schools are monitored at least once per month during the 8 months while schools are in session. Visits by DCMAs are unannounced, occurring at different dates each month, so as to be unpredictable. Also, the

assignment of DCMAs to schools is randomized. About 10% of schools are visited a second time each month – so that principals and teachers are not tempted to "ease up" after the monthly visit. At each visit, teacher attendance and student attendance by grade are taken by means of a headcount. The DCMAs also collect data on school infrastructure – the availability and working status of a boundary wall, electricity, water and toilets. These are physically verified each month by the DCMA. The data are collected on Mobile devices and transmitted to the IMU database, which is online and updated live as data are received. The IMU database is publicly accessible and allows users to view student and teacher attendance rates nationally and by district for any month since collection began in 2014. Attendance rates are not publicly available on the dashboard at present at the tehsil or school level.

Figure 3.3 is a screenshot of the IMU dashboard[94] showing Teacher Attendance rate for the Province and by District for October 2019.

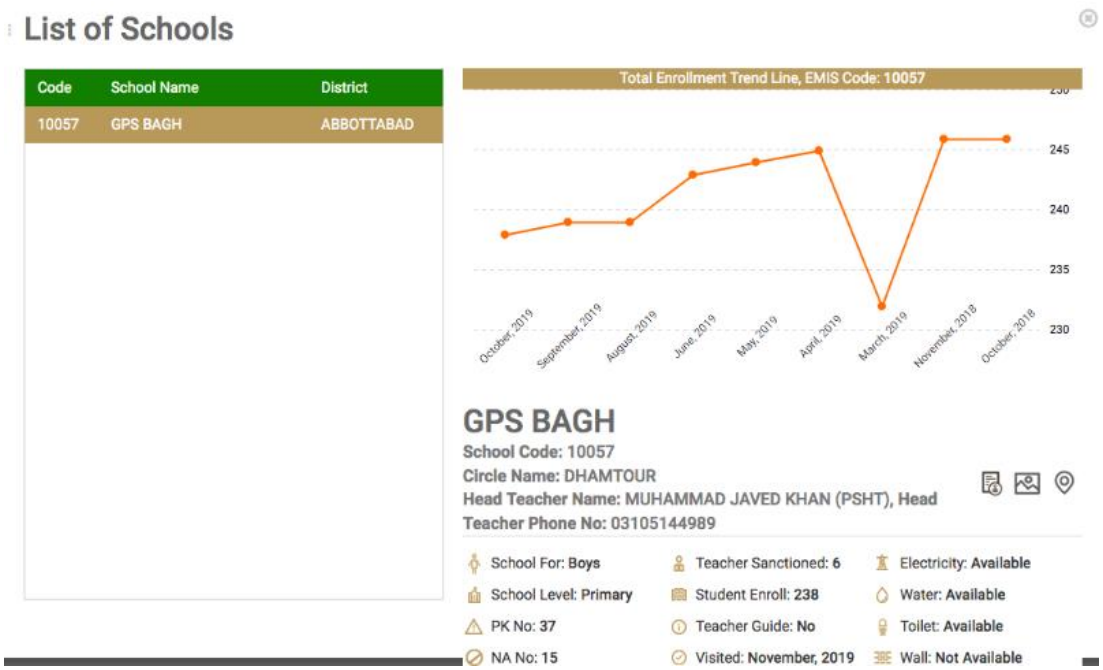
Figure 3.3: IMU Dashboard showing Provincial and District Teacher attendance Rates



Source: Elementary and Secondary Education Department, Government of Khyber Pakhtunkhwa. n.d. *Independent Monitoring Unit Dashboard.* http://175.107.63.45/NewIMUSite/index.aspx

[94] Elementary and Secondary Education Department, Government of Khyber Pakhtunkhwa. n.d. *Independent Monitoring Unit Dashboard.* http://175.107.63.45/NewIMUSite/index.aspx.

Figure 3.4: IMU Dashboard Showing School Level enrolment by month



Source: Elementary and Secondary Education Department, Government of Khyber Pakhtunkhwa. n.d. *Independent Monitoring Unit Dashboard.* http://175.107.63.45/NewIMUSite/index.aspx.

As shown in Figure 3.4, the IMU dashboard can also display basic information on the school, and plots student enrolment over a 12-month period for the school. The ability to display school level information in this dashboard is good, but it would be strengthened if the data viewable at the school level were the key elements being monitored by IMU – student and teacher attendance rate, availability of boundary wall, water, electricity and toilets.

At the outset of monitoring by IMU, a number of non-functional schools without a teacher present were identified. These cases were referred to District Authorities for resolution. The independent monitoring identifies teachers who have been absent without approval both on the day of the visit and during the month by inspection of teacher attendance records. These findings are reported to the District Education Group (DEG). The DEG meets monthly to who review each case. It ensures non-functional schools are staffed and decides on salary deductions for teachers absent without approval. Their decisions are passed on to the pay system for action. The monitoring has resulted in considerable savings over time due to the salary deductions, and it has resulted in a number of chronically absent teachers being dismissed.

In August 2019, the Khyber Pakhtunkhwa Cabinet approved the Education Monitoring Authority Bill 2018[95] establishing the Khyber Pakhtunkhwa Education Monitoring Authority. Under the act, the EMA will "shall establish, control, run and continuously improve an effective system of monitoring of entities", where entity means an elementary and secondary school in the public sector of the Province. Functions of the authority include submission of an annual report to the Secretary ESED, and "to recommend to the Department measures required to be taken to improve the working of entities". The act provides for a director of the authority to be posted by

[95] Government of Khyber Pakhtunkhwa. 2019. *Education Monitoring Act,* https://www.pakp.gov.pk/bills/the-khyber-pakhtunkhwa-education-monitoring-authority-bill-2019/.

the Government, and for District Monitoring Officers, also to be posted by the government from amongst qualified officers. The Authority may constitute District Steering Committees, to meet and take action on recommendations and findings from the monitoring done by the Authority. Further, on creation of the EMA, “all posts sanctioned for the Independent Monitoring Unit and its field formations shall be transferred to the Authority and its field formations respectively” and employees of the IMU in these posts “shall be deemed to have been appointed to these posts”.

In this document we refer to the new authority under its old name, the IMU, as this name is still in current use.

Current activities of the IMU include:

- School Monitoring in all public schools in 6 months of the school year. As of Sept. 2019, the School Monitoring has been extended to Newly Merged Districts (NMDs). One hundred and thirty-eight DCMAs were recruited for this.
- Collection of the ASC data. Since 2017, IMU has collected Annual School Census data in November and December.[96] DCMAs use an android app to collect the data for each school. Data are transmitted to the IMU database, where the data are cleaned. This collection methodology has resulted in improved timeliness in the release of ASC data.
- LitNum. LitNum is a new vehicle for assessment of literacy and numeracy leaning outcomes of Grade 2 students, being introduced by ESED (see Section 3.2.7). IMU has been identified to collect the LitNum assessment and have developed a mobile app for this purpose with two modules: (i) a management module for use by DCMAs, which is used to randomly select students for the assessment, and (ii) the assessment. Students, if able, can use the mobile phone themselves to take the assessment. In other cases, the student looks at the screen, selects his/her answer, and the DCMA enters the answer.

The LitNum assessment will add significantly to the workload of DCMAs. It takes 5-6 minutes per student, and with selection of 9 students per school, it will take about an hour per school, as compared to about 20 minutes on average for the Monitoring in primary schools.

It is not clear how IMU can handle this additional workload, given that they have not been authorised to hire more DCMAs. Some other options are being examined, including assigning the responsibilities for collection of LitNum to District Offices, who have recently been approved 3000 additional posts for School Leaders, or splitting LitNum collection responsibilities between the two.

3.2.3.1 Recommendations

Strengthen coordination between IMU and EMIS unit

Data Analysis Capacity Needed

IMU has identified a need for data analysis capacity, at minimum to be able to analyze the monitoring data for identification of problems that need to be addressed, and for preparation of the annual report.

[96] See Section 3.2.1 for a description of the collection methodology.

Improvements to Dashboard

A few modifications to the publicly accessible Dashboard would improve its usefulness to users. The dashboard can be extended to show results at a tehsil and school level, similar to what is currently displayed at the province and district level. Months where Monitoring data are not collected – the summer break (June, July and August), and months when the ASC collection takes place and monitoring is not done (November and December) should be flagged as such.

Continuously Improving Monitoring

The Monitoring Authority Bill mandates IMU to continuously improve the monitoring of entities. The IMU should engage with the rest of the department to identify ways in which monitoring can be improved. The priorities for monitoring may shift over time.

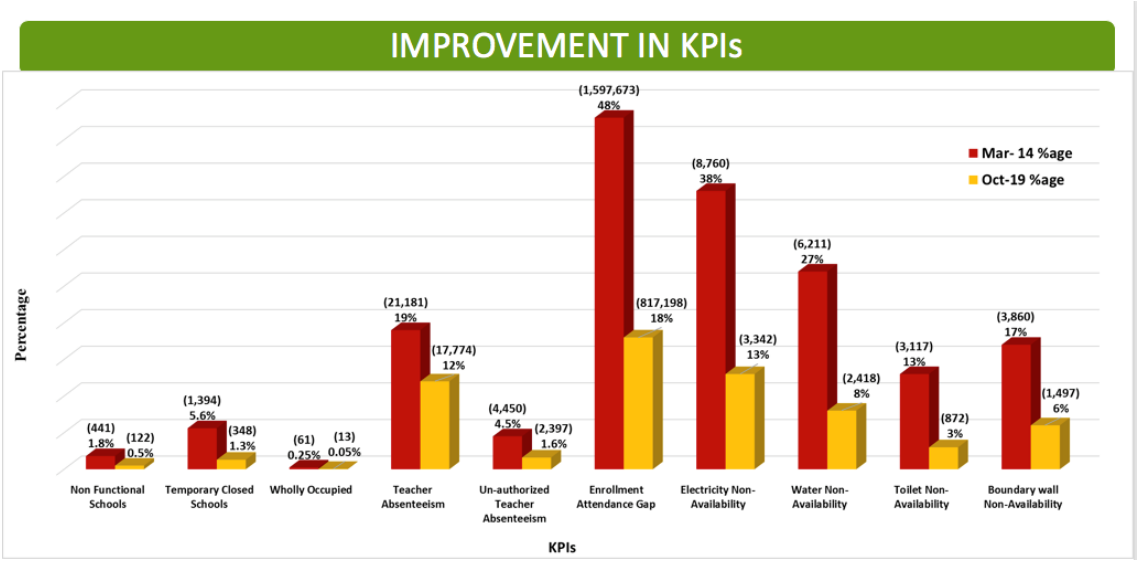
Figure 3.5, from an internal presentation by IMU,[97] shows the improvement in items monitored, since monitoring first began in March 2014 to October 2019. Figure 10, obtained by downloading monthly data from the IMU dashboard[98] and computing annual averages, examines the improvements in annual average data between 2014 and 2019 respectively. Basing the analysis on annual averages removes instability of comparisons between two monthly data points, especially when one of them was the first month of the program. The latter analysis gives quite a different picture of change in student absenteeism, falling from 26% to 22% over the period (versus from 48% to 18% in Figure 3.5). In the latter analysis teacher and non-teacher absenteeism fell from 19% to 13%, and 17% to 15% respectively. These findings point to the positive impact IMU monitoring has had on teacher and student attendance. See Section 1.7 for an analysis of the monitoring of school facilities in relation to targets under the ESP 2015.

In light of increasing demands on the use of IMU for data collection and monitoring capacity, such as for LitNum, strategies to free up capacity of the DCMA field force such as taking attendance on a sample basis could be investigated. If the requirement is for monitoring of attendance at a district level, this could be achieved via a sample of schools each month. Also, the methodology for monitoring school attendance could be modified to take attendance for only a sample of classes only on each occasion. The “deterrence” effect of monitoring would still be present, even if a school did not get monitored every month. As with the current monitoring, any sampling would have to be unpredictable – so that schools cannot “ease off” once monitored knowing they will not be monitored again for some time.

[97] From General Presentation on Independent Monitoring Unit IMU provided to Douglas Drew 9 December 2019.

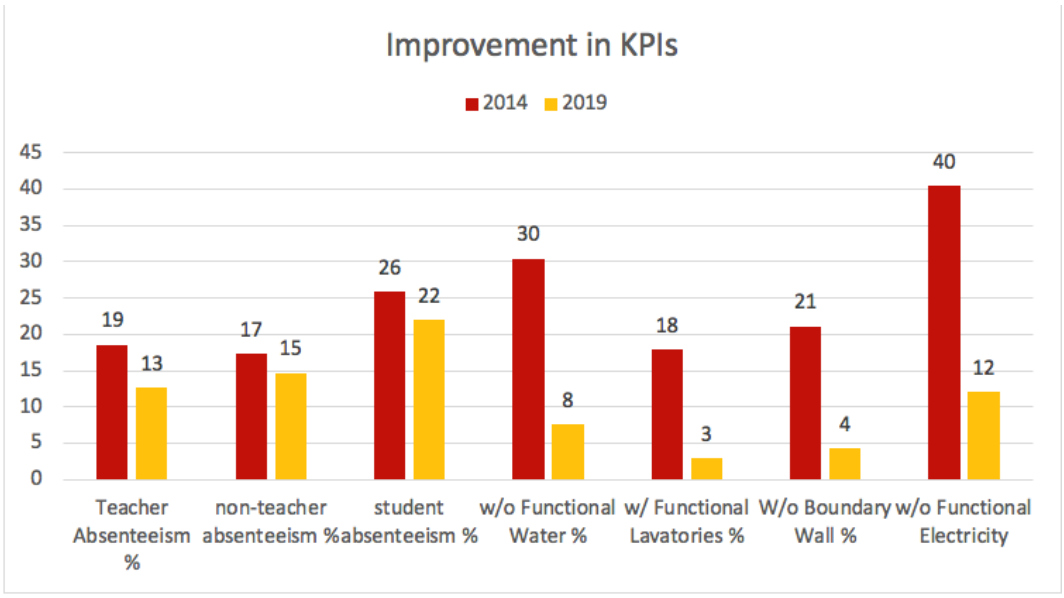
[98] Elementary and Secondary Education Department, Government of Khyber Pakhtunkhwa. n.d. Independent Monitoring Unit Dashboard. http://175.107.63.45/NewIMUSite/index.aspx.

Figure 3.5: Improvement in KPSs, March 2014 to October 2019



Source: From General Presentation on Independent Monitoring Unit IMU provided to Douglas Drew 9 December 2019

Figure 3.6: Improvements in KPIs, Annual Averages 2014 to 2019



Source: Data downloaded from Elementary and Secondary Education Department, Government of Khyber Pakhtunkhwa. n.d. Independent Monitoring Unit Dashboard. http://175.107.63.45/NewIMUSite/index.aspx.

It is also anticipated that ESED will move towards more use of biometrics for teacher attendance, and potentially later for student attendance. While these changes will not occur overnight, and perhaps not for all schools, consideration can be given to monitoring other things as advances in biometric attendance occur.

Potentially, IMU can play a role in monitoring the implementation and use of SMIS, as it is re-launched in the future. IMU could report on items such as: initial capture of individual student data, and individual teacher data, collection and reporting of student and teacher attendance, updating of student and teacher data, and use of the dropout prevention module. Such

independent monitoring of the status of use of the system would provide District offices with information on problems that need to be addressed. The frequency of the monitoring of this activity need not be monthly, but could be at quarterly or semi-annually, so that there is time between successive monitoring for Districts and Schools to take corrective actions where necessary.

IMU can conduct monitoring of other activities at a school level, for example of School Improvement plans. The monitoring can go beyond just whether a SIP has been produced, to examine the situation in more depth:

- Has training taken place in preparation of SIPs?
- Who was trained and duration of training?
- Did the school receive an EMIS school report card to be used for preparation of SIPs?
- Who prepared the SIP?
- Examine the school plan, and rating it on a scale to be developed for comprehensiveness, use of data, etc.
- What has been the role of the PTC?
- Has the SIP been provided to the District?
- Have Budgets been approved based on the SIP?
- What are barriers / bottlenecks to production and effective use of school plans?

Such rich information would help to understand challenges schools are facing in preparation and use of school plans and help Districts to develop targeted actions to provide assistance and support where needed.

3.2.4 Biometric Attendance System

Biometrics is working well for collection of teacher attendance data in Higher Secondary Schools, and also for all employees of education offices. While most Higher Secondary Schools have electricity and internet access, solar panels are being installed as a back-up to ensure uninterrupted availability of electric and internet connectivity for the Biometric Attendance System (BAS). Biometric devices using iris scanning are being used. The collection of the data is rapid, with teachers both signing in and out.

Advantages of the system are that the data are accurate and can't be faked. The teacher needs to be physically present to have his/her attendance taken. It yields individual daily attendance, and no record keeping, and no verification is required. For now, the data are being sent to a server and uploaded into a Teacher MIS that is under development. Occasionally some problems arise with settings of devices for transmission of data, but these can usually be solved via a telephone help line. As SMIS is implemented, the biometric attendance data would be imported directly into SMIS.

The existing biometric data can be triangulated with the attendance data reported by IMU. Differences are that IMU data are collected on a single day of the month for each school, and are the aggregate attendance for the school, whereas BAS collects individual data reported on a daily basis. If IMU data can be accessed by school and date of school visit, then the comparison could triangulate for the same date.

Opportunities for Expanded use of Biometric Attendance System

Given the success of use of use of Biometrics for teacher attendance in Higher Secondary schools, it is already planned to introduce BAS for teacher attendance at other levels. Extension should begin with small scale pilots for each level in order to identify and solve problems before full scale implementation.

Use of Biometrics for student attendance

Biometrics also has great potential for taking student attendance. Pilots as well as drawing on lessons learned in other jurisdictions will help to fast track the identification of successful approaches.

One of the issues is the need for more devices (e.g., 1 device per 100-150 students), so that attendance taking can be done quickly. Aspects to investigate include: hand-held devices requiring a teacher to operate versus stationary devices (e.g., outside classrooms), fingerprint vs iris scan technology, and time required for attendance taking - to gauge how many devices would be needed.

If pilots are successful, and biometrics can be used more extensively for both teacher and student attendance, then this would free up the IMU to branch out into other areas of monitoring and data collection. (See Section 3.2.3.)

Dealing with Internet Connectivity Issues

Similar issues arise concerning electricity and internet connectivity as discussed for extension of SMIS to schools at lower levels of education. Solutions that work for SMIS, may also work for biometric attendance.

In the absence of internet connectivity, can a solution be found where BAS and SMIS both function in an “off-line” mode, but remain synced with each other. Under this scenario, attendance data (ideally for both teachers and students) would be collected daily using BAS, saved locally on the biometric devices and uploaded to SMIS either using physical, Bluetooth, or WIFI-hotspot connectivity. This would permit use of the SMIS dropout prevention module, which needs student attendance data. When internet becomes available at the school or a nearby site, the BAS data and SMIS offline version would be synced with the online databases. In the case of schools where there is no internet connectivity, either at the school or in a nearby town, the updates would be physically uploaded to a District Officers machine at the time of a school visit, who in turn would upload these to the databases at the DEO. These procedures would result in delay in receipts of updates to the online database for schools without internet connection, but such delays would seem to be unavoidable and not a big issue, providing updating via District Office visits are quite frequent. For this to work, biometric devices capable of storing and downloading data collected would be needed. Also, biometric devices working on rechargeable batteries would be needed for student attendance taking.

3.2.5 Directorate of Elementary and Secondary Education

The Directorate of Elementary and Secondary Education (DESE) is responsible for the delivery of Elementary and Secondary Education in the province, based on the standards developed by the Secretariat. Its organogram is presented in Figure 15. It is headed by the Director, and has

central staff located in Peshawar, and has two offices per District, each headed by a District Education Officer, for Boys Schools and Girls Schools respectively.

DEOs have responsibility for hiring of teachers. Assistant DEOs are responsible for school support visits, which include teacher observation and feedback. DEOs also are responsible for review of School Improvement Plans prepared by schools, and approval of priority improvements, allocation of funds to schools for approved items, and for monitoring of expenditures and progress against approved items.

Recently a significant increase in the number of ADEOs has been approved, which will achieve a 7:1 ratio of Schools per ADEO

DESE identified the following needs for MIS:

- A District EMIS, for management and monitoring of the work activities of the Districts. This would be a transactional system, tracking school visits, observation of teachers and recommendations, management of budgets and SIPs. Detailed specifications of such a system have yet to be identified.
- An EMIS focal point in each DEO and in the central Directorate. The persons would have expertise in EMIS. One role would be to access ASC based EMIS and produce data and analysis needed by DESE. The EMIS focal persons would also play a vital role in leading the training programmes and roll out of new MISs, including SMIS and the proposed new District EMIS module, once it has been developed. The EMIS focal persons in DESE, at both Central and District levels will be a key to successful implementation and use of EMIS at District and school levels.
- Capacity building of Directorate staff at both Provincial and District Levels in use of data for planning and decision taking. DESE central and district leadership should participate in these department-wide capacity building efforts.

3.2.6 Directorate of Curriculum and Teacher Education

DCTE is responsible for curriculum, standards for teachers training, assessments, textbook review and approval, and assessment of teacher competency and teacher content knowledge.

DCTEs role in three programmes were discussed:

- Teacher assessments in grades 2,5, and 8. A Teacher Competency Survey examining management of the classroom, and a Teacher Content Survey examining teacher of subject matter knowledge are carried out in a 5-10 % sample of schools annually. Data is collected by senior trainers, who go to the schools, do teacher observation, and report the findings through a mobile app developed by IMU. DCTE convenes a committee of 20-30 experts who review, mark and analyse results. These are done manually without the benefit of an MIS. Recommendations and proposed plans for CPD are sent to the teacher via SMS.
- Grade 9,10,11, and 12 Board examinations. The curriculum is the same throughout the province, but each district board develops its own examinations. DCTE reviews these to identify shortfalls and does follow-ups to see how recommendations are being followed. Student registration involves sending photo, name, father's name, date of birth and certificate to the board. Each board has a database, and issues an id consisting of number and photo to each student. The student brings these for identification purposes when appearing for the examinations. Students get results via SMS, if they have a SIM (they need to be aged 18 and have a CNIC number to get a SIM), otherwise results are sent to parent's SIM.

- LitNum. Observations made by DCTE on LitNum included: DCTE developed the assessment tools and Standard Learning Outcomes. Ideally the assessment should be for students in grades 1-5 not just grade 2. DCTE should be taking the lead in how the results are used - data should go to DCTE, who can analyse and make recommendations to teachers. To date this has not been the case. DCTE has requested the data but have not received it, and the analysis has been carried out by ASI. The frequency of LitNum should be at most quarterly to allow time for analysis and to provide feedback to teachers, and these should be done by DCTE in keeping with its mandate and expertise. There is need for equipment and servers for DCTE to play these roles. More frequent tests also run the risk of test fatigue potentially increasing dropouts, and the adverse effect of "teaching to the test" to the detriment of learning in other subjects. Examination of these issues can be included in the proposed review of LitNum (see Section 3.2.7).

3.2.7 LitNum

3.2.7.1 Overview of LitNum

LitNum is a new, large-scale assessment of literacy and numeracy skills of grade 2 students in government schools of Khyber Pakhtunkhwa. The current plan is for LitNum assessment to be carried out on a sample of nine Grade 2 students per school in all government primary schools, for each month in which the assessment takes place. Given the 21,780 government primary schools, this corresponds to a sample of about 196,000 students each time the assessment is carried out. It is being thought to carry out the assessment 3-4 times during the school year – yielding extremely large sample sizes of between 600,000 to 800,000 students.

The assessment tool is designed to test the competencies grade 2 students at different points throughout the year. Hence the assessment to be administered in early months of the school year has items corresponding to the skills students are expected have acquired at the beginning of grade 2, with additional skills being added to the assessments to be carried out later in the year, keeping pace with the new skills students are expected to learn. DCTE has been involved in the development of the assessment tools.

ASI has undertaken the development of android apps to be used to select the sample of grade 2 students to participate in the assessment within a school, and an app for the conduct of the assessment. The sample selection app works as follows: if there are 2 or more grade 2 classes in a school, one of them is chosen at random; the data collector then enters the number of students in the Grade 2 class chosen, and the app selects at random nine numbers between 1 and the number of students. Students are assigned numbers based on where they are seated, and in this fashion students whose numbers correspond to the selected numbers are chosen for the assessment. The pros and cons of this sampling strategy is discussed below.

Sampled students are administered the assessment privately, one after the other. In most cases the data collector uses the app to display each question and the multiple-choice answers, which are shown to the student. The student then indicates his/her answer, which is entered by the data collector. This mode is used since most Grade 2 students would have difficulty in self-administering the test using the tablet on their own.

It is estimated that the assessments take 5 to 6 minutes per student, and hence about 60 minutes for the assessments per school. This compares to about 20 minutes average time per primary school to do the regular monitoring. Hence the conduct of LitNum as it is currently conceived

represents a major undertaking, taking up to 3 times as much time per primary school as the current monitoring. There would not appear to be any scope with current number of DCMAs to add this collection activity to the scope of work to be done.

LitNum was done on a pilot basis in October 2018, with DCMAs undertaking the data collection. The next round is scheduled for January 2020.

3.2.7.2 A preliminary examination of Sampling Methodology

Sampling methodology is but one of the aspects of LitNum that need to be carefully designed. The discussion below illustrates the issues involved in sampling, which ought to be taken into account in the design of LitNum.

Achieving an equal probability sample of students

The sampling methodology should yield a self-weighting design – that is a design where each grade 2 student (in the province or in a district) has an equal probability of being in the sample.

With a census of all schools, choosing a fixed number of students per class as is currently the case under LitNum does not result in equal probabilities of selection for all students. Hence, raw data will not be suited for analysis of student results, as students from small schools will be over-represented (i.e., have a greater chance of being selected) and students from large schools will be under-represented. Hence results based on raw data are biased and can be misleading despite the large sample sizes.

With a census of all schools all schools, for each student to have the same chance of selection students need to be sampled at a fixed rate, for example every third student could be sampled.

Also, if instead of a census of all schools, a sample of schools is chosen, then there are sampling methodologies to follow to yield an overall sample where all students have the same probability of being selected.

Sampling in schools with multiple Grade 2 classes

Under the LitNum sample design, in schools were there are two or more two grade 2 classes, currently one of the classrooms will be selected at random, and all the students selected for the assessment will be chosen from that classroom. Sampling of classes in this manner yields an unnecessary clustering of the sample, which may bias school-level results, e.g., if schools have grouped better performing students into one class.

A preferred sampling methodology is to sample form the list of all grade 2 students independent of the class they are in.

Systematic sampling of students to avoid repeated selection of students

As LitNum is to be conducted on repeated occasions for the same schools, it would be desirable to have a sampling methodology that prevents students from being repeatedly selected. As sampling is currently set up, with a random sample of students on each occasion, some students can be repeatedly selected on multiple occasions, where others may not be selected at all.

Systematic sampling can prevent students from being repeated selected. To illustrate, say there are 27 students, and 9 are to be selected. If sampling is done randomly, then 1/3 of students will be selected on each occasion. On the second occasion on average 1/9 of students sampled on the first occasion will be sampled again on the second occasion. Avoiding repeated selection of students can be achieved as follows: a list of all students is created, with name and serial number of each student. A "systematic" sample of students, where the sampling is not independent on each occasion, but rather all students get sampled once before any reselection of students occurs, can be selected as follows:

- Sampled students on Occasion 1: 1,4,7,10,13,16,19,22,25
- Sampled students on Occasion 2: 2,5,8,11,14,17,20,23,26
- Sampled students on Occasion 3: 3,6,9,12,15,18,21,24,27
- Sampled students on Occasion 4: same as occasion 1

In order to conduct systematic sampling, a list of all the students in the class is needed. From this list, the sampling app can determine the students to be selected on each occasion. As SMIS will have the list of students, and student ids, the sampling module can access the SMIS student list, and select the sample of students for each occasion. Sampling can be done before LitNum is carried out, and the list of sampled students uploaded to the devices being used by DCMAs. An additional advantage of sampling in this fashion, is that the LitNum results can be linked back the SMIS at an individual student level. This will permit analysis of LitNum results by student, teacher and school characteristics, and LitNum results can be produced by student equity dimensions, for analysis of relationships between students from disadvantaged groups and LitNum results.

3.2.7.3 Review to Strengthen LitNum

There are a number of issues surrounding LitNum that ought to be considered and reflected upon, so that at timely junctures as feasible, modifications can be introduced to strengthen the programme. Points to be considered by such a review include:

- **Objectives of LitNum.** What are objectives of LitNum and what data and analysis needs to be collected to meet these objectives. How and for what purposes will the data be used? Is it to assess learning achievement of grade 2 students at different points throughout the year? At what level are the assessments needed? Assessments typically are designed to achieve reliable data at provincial and perhaps district levels
- **Sample Design of LitNum to cost effectively meet the objectives.** What sample size of schools and students per school? What methodology to use for sample selection of students? How often is data needed throughout the school year? As an example, the PISA sampling Guidelines are 6500 students for national/provincial results, with 150 schools and 35 students per school. A larger overall sample size would be needed to also provide for reliable district level data. Also, there is a need for a sound methodology for selection of schools and students within schools. It should yield equal probabilities of selection for all students. The current LitNum design does not (see preceding discussion.) Consideration of adoption of Systematic Sampling using SMIS student lists, once SMIS has been introduced for Grade 2 students in Primary Schools. If the objective is to assess gain in learning achievement throughout the year, will three measurements suffice (e.g. beginning, mid-point and year end)?
- **How will the data be used to improve learning that takes place**? What use will be made of the information by DCTE? How will schools and teachers be able to access and use the results to improve teaching? What weaknesses can be identified at provincial level? How can these be addressed by improvements in curriculum or teacher training, noting that analysis

and implementation of follow-up measures take time to implement and to see results, and that use of assessments lend themselves to medium to longer term improvements.

- **Pros and cons of use of LitNum of as a performance measure**. Because the identification of problems and implementation of actionable measures is a lengthy process, assessment results are typically not good candidates for regular performance indicators. Actions will differ from operational measures such as attendance rates for which immediate measure can be taken to address. Also use of assessment results for performance indicators can have perverse results – of teachers focusing on "teaching to the test", to the detriment of other subjects and areas of learning.
- **What will be the means for dissemination of results**? Results can be used by various parties - public, district and provincial ESED leadership, to schools and grade 2 teachers. Will results of the assessment be analytical reports? Will there be dashboards showing results at province and district level? Will there be any dissemination of school level results? If LitNum is redesigned based on a sample of schools, should results be disseminated for sampled schools?

Linkage of LitNum assessment in the medium term to SMIS. Linkage of results of individual students to SMIS will be possible once SMIS has been extended to Primary schools, and if the SMIS student lists are used to conduct the sampling. Benefits of linkage of LitNum results to individual student data will permit analysis student results by school, teacher, and by student characteristics including equity variables in SMIS.

3.2.8 Out of School Children Census

3.2.8.1 Overview of Out of School Children Census

As noted earlier, Out of School Children (OOSC) is an important issue for education in Khyber Pakhtunkhwa. To better understand the magnitude of, the causes of, and distribution of OOSC, ESED carried out the 2017 OOSC Census.[99] The project was undertaken with financial assistance the DFID Education Support Programme, and the UNICEF Country Office.

The OOSC Census methodology and collection procedures were developed by a contractor. The Khyber Pakhtunkhwa Bureau of Census was consulted at early stages, but finally had little involvement of the design and conduct of the Census. Data collection was carried out by teachers, with little experience in collecting such data.There has been some controversary surrounding the results, as comparative data from household surveys have yielded higher estimates of the OOSC, as discussed in Section 3.2.8.

Some criticisms of the OOSC census have been that it did not benefit from KPBOS expertise in the design and conduct of household surveys and censuses and its fields capacity of 600 trained data collectors. The data were collected by teachers, and the adequacy of procedures and training have been questioned, suggesting a lack of adherence to professional standards, may have compromised the quality of results.

ESED plans are to carry out another OOSC Census in 2020.

[99] Elementary and Secondary Education Department, Government of Khyber Pakhtunkhwa. 2019. "Out of School Children Survey 2017-18."

3.2.8.2 Path forward on Collection, Analysis and Use of Data on Out of School Children

Develop ongoing and historical estimates of OOSC from ASC based EMIS data

UNICEF and UIS have developed a framework for OOSC,[100] one element of which is a set of indicators of number and rate of OOSC which can be produced via typical ASC-based EMIS. These indicators can be calculated from the enrolment data by single year of age collected in the Khyber Pakhtunkhwa EMIS. Calculation of these indicators will provide an ongoing set of OOSC indicators for the province of Khyber Pakhtunkhwa and for each district. Definitions of the indicators are provided below:

Figure 3.7: Indicators of OOC from ASC Data[101] [102]

Primary aged OOSC: rate and number of children of primary-school age who are not in primary or secondary school

Primary OOSC rate = (100 – ANER Primary)
= 100 – rate of children aged 5-9 attending primary or middle school
Number = OOSC Primary rate * Primary aged population

Lower secondary OOSC: rate and number children of lower secondary school age who are not in school (in school refers to enrolment in any level of school: primary, lower secondary or upper secondary).

Lower Secondary OOSC Rate = 100 – rate of children aged 10-12 in school
= 100 – rate of lower secondary aged children in school
Number = Lower Secondary OOSC rate * lower secondary aged population

Upper secondary OOSC: rate and number of upper secondary aged adolescents who are not in school (where in school refers to enrolment in any level of education - primary, lower secondary level, upper secondary level, or Tertiary education)

Upper secondary OOSC Rate = 100 – rate of adolescents aged 13-16 in school

Number = Upper Secondary OOSC Rate * Upper secondary aged population

A potential problem with the above estimates of OOSC, is that they are derived by subtraction of enrolled students from the estimated population. Any problems with the accuracy of the population estimates are reflected in the resulting OOSC estimates. Nonetheless, once population estimates based on projection of results from the 2017 Census of Population have been adopted, the projection error on the population estimates will be relatively small for a number of years, and these indicators ought to be quite reliable at both provincial and district levels.

Review of Vehicles for Collecting Needed Data on Out of School Children

The OOSC Census results, as noted, were inconsistent with OOSC rates household survey-based estimates of OOSC. Comparison with ASC Based Estimates described above can also be undertaken.

[100] UNICEF and UIS. 2016. *Monitoring Education Participation : Framework for Monitoring Children and Adolescents who are Out of School or at Risk of Dropping Out, retrieved from http://uis.unesco.org/sites/default/files/documents/monitoring-education-participation.pdf.* December.

[101] Ibid.

[102] In this table primary, lower secondary and upper secondary are defined in terms of the ISCED classification – see Table 3.

In addition, there should be careful consideration given to what data are needed on Out of School Children and for what uses – at Provincial, District and Local levels. Once these are known, the vehicle for collecting the needed data can be determined – whether a census as was done in 2017, or a sample survey. If the need is to know the size and distribution of OOSC at provincial and district levels, a sample survey will suffice. If the objective is to identify individual OOSC, and take concrete actions to get them into school, this would be better a achieved by a Census – but does the capacity for the follow-up actions exist?

Also, the review can examine what data on OOSC can be derived from the 2017 Census of Population. For example, does the Census of Population permit identification of those aged 5-16 who have never attended school? Detailed information on this major component of OOSC might provide sufficient data to work with for a period of time.

Consideration can also be given to changes to the Census of Population education questions to better enable estimation of OOSC in the future. While the next Census of Population is several years away, it is not too early to consider what possible modifications might be made to the Census questionnaire, and to consider the feasibility and costs associated with adding a question to the Census of Population. Even if the ESED were to bear such costs, they may be a cost-effective means of periodic collection of OOSC data on a large scale.

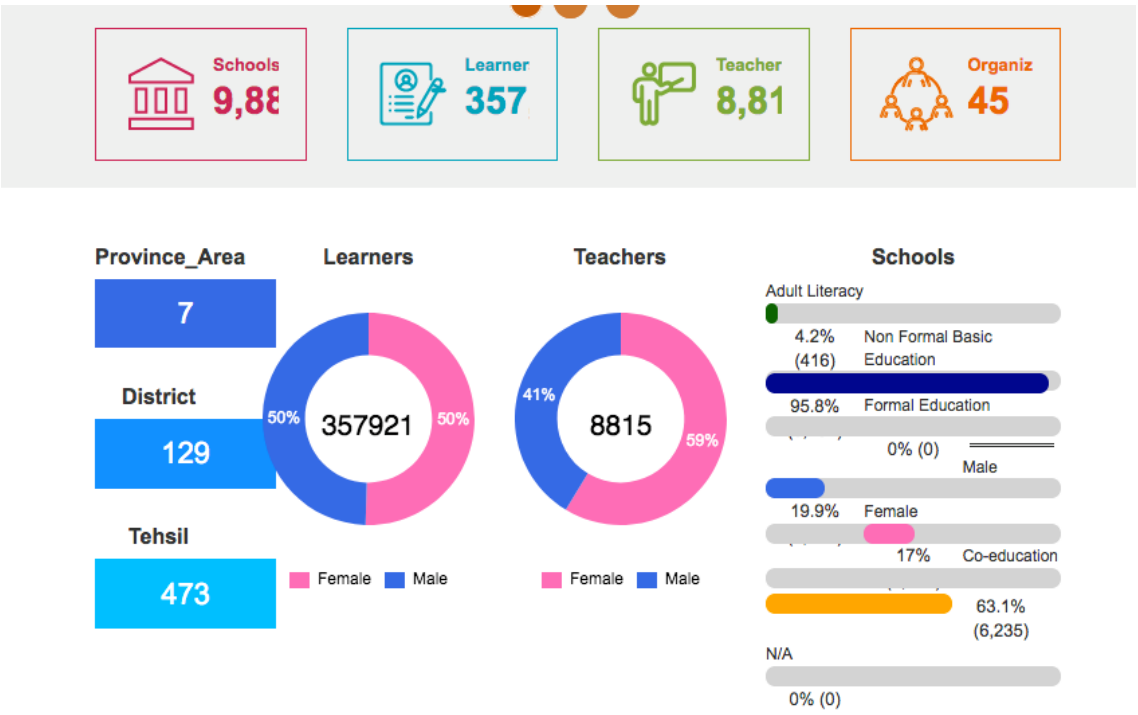
If the Analysis reveals that a new OOSC Census or a sample survey represents a cost-effective means of collecting the data needed, then it is recommended the next time around for the KPBOS to be involved in the design, conduct and processing of the survey results. Not only does KPBOS have a mandate to carry out such collections, they have the capacity to do so, with statistical expertise in developing and implementing the survey methodology, and a trained staff of field interviewers with expertise and experience on carrying out household surveys. The survey can be carried out with ESED as the client, identifying needs, and KPBOS as the implementing organization.

3.2.9 Nonformal EMIS (NFEMIS)

JICA has supported the development of a NFEMIS[103] for Pakistan. The system is web-based and is designed for use by Providers as a management tool, while also providing key data and indicators for education planning and decision-making purposes. It features an android collection app for use by Providers to gather data when visiting centres. Data collected using the app are uploaded directly to the online database. The system has a dashboard, which allows users to see the various disaggregations of the data. NFEMIS data on enrolments, teachers, and providers are presented in Section 1.6.2.

[103] JICA and AEPAM. n.d. *Non Formal Education Management Information System,*. http://nfemis.net/Default.aspx?ReturnUrl=%2f.

Figure 3.8: Screenshot of NFEMIS - Profile of Schools



Source: JICA and AEPAM. n.d. *Non Formal Education Management Information System,*. http://nfemis.net/Default.aspx?ReturnUrl=%2f.

3.2.10 Program Specific MISs

In addition to the MISs already discussed, there are a number of other MISs, many of which are program specific. Most of these have been developed under the KESP for DFID funded support to ESED, and they have been designed to provide data needed for monitoring of specific initiatives under the program.

With the KESP programme closing in early 2020, these MISs are in the process of being turned over to EMIS cell, who will support them going forward. During the mission, there was only time to have a cursory demonstration of some of these MISs, hence most have not been considered in any depth in the review.

The EMIS Roadmap will have to address how to integrate these different MISs with SMIS in the future.

Table 3.4: Program Specific MISs

No.	Program Specific MIS	Objectives of MIS	Frequency	Year of Implementation
1	Teachers' Training Management Information System (TT-MIS)	Record of teachers' participation in teacher training activities.	Quarterly	2016
2	Conditional Grants MIS (CG-MIS)	Tracks conditional grants with a focus on flow of finances.	Monthly	2016
3	Girls Stipend MIS (GSM)	Tracking of individual student attendance in Girls' Middle schools and issuing of stipends.	Quarterly	2017
4	Education Voucher Scheme MIS (EVS-MIS)	Tracks voucher students and their attendance.	Quarterly	2017
5	Girls Community Schools MIS (GCS-MIS)	Tracks GCSs, enrolment and attendance.	Quarterly	2017
6	Online Action Management System (OAMS)	Generates actions on teacher absenteeism data.	Monthly	2016
7	Induction Management System (IMS)	Online teacher induction programme including regular self-assessment.	Monthly	2017
8	School Quality Management Information System (SQMIS)	ASDEOs assistance to monitor and guide teachers on student performance, teacher competency and curriculum pacing.	Bi-annually	2018
9	Continuous Professional Development MIS (CPD-MIS)	Participation of primary school teachers in Continuous Professional Development Programme.	Monthly	2019
10	E-transfer System (ETS)	Online system allowing teachers to apply for transfer between Districts and DEOs to accept or reject in-transfer requests.	Monthly	2020
11	Human Resources Management Information System (HRMIS)	Management of Human Resources.	daily	Under development

Source: Information provided to author by EMIS unit, during on-site visit.

3.2.11 AEPAM

The Academy for Educational Planning and Management (AEPAM)[104] is part of the Ministry of Federal Education and Professional Training. It receives EMIS data from each province, to create the National EMIS database (NEMIS),[105] and produce the Annual NEMIS Report. AEPAM is also responsible for reporting of data internationally to UIS. A challenge is to develop standard core items for use by provinces for national reporting (common definitions, breakdowns, etc.). AEPAM has a Working group with the provinces on methodology for SDG Education Indicators with provinces. AEPAM also conducts research studies.

[104] Academy for Educational Planning and Management. http://www.aepam.edu.pk/

[105] Academy for Educational Planning and Management. NEMIS home. http://www.aepam.edu.pk/Index.asp?PageId=2

Recent topics have included:

- Public Financing in Education Sector
- Age Specific Data of Students up to Higher Secondary School
- Causes of Dropout Rate in Primary Education

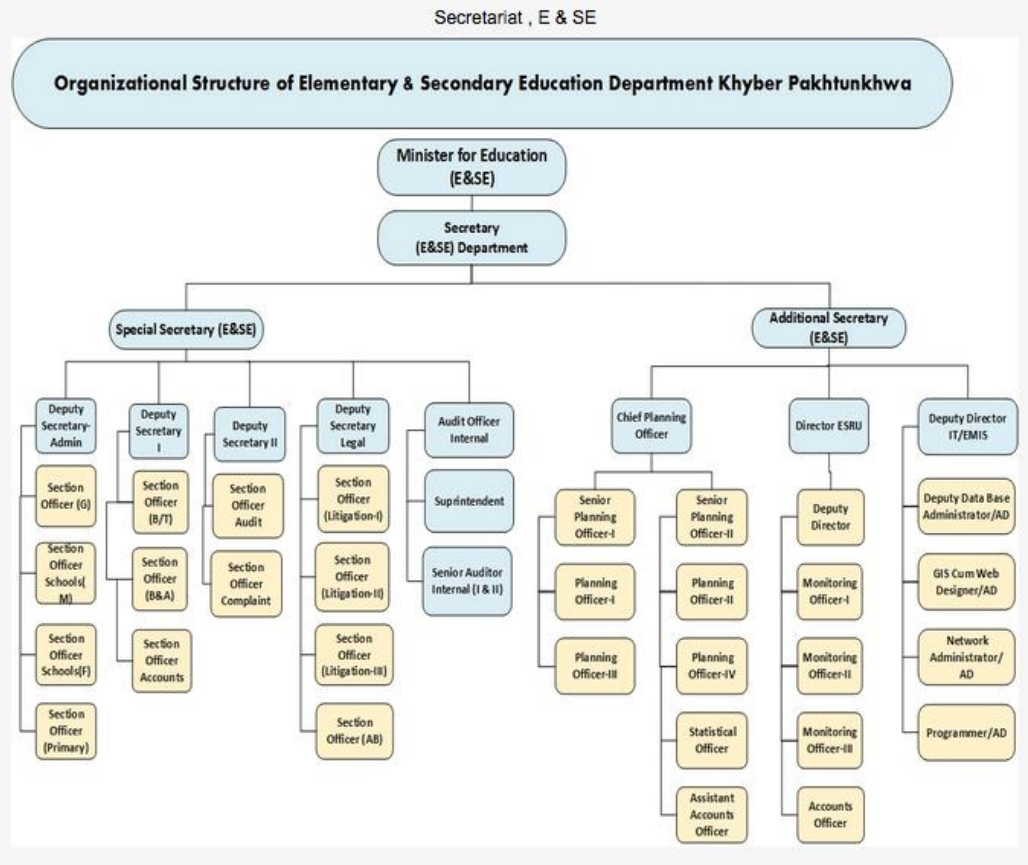
Findings from the AEPAM studies can serve as useful input to ESED in formulation of its policies. For example, the study on reasons for dropouts can help in defining for programmatic efforts to combat the underlying causes of dropouts.

3.3 Organizational and Institutional Arrangements and Capacity

Figures 3.9,3.10 and 3.11 present the organigram of ESED, available on the ESED website.

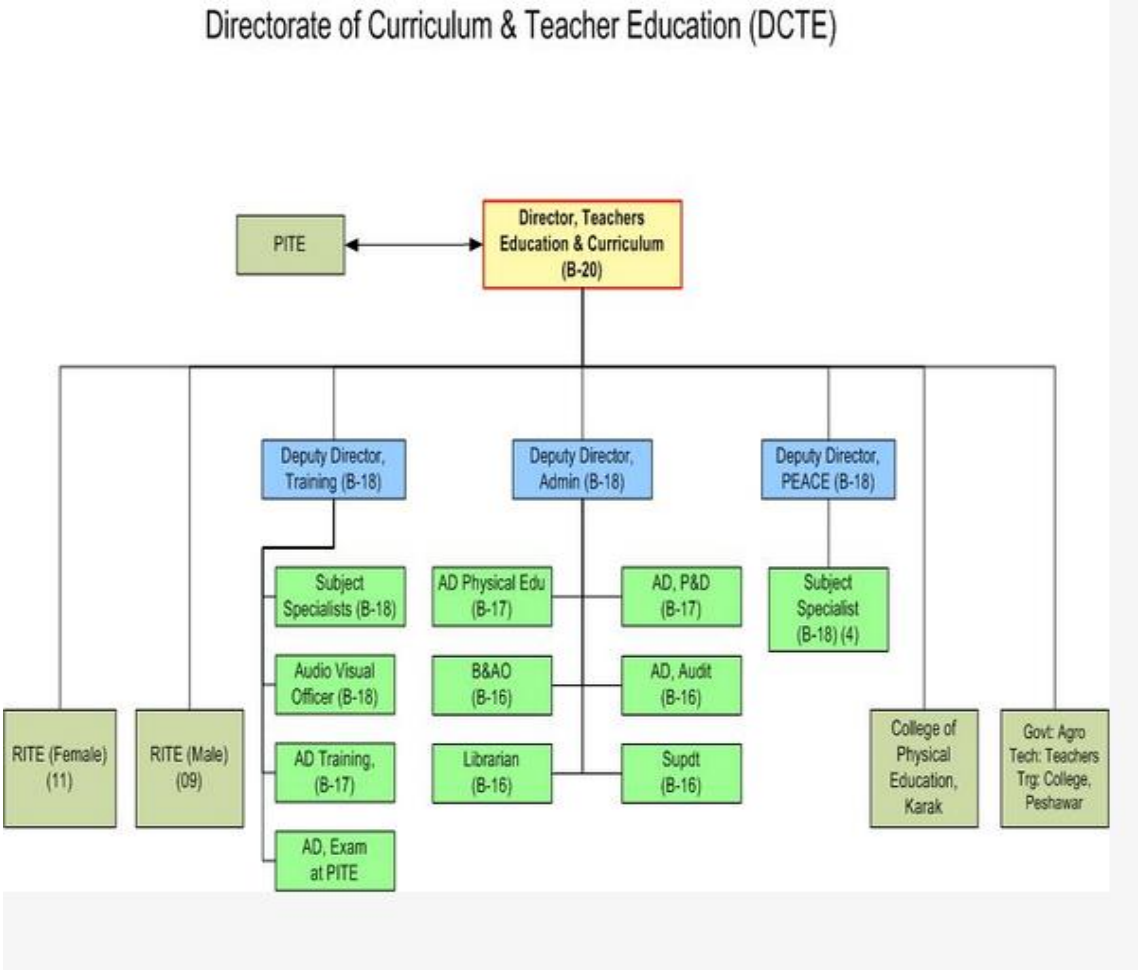
We discuss below the institutional structure from the perspective of EMIS. One can distinguish two institutional roles: that of data Producer, and that of data User. Both are important to an effective EMIS. We first discuss what the Producer and User roles should be ideally. Then we discuss how these roles currently exist in ESED, and areas in which the roles could be strengthened.

Figure 3.9: Organogram of ESED Secretariat



Source: Elementary and Secondary Education Department, Government of Khyber Pakhtunkhwa. https://www.kpese.gov.pk

Figure 3.10: Organogram of Directorate of Curriculum and Teacher Education



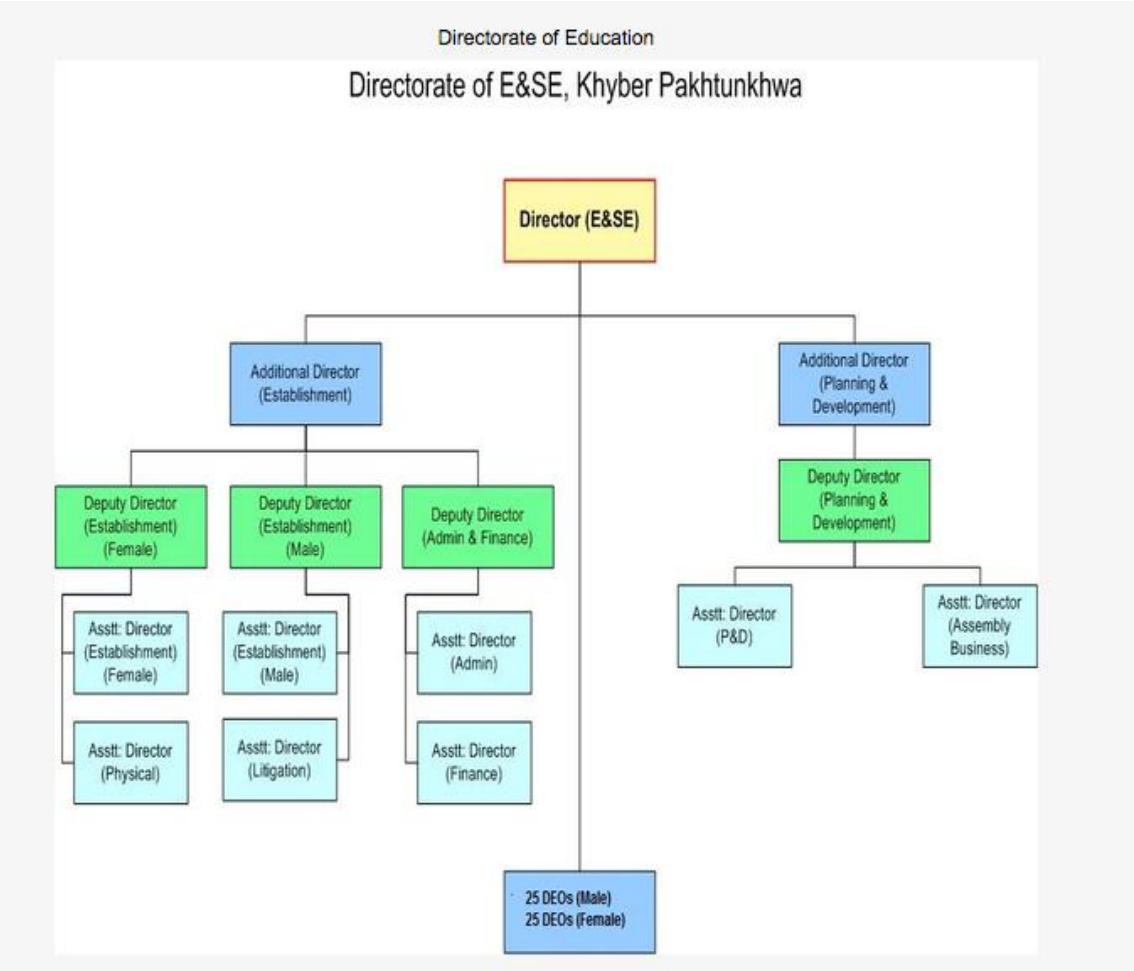
Source: Elementary and Secondary Education Department, Government of Khyber Pakhtunkhwa. https://www.kpese.gov.pk

3.3.1 Data Producer Role – Ideal

The data production role begins with an understanding that EMIS is providing a good and a service to the data users within the Department. EMIS exists for no other reason than to provide the data needed for management, decision making, planning, and policy development, monitoring and evaluation by the Data Users.

Therefore, a first step for the Data Producers is to develop an understanding of the information needs of Users, so that MISs can be developed (or existing ones can be adapted) to respond to the information needs of Users. Producers need to engage in dialogue with the Users to develop this understanding, such as through an annual meeting to see if new needs have emerged. They need to be proactive in doing so. They also need to examine policy documents such as the ESP, and identify data required to monitor priorities, even if the ESP does not explicitly identify the information requirements.

Figure 3.11: Organogram of Directorate of Elementary and Secondary Education



Source: Elementary and Secondary Education Department, Government of Khyber Pakhtunkhwa. https://www.kpese.gov.pk

The second function of the Producers is to develop and adapt MIS to respond to user information needs. What data need to be collected? Having collected data, how to ensure data and information can be accessed in a way they are usable by Users? Dashboards and data dissemination systems are needed that provide Users access to the raw data. But beyond that there is a need for Producers to provide information service to Users – that is, analyses and interpretation of data that render them more useful to Users.

There is an abundance of examples of what constitutes good practice on the part of data producers.

First, there are Internationally accepted education indicators. Education Indicators differ from education data, in that indicators are normalized. For example, the number of students enrolled is data, while the gross enrolment rate is an indicator. Indicators can be compared from one region to another, because they are normalized. The UNESCO institute for Statistics is responsible for the collection of international data from all UN member states, and has been one of the lead agencies worldwide in development and promulgation of internationally comparable indicators,

and producing documentation on the definition, calculation and use of these indicators.[106] OECD has been very active also in the development and enhancement of education indicators, to shed further light on performance of education systems. It publishes these annually for its member states in Education at a Glance.[107] One of the biggest contributions of OECD has been the development of the Program for International Student Assessment (PISA)[108,] and the development of indicators and methods of analyses of these data. The field of International Education Indicators is continually evolving to meet new demands for policy relevant information. A recent example is Monitoring Education Participation: Framework for Monitoring Children and Adolescents who are Out of School or at Risk of Dropping Out, by UNICEF and UIS[109] , which has developed a framework and set of indicators for Out of School Children. UIS is the lead international agency in the development of education indicators for Sustainability Development Goal 4.[110] Given the very comprehensive set of internationally accepted education indicators, National and sub-national EMISs should endeavour to place more emphasis on reporting of indicators than data, and on producing internationally accepted indicators wherever feasible.

Second, there is a need for dissemination systems to make the data and indicators readily accessible to data users. These can take the form of dashboards which display key indicators and data. Dashboards are generally designed to show a number of key indicators which together can summarize the performance of a system, presented in such a way that the overall system performance can be viewed “at a glance” on one screen.

Beyond dashboards are data dissemination systems that allow users to query the database to produce pre-determined tables and customized tables. Dissemination systems should have a front-end user interface that allows the user to specify the variables and dimensions of interest. Increasingly dissemination systems make use of Business Intelligence approaches. One example of a Dissemination system is the UIS statistics system[111] which allows users select the indicator, and then select dimensions of interest (countries, years, level of education, gender breakdowns, etc). In this dissemination system, the aggregate data points already exist in the database, and it is just a matter of retrieving them. The other approach to dissemination systems are ones based on generating the requested data directly from the database and the microdata for each school. In the case of such dissemination systems, especially if these are available for use by the public, it is important to ensure that there are safeguards to prevent the disclose of private data on individuals. One way of achieving this is for the dissemination to use an anonymized version of the database, where are personal identifiers have been removed.

Third, is a body of good practice on the sorts of analyses of data that can be carried out by the producers, and included in statistical yearbooks, so that the yearbook moves away from being a large compendium of data tables, to a report that show key indicators, and analysis of the trends over time, regional disparities, and also compare results for equity groups to those of the overall

[106] UIS. 2009. Education Indicators Technical Guidelines. http://uis.unesco.org/sites/default/files/documents/education-indicators-technical-guidelines-en_0.pdf

[107] OECD, Education. Education at a Glance 2019**.** https://www.oecd.org/education/education-at-a-glance/

[108] OECD. n.d. *Web site for PISA.* https://www.oecd.org/pisa/

[109] UNICEF and UIS. 2016. Monitoring Education Participation: Framework for Monitoring Children and Adolescents who are Out of School or at Risk of Dropping Out, retrieved from http://uis.unesco.org/sites/default/files/documents/monitoring-education-participation.pdf.

[110] UIS.2019. SDG 4 Databook: Global Education Indicators 2019. http://uis.unesco.org/sites/default/files/documents/sdg4-databook-global-ed-indicators-2019-en.pdf

[111] UIS. n.d. UIS Statistics. http://data.uis.unesco.org/

student population. The reports should also examine the performance of the education system relative to key priorities under the ESP and other relevant policy documents. While the statistical yearbook will include basic indicators for all levels of education as a core content that repeats each year, it may be supplemented with focus topics in which some priority issue is examined in more detail, either as a chapter in the statistical yearbook, or as a companion more analytical publication. Good examples internationally of Statistical yearbooks are the OECD's Education at a Glance,[112] and UNESCOs Global Education Monitoring Report.[113]

3.3.2 Data User Role – Ideal

Data Users need to have capacity in the use and interpretation of data for evidence-based decision taking. Users also need to be able articulate their needs and priorities, both for new data, and well as for access to data and information in usable format. Data use will vary by level of education. At the provincial level, data are needed for policy development, system monitoring and evaluation, planning and budgeting. At the district level, uses include monitoring of teacher and student attendance, teacher and resource allocation, and monitoring teacher performance. At a school level, uses include preparation of school improvement plans, and monitoring student and teacher attendance.

3.3.3 Data Producers in ESED

There are two units within ESED that have responsibility for data production functions.

First, the EMIS Cell is responsible for development of EMIS, for data processing, and for data dissemination functions, for preparation and publishing the Statistical Report, including analysis and interpretation of the data. A number of program-specific MISs were developed during the KESP, and with its pending conclusion, the EMIS cell is taking responsibility for these systems.

Second, the Independent Monitoring UNIT (IMU), is responsible for independent, ongoing monitoring of schools, in particular of teacher and student attendance rates, and school infrastructure, and for dissemination of results on a publicly accessible dashboard. Since 2017, IMU has been responsible for collection of the ASC data. The IMU has also have been involved in collection of data for the new LitNum assessment of literacy and numeracy of Grade 2 students. As such, the IMU data production role includes both being both the data collection arm of ESED, and the collection and dissemination of independent monitoring data.

3.3.4 Data Users in ESED

Within the ESED secretariat, there are two data user units. First, the Education Sector Reform Unit, is responsible for developing and administering education reforms under the ESP. ESRU has been the client for some program specific MISs such as the Girls Stipend System, developed under the KESP. Second the office of the Chief Planning Officer is responsible for the planning. EMIS data is used in planning and budget preparation. The Planning Unit has also provided GIS data on school GPS coordinates to the Home Department, to do analysis as an input into location of new schools.

[112] OECD, Education. Education at a Glance 2019. https://www.oecd.org/education/education-at-a-glance/
[113] UNESCO. n.d. Global Education Monitoring Report. https://en.unesco.org/gem-report/

The two Directorates of ESED also fall into the category of Data user. The Directorate for Curriculum and Teacher Education, is responsible for curriculum development, teacher training, and for conduct of provincial examinations. The directorate is not a heavy user of existing EMIS data, and it could benefit from an MIS to support the functions it carries out, in particular the examinations. The Directorate for Elementary and Secondary Education is responsible for delivery of education services, in accordance with the curriculum developed by DCTE and other policies developed by the Secretariat. DESE has separate DEOs in each District for delivery of education in Boys and Girls schools respectively. DESE lacks a District EMIS. Such an MIS would be transactional in nature, handling work processes between districts and schools, such as school visits, classroom observation of teachers, etc. DESE also lacks expertise in use of EMIS data at both central and district levels.

3.3.5 Role of Schools as EMIS Data Providers and Users

Schools are both data providers and ideally users of EMIS. Under EMIS based on the Annual School Census, headteachers complete questionnaires, which are the source of the EMIS data. The quality of the EMIS data are functions of the state of record keeping practices in schools, and the training headteachers receive in completion of the questionnaires. Under the new data collection methodology introduced in 2017, headteachers still complete the ASC questionnaires, which are verified and captured by IMU monitors using mobile devices. Schools should be users of EMIS data, but this has been a weakness of the current EMIS. The weakness has been in the generation and distribution of data products that can be used by school. An initiative is underway to develop and provide School Report Cards to schools, and in parallel to build capacity at the school and local level in use of these. This initiative is important and needs to continue.

Under SMIS, schools will have greater data production responsibilities – it will be the school that enters data into SMIS – and the volume of data will be larger than is currently the case under EMIS based on the ASC, as SMIS will contain individual as opposed to aggregate student data. Moreover, schools will capture individual student and teacher attendance data on a daily basis, except in cases where these data are generated via the Biometric Attendance System. It is also planned that schools will become principal users of SMIS. One of the initial uses recommended in this review is a dropout prevention module (as discussed in ccc). Additionally, schools will be able to monitor student and teacher attendance themselves, and take steps as required to keep these in line with expected standards. SMIS will contain all the data needed to prepare data-driven School Improvement Plans and will be used for this purpose as the skills are built up.

3.3.6 Strengthening needed to Data Producer Function in ESED

Based on the country visits and meetings with both data producers and data users in ESED, this section and the next are observations on areas of strengthening needed on both the data production and data user functions in ESED.

On the Data producer side, the EMIS cell needs to develop a service culture. Among staff of the cell, responsibilities tend to be viewed narrowly in terms of the technical aspects of developing and maintaining IT Systems, producing a report which has been little changed for years, and not engaging sufficiently with users to see how to better meet their information needs. The staff in the EMIS cell have a background in IT, which may partly explain this focus. The EMIS cell could be strengthened by addition of staff with statistical background and expertise in defining users'

needs, and in data analysis and interpretation of data, and how to incorporate these into products and services offered by the EMIS cell.

In a similar vein, the EMIS cell need to take a more proactive approach in ensuring the successful implementation of new MIS module, and SMIS in particular. In the Implementation of SMIS to date in Higher Secondary schools, EMIS does not appear to have taken a hands-on role in ensuring it was a success. They have to be champions, take ownership, and take all measures needed to ensure success. Their role should not stop with the technical aspects of developing the Systems.

Moving forward to the implementation of SMIS, data collection will effectively be carried out by schools. This has impacts on roles currently played by both IMU and the EMIS cell. Also the roles to be played by EMIS cell, district Offices, and potentially IMU in the roll out of SMIS, needs to be considered, as ESED moves ahead with this major new initiative. One model would be that districts supported by EMIS cell, will be responsible for the implementation (training and follow-up), and that potentially IMU could have a role in monitoring the status of implementation – to provide an independent view. Other models could also be considered, but there is a need for clear roles and responsibilities.

More generally, there needs to be a clarification of roles and responsibilities of EMIS cell versus those of IMU. IMU is clearly responsible for ongoing monitoring of data, and for the ASC data collection. The data collection function of IMU does not appear to be recognized in the Act creating the Independent Monitoring Authority (IMA), as a permanent organizational unit within ESED. The EMIS cell is responsible for questionnaire contents, processing, publication, analysis, and being custodian of EMIS data, for development of new MISs, and in the longer term for development of an Integrated EMIS.

Given their shared responsibilities for the EMIS production function, there is a need for close coordination between the EMIS unit and IMU. EMIS needs to engage with data users within ESED to finalize questionnaire content. IMU needs to update its collection app and database to reflect any questionnaire changes. Also, agreements are needed on data cleaning to be done by IMU versus EMIS unit, and on the data transfer protocol from IMU to the EMIS unit on completion of data collection operations.

IMU has collected LitNum data collection thus far, although it is not clear whether it has the capacity to continue to handle both LitNum collection, together with its Monitoring and ASC collection responsibilities, unless the number of DCMAs is increased dramatically. Rationalization of the role of IMU versus DEOs in collecting LitNum data is needed. With planned increases in District ADEOs to lower the ratio to 1 ADEO per 7 schools, there may be greater capacity on the side of DEOs to collect the LitNum data.

3.3.7 Strengthening needed to Data User Function in ESED

Across all the Data user units, there is a lack of capacity in use and interpretation of data for planning and decision making. This was recognized by all concerned and raised repeatedly in meetings with leadership.

There is a need for training in the use and interpretation of data for planning and decision makers for all ESED leadership. In addition to such across the board training, organizational units could

benefit having a designated EMIS focal point, to receive further training to build expertise in use of data, and to interface with Data Producers. This is particularly the case with 50 DEOs, where task of building expertise in use of data among a number of staff in each of DEO would be overwhelming, and creation and staffing of an EMIS user focal point would be a means of providing a resource that could serve the needs of the DEO.

In addition to building capacity in use of existing EMIS data, both Directorates of ESED have unique data requirements that are not meant by existing MISs (see Sections 3.2.5 and 3.2.6).

3.4 Policy and Legislative Framework

3.4.1 Legislative Framework

ESED has legislative authority to collect education, compile and publish education statistics. The General Statistics Act of 1975,[114] permits the Bureau of Statistics to delegate its authority under the act to Statistical Agents. The Ministry of Federal Education and Professional Training, and Provincial Departments of Education have been designated as Statistical Agents.

Provisions of the General Statistics Act apply to ESED. One of these states that data shall not be "published in a form which may disclose the state of affairs of any particular individual, firm or institution".[115] While publication of data on individual government schools appears to be exempt from this provision as they are public institutions, publication of individual level data on teachers or students would be prohibited. Implications of this are discussed later for publication of data from SMIS.

3.4.2 Policy Framework

It is a clear role for EMIS to provide data and analysis to support the Policy Framework of ESED. Policies are articulated through documents such as the ESP,[116] and the Tribal Decade Strategy 2020-30.[117]

It is common practice in many jurisdictions to have a clearly articulated Monitoring and Evaluation Framework accompanying Policy documents such as the ESP. The ESP 2015 has a Joint Monitoring Framework, which sets out empirical targets for some of the policy areas (See section 1.7), but there remains scope for strengthening the M&E aspects of the framework in the EPS 2020 in preparation. This can be a joint undertaking of the ESED User divisions and the EMIS cell.

[114] Pakistan Bureau of Statistics. n.d. General Statistics Act of 1975. http://www.pbs.gov.pk/content/general-statistics-act-1975
[115] Ibid.
[116] Elementary and Secondary Education Department, Government of Khyber Pakhtunkhwa. 2014. "Education Sector Plan 2015-19."
[117] Planning and Development Department Government of Khyber Pakhtunkhwa. 2019. "Tribal Decade Strategy 2020-2030."

Development of Education Data Quality Standards:

The ESPSP prepared a report Development of Education Data Quality Standards for Khyber Pakhtunkhwa.[118]

The report was based on a study that included a number of workshops bringing together data Producers and Users. Below are selected observations from the report:

- Khyber Pakhtunkhwa, like other provinces of Pakistan, has invested significant resources in the collection, processing, and management of more and better data through its Education Management Information System (EMIS). However, these investments have not always been matched by a parallel emphasis on the use of data for policy making, planning and decision making.
- At the same time, the work of the ESED is affected by capacity weaknesses in the use and interpretation of available data, which negatively affects the quality of longer-term planning across the Department.
- The quality of EMIS data and their accuracy, reliability, relevance and accessibility has resulted in the low confidence of the senior management of ESED to make use of this data in their decision-making. This point is highlighted in the Khyber Pakhtunkhwa Education Sector Plan 2015-19[119] where it states three principal limitations of EMIS data: a) delay in data collection and analysis; b) quality concerns; and c) missing indicators.

The report proposed Data Quality Standards, based on a framework built around SABER, a set of indicators related to implementation of the standards, and an Education Data Quality Standards Task Force for quality assurance and oversight. It is not clear if the recommendations of this study have been adopted and are being acted upon, as no mention was made of such steps during the Peshawar visit.

The current review has identified similar issues as that found in the earlier study. Whereas the previous study and its recommendations have identified a process-oriented approach to dealing with the issues, the current study is complementary in that it has taken an action and results oriented approach – identifying specific problems and how to deal with them, within the context of an overall strategy or road map.

3.5 Human and Technical Resources

The current study did not examine the technical requirements, particularly as they relate to IT requirements at different levels, needed for EMIS and SMIS. Restrictions on movements to District Offices and to schools outside of Peshawar due to security considerations prevented the examination of current IT capacities. Had visits been feasible to a handful of DEOs and to a small sample of schools at different levels, it would have been sufficient to get some sense of technical and IT capacities and needs. However, there is a need for more detailed collection of data on these factors. Such information could potentially be collected via expanding the data collected on technical and IT capacities through the ASC.

[118] Powell-Davies, Philip. 2018. “The Development of Education Data Quality Standards in KP.” Khyber Pakhtunkhwa - Education Sector Plan Support Programme (KP-ESPSP)

[119] Elementary and Secondary Education Department, Government of Khyber Pakhtunkhwa. 2014. “Education Sector Plan 2015-19.”

3.5.1 Capacity Building of Human Resources for EMIS

3.5.1.1 Need for Capacity Building in Use and Interpretation of Data at Provincial level

A common theme that came up in meetings with ESED leadership, both data Producers and Users was the need for building capacity in use and interpretation of data for planning and decision-making purposes.

The report Development of Education Data Quality Standards for KP[120] recommended "a Capacity Development Strategy and Plan for all ESED stakeholders: supply and demand side."

EMIS Leadership indicated that better skills were needed in the EMIS cell, in order to provide more data analysis and interpretation in the Annual Statistical report and other EMIS products. Data Users on their part also expressed the need for building these capacities, to undertake evidence-based planning and budgeting, policy development, monitoring and evaluation.

There is the question of how to go about this capacity building.

Examination of the qualifications and expertise of the EMIS cell, reveals most of the leadership have an IT background. Another type of expertise needs to be introduced to the EMIS cell, namely expertise in data analysis. One option for achieving this would be via secondment of a Statistician with data analysis expertise from the KPBOS to the EMIS cell. The secondee could start by building the capacities in data analysis and data interpretation within the EMIS. The secondee could then play a pivotal role along with others in the EMIS cell, in building this capacity among data users. During the Peshawar visit, the notion of such a secondment was raised in a meeting with KPBOS, who indicated they were open to the idea.

The training should also be practical, related to real issues and problems faced by ESED. For example, a module could be built around OOSC, considering: What do we currently know about OOSC? What are options for obtaining data on the size and characteristics of OOSC, and their strengths and limitations? What do the data tell us about the numbers, geographic distribution and characteristics of the OOSC population? What are the reasons for being out of school, and how many have attended school and dropped out, versus never attended? Based on better understanding of these issues, what policies or measures could be undertaken to deal with OOSC? What data and mechanisms are needed to monitor and evaluate the policies and measures?

3.5.1.2 EMIS Capacity needs at District Level

DESE expressed the same capacity building needs as those at the provincial level, for the 50 DEOs. Furthermore, DESE expressed the need for an EMIS officer in each District, to be responsible for supporting the district use of EMIS.

[120] Powell-Davies, Philip. 2018. "The Development of Education Data Quality Standards in KP." Khyber Pakhtunkhwa - Education Sector Plan Support Programme (KP-ESPSP)

Districts will be the front line for training and support at the school level during broader implementation of SMIS. Having an EMIS focal person within each DEO will help to have strong foundation in EMIS, to support the training of ADEOs who will in turn train and support schools.

3.5.1.3 EMIS Capacity needs at School Level

Training and building capacity of School headmasters and School EMIS focal points, will be critical to the successful implementation of SMIS. Those trained will also have to train other teachers in the use of SMIS, as all staff will be entering data, such as attendance data into the system. SMIS will represent a fundamentally different way for schools to operate. Training and support will not be a one-time event, but something that is done repeatedly at regular intervals. Training will be needed in use of specialized modules such as the proposed dropout prevention module, as well as training in use of data for preparation of School Improvement Plans.

Building and sustaining such capacity is a big undertaking and needs careful planning. It needs to be done together with making data available to schools, so that the learning is done using real data, and becomes a practical exercise, and not a theoretical one. It is not a one-time training, but has to be ongoing, to cope with changes, and to deal with new MIS features as they are introduced.

Training needs to focus on the dual role of headteachers and schools as collectors of data, and as user of data, specifically the interpretation and use of the information products developed for them, in order to manage school operations and for planning purposes.

Table 3.5 gives an indicative illustration of the data and information products that will be provided to Schools sequentially under different MISs, the uses that Schools will make of this information, and topics to be covered by training. A programme of training at periodic intervals will be needed, in order to cover the collection (where applicable) and use of data from the different EMIS modules.

Training needs will be heaviest for SMIS, since schools will be responsible for collecting and entering the data themselves, and for generation and use of reports. Due to the complexity of the system, it is recommended it be introduced by for selected groups of modules at a time. In addition to school staff, PTC chairpersons, PTC members, and parents will need to be trained in use of the SMIS. Parents will need to know how to sign up for an account, how to login to the system, and how to access data for his/her child.

ESED stands to learn a lot from successes of other jurisdictions in implementation of SMIS, and the training and capacity building efforts that have accompanied it.

Table 3.5: Capacity Building Needed at School Level on MIS information products

MIS	School Level Data and information Products	Description of Product	Trainees	Uses
EMIS(ASC)	School Report Card Indicators Student teacher ratio Classrooms in need of repair Student Textbook Ratio Enrolment by class % teachers with advanced education qualifications % teachers with advanced Professional Qualifications	Key indicators for school relative to norms and district average	-HT - TOT of PTC Chair and members	- If KPIs are not in target range, look for reasons why, and corrective actions. -Preparation of School Improvement plans This should also be an opportunity for improvement: with a functioning SMIS, schools have the opportunity to track improvement plans and set their own targets, and also this helps to hold them accountable for results, and allows for comparisons between schools in terms of performance

IMU	IMU indicators:
	
	- Teacher attendance
	- Student attendance
	- % schools with functional:
	  - Boundary wall
	  - Water
	  - Lavatories
	  - Electricity
		Key indicators for school relative to norms and district average	-HT
			
			- TOT of PTC Chair and members
				- If KPIs are not in target range, look for reasons why, and corrective actions
				
				-preparation of School Improvement plans

MIS	School Level Data and information Products	Description of Product	Trainees	Uses
District EMIS/CPD	Report card: - % of teachers with satisfactory or better results on observation - Observation scores by sub-element for individual teachers - % of teachers completing required CPD	Key indicators for school relative to norms and district average	-HT - TOT of PTC Chair and members	Discuss results, develop actions plans for underperforming teachers
LitNum	Report on weaknesses in specific aspects of curriculum, and how to address these via improved teaching practices	Guidelines on how to improve teaching practices produced by DCTE based on analysis of LitNum results	HT TOT of teachers	Improve teaching practices of teachers Use of improved teaching practices to be followed up via classroom observation
SMIS	Use of SMIS Use of Module for dropout prevention School level indicators generated by the system	Key Performance indicators (KPIs) for school relative to norms and district average	-HT - EMIS focal person - TOT of PTC Chair and members	If KPIs are not in target range, look for reasons why, and corrective actions. Schools can track improvement plans and set their own targets, and hold them accountable for results. Comparisons of school performance to that of similar schools.

3.5.2 Financing and Budget for EMIS

For 2019-20 financial year, the total budget of the Elementary & Secondary Education Department is 146 Billion PKRs of which 20 Billion are for Development, and 126 Billion are for recurring salary and non-salary expenditures.[121]

In the Development budget, 15 Million PKR have been allocated for improvement and strengthening of EMIS in its operational activities during the current Financial Year. It is planned to increase this amount to 19 Million PKRs for the next three years.[122] Budgets for current expenditures related to EMIS, for salary and non-salary expenditures associated with data collection and dissemination are covered in the overall budget of the Department, and a breakdown of these was not obtained during the review.

The 15 Million PKR (100,000 USD) for EMIS development, represents a small budget. About three-quarters of it is allocated to training and skill set development. The EMIS cell prepared an internal Concept note on EMIS strengthening, which provided the justification for this budget.

The EMIS Development Budget is insufficient for the work ahead in developing and implementing the EMIS roadmap. As noted earlier, given its scale and complexity – these should be developed and implemented via TA component of an IDP sector support program.

[121] Information provided in responses to the Evaluability Questionnaire.
[122] Ibid.

4 Responses to Review Technical Questions

4.1 Relevance and comprehensiveness of indicators for monitoring access, equity and quality

4.1.1 Descriptive questions

Which indicators are routinely generated and monitored, and do they enable monitoring of the status and progress in terms of access, progression (e.g., survival and transition rates) and learning? If not: what are the gaps?

EMIS

The 2018-19 Statistical Report included the following indicators for Khyber Pakhtunkhwa excluding the Newly Merged Districts, with disaggregation at the district level:

- GER and NER total, and by type of School (government, private and madrasa), for age groups 5-9, and 10-14
- Promotion, repetition, dropout and survival rate by class
- Percentage of schools with: boundary wall, electricity, water and toilets
- Transition rates

The Statistical Report could be strengthened by inclusion of additional indicators, fewer tables of raw numbers, and by comparison of indicators over time, to permit analysis of changes, identify areas of progress, and where challenges remain.

The following is a list of additional Indicators based on ASC data that would be helpful to include. Where applicable all these indicators should be presented with breakdowns by gender, by district, and by level of education.

- Completion rates
- Student Teacher Ratio
- Adjusted Net Enrolment Rate (ANER)
- ASC based estimate of OOSC numbers and rates[123]
- Attendance rate (based on IMU data)
- Student Classroom ratios
- Percentage of teachers with University degree, by level of education, province and districts
- Percentage of qualified teachers at each level, province and districts
- Percentage of schools with classrooms requiring major repairs
- Student textbook ratios

[123] See Figure 12 for definition of these.

The report is based on the results based on the ASC. However, incorporation of data from other MIS, would present a more comprehensive picture of education (even if these data are available and/or reported separately by the other MISs). For example, a comprehensive report on education could include data on:

- Graduation rates
- Learning outcome data (for example results for provincial examinations at grade 2,5, and 8)
- Indicators on teachers, such as % receiving CPD (from the CPD-MIS)
- Annual average teacher and student attendance rates (from IMU)

A Short analytical section where multiyear trends in key indicators are examined would also be informative, and help to understand where progress is being made, and to help identify and challenges that may need to be addressed.

SMIS

SMIS software is designed with a focus collecting and maintaining data at the school level – individual student data and individual staff data. The report generation functionality of the system is focused on school level reporting. A number of reports yield a list of students, rather than tables with aggregate data at the school, and higher levels. There is a facility for generation of summary information at a school level, but this was not seen by the consultant, so it is not clear if it is working or not.

The capability to generate statistical tables and indicators is missing from SMIS at present. The table generation capability of the system needs to be reviewed, with a view to adding this functionality to the reporting capabilities of the system.

SMIS needs the capability to calculate and present all the internationally standard set of indicators, as are currently generated via EMIS (ASC). There are two options – the first to build this capacity for production of indicators directly as part of SMIS. The second is to have a data dissemination system that sits on top of SMIS, and which generates the indicators, and their dissemination. The second option could be invisible to the user and appear to be part of SMIS. The Business Intelligence initiative that ESED is participating in can be examined as the potential report and data dissemination capacity for SMIS.

IMU

The IMU has a publicly accessible online dashboard.[124] It is live, as it reflects data as they are reported by DCMAs using their mobile devices. The dashboard reports on the following indicators: student attendance rate; teacher attendance rate; and % of schools with functional boundary walls, water, lavatories and electricity. These are available for the current month (in which case they are rates based on the number of schools monitored to date during the month) and also by any month since IMU began monitoring in March 2014. These indicators are available on the dashboard, for Khyber Pakhtunkhwa province and by district. The public dashboard does not

[124] Elementary and Secondary Education Department, Government of Khyber Pakhtunkhwa. n.d. *Independent Monitoring Unit Dashboard.* http://175.107.63.45/NewIMUSite/index.aspx.

currently allow for drilling down to the tehsil and school levels for these indicators, although some data is available at the school level.

Attendance of teachers and students at tehsil and school levels should be on the publicly accessible dashboard for monthly review and action. Also, it would be helpful if the indicators could be displayed for a user-specified data range. This would make the dashboard more useful as a tool to support data analysis, allowing for examination of trends over time, rather than just displaying data for a user-specified month as it currently does.

Are the indicators generated by the system disaggregated by gender, location, ethnicity or other aspects which would allow for an analysis focusing on equity?

EMIS (ASC)

EMIS collects aggregate student data mostly disaggregated by gender, permitting generation of most indicators by gender. Also, the majority of indicators can be disaggregated by location of the school – rural or urban. Population projections by gender are available down to the District Level, so rates such as GER, NER by gender can be produced at a District level.Aggregate data on students with disability by gender are collected, permitting reporting on disability, but not permitting disaggregation of indicators using disability as an equity variable, such as dropout rates by disability status.

SMIS

Table 4.1 presents an analysis of the equity variables currently captured in SMIS. In addition to those currently included, there is potential to add occupation and level of education of father (as proxies for socioeconomic status), and attendance at pre-school (Y/N), as these are on the School Register, but not currently captured. Occupation and level of education of mother, and distance from home to school are not available. Level of education of the mother would be a useful variable to collect, since in other countries, it has been shown to be a factor that is related to education outcomes of students.

Table 4.1: Equity variables currently included versus not included in SMIS

Equity Variable	Collected in SMIS	Not in SMIS, but on School Register	Not available
Equity Disability status	X		
Washington Group disability/impairment categories	X		
Member of ethnic minority	X		
Language spoken at home	X		
Orphan Status	X		
Occupation of father (proxy for socioeconomic status)		X	
Education level of father (proxy for socioeconomic status)		X	
Attended pre-school/ECE		X	
Living distance from school			X
Education level of mother (proxy for socioeconomic status)			X
Occupation of mother (proxy for socioeconomic status)			X

Source: Evaluability Questionnaire

SMIS has the potential therefore to generate student data and indicators disaggregated by the available equity variables. Father's occupation and level of education can be used to generate a measure of Socioeconomic Status (SES). However as discussed in Section 3.2.2, the capacity for production of statistical tables and indicators has not yet been developed for SMIS.

IMU

Public schools in Khyber Pakhtunkhwa are either boys' or girls' schools. IMU indicators currently are produced for all schools but could be disaggregated to report separately for boys' and girls' schools.

If learning outcomes are not integrated within the system, what other measures of education quality are available within the system?

DCTE currently does not have MIS for provincial level examinations. Results of these are not included in the Annual Statistical Report. The consultant did not ascertain in what form the results are reported on and disseminated.

LitNum is being introduced as a literacy numeracy assessment of grade 2 students. (see section 3.2.7). AT the time of the review it had only been conducted once. The aim is to conduct it in a number of months during the school year to measure progress in learning outcomes throughout the school year. As yet, issues of how the results will be disseminated and used have yet to be decided on. Data from the initial month are being analyzed by ASI, and as of the review had not yet been made available to DCTE, who would normally be the "client" for the data, to analyse and identify follow-up actions based on the results.

The review recommendations are that as SMIS is introduced for Grade 2 of primary schools, for LitNum to be integrated with SMIS in the sampling of students, and that results be linked at an individual level, to strengthen the analytical potential of LitNum.

Are those indicators automatically calculated within the system and if so at what level (school, lower level admin or national)?

EMIS

As noted, EMIS products include many of the standard set of internationally accepted indicators. It was not examined whether calculation of these indicators is directly programmed into the EMIS database, or whether there is an intermediate step, such as export into excel spreadsheets for calculation of the indicators. Regardless of which is the case, the calculation of indicators is automated, and the EMIS cell has the capacity adding new indicators to the set automatically generated. Indicators at the school level are discussed under Business Intelligence System below.

Business Intelligence System (under development)

As noted earlier, the EMIS cell is participating in an interdepartmental initiative to develop a data dissemination system. This system needs to be capable not just of producing data tables based on user-specified queries, but also of generating the complete set of standard internationally accepted indicators, at provincial and district and school levels – for the subset of indicators that are applicable to the school level. (Indicators that are rates with population projections as a

denominator can be produced at the provincial, and the district level which is the lowest level at which the population projections are available.)

SMIS

SMIS does not currently have functionality for production of indicators. The Business Intelligence System above has the potential for generation of table and indicators from SMIS. An analysis is needed of indicators to produce at a school level, and with what equity disaggregations should be carried out, including which should be KPIs. The majority of the standard internationally accepted indicators can be produced at a school level.

Are the values of the indicators publicly accessible through a web-platform, and at what level (school level, lower level admin or national)? What are the data access restrictions?

EMIS (ASC)

Currently EMIS (ASC) Annual Statistical Reports are available electronically as PDFs on the ESED website. Reports contains tables of data for the current year. There are not at present any dashboards or databases contain data in formats that would permit data manipulation and analysis.

The lack of a web-based platform for data dissemination is a serious gap that stands as a barrier to greater use of the data. (see discussion of the Business Intelligence initiative).

SMIS

SMIS modules for report generation and dissemination are yet to be developed. The modules should allow the user to request from amongst a standard per-defined set of tables and indicators, and also provide a user-friendly “point and click” interface, allowing the user to develop his/her own customized queries of the database. The pre-defined set should include standard indicators, including a sub-set of key indicators with Equity disaggregations.

IMU

IMU has an online database that provided current and historical data attendance rates of students, teachers, and non-teaching staff at Khyber Pakhtunkhwa, and district levels, but not at tehsil and school level (See Section 3.2.3).

4.1.2 Normative questions

Are the data collected and the automated indicator calculations within the system sufficient to provide the information necessary to track progress on agreed targets at the different levels? (At national/provincial level, or district level: looking at the results framework of existing education sector plans or equivalent, does the system enable monitoring of all results? At school level: is the information provided by the system sufficient to facilitate school management practices and to monitor progress on agreed improvement plans?)

The 2015 ESP joint review framework does not contain a set of Education Indicators and explicit targets for these over the duration of the programme. It contains 10 Policy actions. For some of these requiring quantitative data to monitor, new MIS have been developed. These include the Continuous Professional Development MIS to monitor implementation of new CPD policy, the

Girls' Stipend MIS to monitor and monthly distribution of vouchers to girls in middle schools with 80% attendance. The policy for a framework agreement with Finance for the education budget, but it does not explicitly identify the data required.

Table 4.2 below examines a number of indicators for 2014-15 at the onset of 2015 ESP versus 2018-19[125] towards the end of the ESP, complied by the consultant from the Annual Statistical Reports for the two years.

Table 4.2: Number of schools, classrooms, and rooms needing repair, 2014-15 & 2018-19

Government schools 2014-14 and 2018-19												
2014-15 Functional Government schools	**Number of Schools**			**Classrooms**			**Student classroom ratio**			**% rooms in need of major repair**		
	Boys	Girls	Total	Boys	Girls	Total	Boys	Girls	Total	Boys	Girls	Total
Primary	14357	8360	22717	46920	25663	72583	54	68	59	9	8	8
Middle	1516	1076	2592	4904	3507	8411	100	98	94	7	4	6
High School	1386	722	2108	12079	5418	17497	18	22	19	7	5	7
Higher Secondary	265	141	406	4495	1974	6469	7	9	7	8	6	8
2018-19 Functional Government schools	**Number of Schools**			**Classrooms**			**Student classroom ratio**			**% rooms in need of major repair**		
	Boys	Girls	Total	Boys	Girls	Total	Boys	Girls	Total	Boys	Girls	Total
Primary	13338	8442	21780	48355	30001	78356	58	67	61	9	6	7
Middle	1445	1188	2633	4959	3979	8938	107	86	98	7	3	5
High School	1428	825	2253	11875	6013	17888	20	24	21	7	3	6
Higher Secondary	441	250	691	7061	3540	10601	9	9	9	5	3	5

Source: Data Compiled for this report from Annual Statistical Report 2014-15; 2018-19

Observations:

- There was little change in the number of schools, with exception of Higher secondary with 70% increase, and a corresponding increase in number of classrooms. Further analysis by ESED could include commentary on policy considerations behind this.

[125] Elementary and Secondary Education Department, Government of Khyber Pakhtunkhwa. 2015; 2019. *Education Management Information System, Annual Statistical Report 2014-15; 2018-19.*

- There is considerable variation in classroom-to teacher ratio – high with little change between 2014-15 to 2018-19 for Primary schools, extremely high in both time periods for middles schools, at an expected level for high school, and very low for higher secondary, with little change over time. Further analysis by ESED could include commentary on the policy and operational implications of these. Are the rates low for Higher secondary because of the low number of students at such schools? Are there alternatives?

Departmental budgeting requires historical trends and projections of demand for education services (school aged population), and education supply (enrolments, GER, NER, STR, teachers, teacher training, etc.). These are the core education indicators produced by EMIS (ASC). Historical trends of these needed for education budgeting are available from EMIS cell for use by the Planning and ESRU.

While the data required for planning, monitoring and budgeting purpose are available within EMIS, they are not available in a readily accessible and usable form for planners and decision makers, for development partners, and the public. Users obtain data by requesting it from the EMIS cell, who generate the required data.

At the school level, for two higher secondary schools visited (where SMIS has been implemented), neither school visited had an overall school improvement plan, rather they had plans covering particular items that needed attention. Head teachers kept track of key data such enrolments by year, but it was unclear if they were using these data for school planning, despite training received by head teacher and PTC chairpersons in preparation of school improvement plans. This represents an opportunity for improvement: with a functioning SMIS, schools have the opportunity to track improvement plans and set their own targets, and also this will help to hold them accountable for results and allows for comparisons between schools in terms of performance.

4.2 Data quality management and mechanisms

Who collects the information (e.g. school admin, teachers), and how is it entered? (e.g. paper-based, mobile, web-based, PC)?

EMIS (ASC)

IMU has been responsible for ASC data collection since 2017. Paper questionnaires are sent to school in October and completed by the headteacher. During November – December, IMU monitors visit each school, verify the data and enter it into Android devices using an app developed for this purpose. Some fields, such as the list of teachers at the school (name, age, qualifications, etc.) are pre-filled on the app and only need to be updated to reflect changes that have occurred. This streamlines the data entry process.

SMIS

SMIS has been implemented for Higher Secondary Education. Individual student data has been captured from school registry on initial implementation in 2017/18, and there has been no updating of this information since then. Schools have an SMIS focal person who have been trained on the system, who are responsible for initial entering the student data, using a computer dedicated to administrative purposes. Data are entered live into the SMIS database. The system is not used to collect attendance data, and currently the linkage between teacher data collected via the Biometric Attendance System and SMIS has yet to be developed.

IMU Monitoring

The IMU Monitors visit each school at least once per month. Teacher attendance and student attendance are taken via physical counts of those present. School facilities and their working status are physically verified. Data are captured using Android devices with apps developed for this purpose.

LitNum

LitNum assessment data is collected by IMU Monitors, using Android devices. (see Section 3.2.7) One app selects the sample of students to receive the assessment – via a random sample of nine students in the Grade 2 class. The second app is used to administer the assessment to each sampled student. The Monitor runs the app as Grade 2 students are generally not capable of self-administering the test. Hence, the student views the questions on the screen, tells the Monitor his/her answer, and the Monitor enters the response. The assessment takes 5-6 minutes per student.

District EMIS module

There is no module within EMIS with features required to manage the work processes of Districts, such as school visits, teacher observation, etc.

Which measures are in place to prevent and resolve data errors, e.g. data validation during data entry, partially pre-filled data collection instruments, help desk, documentation?

There have been no studies documenting data quality and accuracy. What follows are observations based on the review:

Underreporting of student and teacher absenteeism

IMU collects headcount-based teacher and student attendance once per month for all schools, reducing the errors that typically occur with self-reported attendance data.

Use of the Biometric Attendance System for teacher attendance in higher secondary schools yields accurate, daily individual attendance data.

Cross checking and triangulation should be carried out of teacher attendance data between the biometric system and IMU monitoring to determine the consistency of data, and investigate cases of discrepancies.

Errors in population projections

EMIS indicators such as GER, NER, and ANER, use projections of the school-aged population as a denominator. The population projections are also used in producing EMIS-based estimates of the OOSC. The projections currently being used by EMIS are based on the1994 Census of Population. As such, they now contain high levels of errors due to the lengthy projection period. Projections based on the 2017 Census are not yet available from the Bureau of Statistics. As soon as the projections form the 2017 Census become available, they will be used in the production of EMIS data going forward. As discussed in Section 6.3.1.4, errors due to population projections can be addressed by historical revision of EMIS indicators, using 2017 Census based population estimates and projections.

Errors in filling the questionnaires

In the ASC, IMU officers physically verify ASC data compiled by School Headteachers.

Errors in data capture of ASC

ASC data are entered into the Android app by IMU officers. The app has range checks on fields, flagging suspicious entries, which are changed or verified by the monitor. As this is done in the presence of the headteacher, it allows for verification that would be more difficult to obtain if data entry was being done after the fact. In the app, baseline data on individual teacher and school are carried forward from the previous year and updated as needed to cut down on entry time and errors. This streamlines the data entry process and reduces errors in capturing this information independently on each occasion.

Comparison of data with other sources

There is potential for comparing biometric teacher attendance data with IMU data, as already noted. Monthly attendance data collected by IMU – are expected to be accurate due to the head count methodology used. A sample of schools are selected more than once per month – to prevent schools from "easing up" once they have been visited.

KPBOS collects and reports on education data collected in the 2017 Population Census.[126] They also carry out surveys such as MICS.[127] There is potential for ESED to make use of these data to compare against EMIS data. Also, MICS produces a number of Education Indicators that EMIS does not, and there is an opportunity for ESED to look to MICS and other household surveys as a source of complementary education indicators.

Estimates of OOSC face challenges. To estimate OOSC via EMIS, it is necessary to collect student enrolment data in all forms of schooling (public and private Schools, nonformal schools, and TVET schools), and compare total enrolments with the estimated population. There are problems with both the numerator and denominators. Until 2019, the ASC coverage was limited to public schools, in 2019 it was extended to private schools. The estimate of enrolment in nonformal education in Khyber Pakhtunkhwa from the NFEMIS is about 54,000 (see Section 1.6.1) but there has been no review of this number. The denominator, estimates of the population in recent years are subject to potentially large errors of projection, as discussed above.

Alternate means of estimating OOSC are via Censuses and household surveys and depend on inclusion of questions on current educational status of school-aged children. An analysis of the capability to produce such estimates from the MICS and the 2017 Census can be made. ESED should have input into the design of future household surveys and censuses to ensure they can produce estimates of the OOSC.

ESED conducted its own OOSC Census[128] in 2017. In section 1.6.3, comparisons are made of results with those from the 2017 MICS, and with estimates produced by AEPAM and included in

[126] Pakistan Bureau of Statistics, Government of Pakistan, . n.d. http://www.pbs.gov.pk/content/population-census.

[127] Bureau of Statistics Khyber Pakhtunkhwa; Planning & Development Department, Government of the Khyber Pakhtunkhwa and UNICEF Pakistan; Multiple Indicator Cluster Survey, Khyber Pakhtunkhwa, 2016-17; Final Report; KP-MICS; Peshawar Pakistan, pp. 151, 154

[128] Elementary and Secondary Education Department, Government of Khyber Pakhtunkhwa. 2019. "Out of School Children Survey 2017-18."

NEMIS reports. The OOSC Census found a lower rate of OOSC than other sources. This may have stemmed from methodological and operational issues in the conduct of the OOSC Census.

Another OOSC is planned for 2020. A recommendation of the current study, is that prior to this, a review is needed to: clearly identify what data are needed on OOSC, to consider pros and cons of different means of obtaining the required data, to consider the capacity of ESED to undertake follow-up actions on the basis of the data collected, and to recommend how to draw on the expertise of KPBOS in the design and collection of the data.

4.3 Measures for safeguarding personal and confidential information

4.3.1 Descriptive questions

Does the system define different levels of access and editing rights according to user type/role? Which ones? the rights to access them?

The IMU system has user rights and privileges.

EMIS cell is the custodian of the EMIS database. ESED staff wanting data submit requests to the EMIS cell who generate the data.

For SMIS, user rights are defined within the system, for school, district and EMIS staff.

Encryption is used on some databases.

Which security and data protection measures are in place to ensure that confidential information (e.g., individual student records, financial information), are only accessible to those with the rights to access them?

For SMIS, only authorized users can see personal identifiers. Furthermore, the database is encrypted.

4.3.2 Normative questions

In the present condition, how safe/vulnerable is the system, and what would be recommended additional security measures to be adopted, in order to protect individual student data, or school financial information?

Question 23 of the Evaluability Questionnaire addressed this issue. Table 4.3 gives responses provided by Khyber Pakhtunkhwa to a list of potential measures to safeguard confidentiality of the data. In summary Khyber Pakhtunkhwa indicated all the potential measures were being followed.

Table 4.3: Measures to safeguard Confidentiality of Individual Data in EMIS and SMIS

Safeguarding Confidentiality of Private Individual Data		
Measure to safeguard confidentiality of data	**Used for SMIS** (Yes or No)	**Used for EMIS** (Yes or No)
23.1 Only authorized personnel are assigned User IDs and Passwords by the System Administrator	Yes	Yes
23.2 Users assigned privileges to access only approved portions of the data. Access to individual student level data is restricted to those needing to enter and work with these data and approved by senior management.	Yes	Yes
23.3 The database used by the system for online queries and report generation is a separate encrypted database that has been stripped of all personal identifiers on individual records.	Yes	Yes
23.4 The main database is encrypted.	Yes	Yes
23.5 Any linkages of EMIS data with date from External files is only done once a formal request has been made and approved by senior management of both Ministries involved. The request identifies measures being undertaken to safeguard the confidentiality of the databases being linked, and the confidentiality of data resulting from the linkage of the two databases.	Yes	Yes
23.6 Other measures: specify		

Source: Created for this report based on answers to the evaluability questionnaire

Due to time constraints of the onsite visit, there was no time to physically verify each of these. They are all important measures to undertake. These measures will be most critical for SMIS, which will contain the personal individual data on both students and teachers. Since the data dissemination module of the SMIS has yet to be developed, a version of the database which is stripped of all personal identifiers could be used for dissemination purposes. This will guard against any inadvertent disclosure of personal data, or against any hacking of the system to divulge personal data.

4.4 Types of information and levels of disaggregation

4.4.1 Descriptive questions

For the key indicators, which levels of disaggregation are available, e.g., by gender, age, ethnicity, religion, residence location, socioeconomic status, parents' profession and status (e.g., both parents, single parent, guardian), etc.? Which of these are routinely generated?

EMIS (ASC). Key student indicators are disaggregated by gender, and district. Other disaggregation is not possible from EMIS (ASC) data, which collects aggregate data.

SMIS – Indicator production capabilities of SMIS are yet to be developed.

Which information is collected regarding teachers and non-teaching staff characteristics?

The ASC based EMIS annually collects individual data on teachers and non-teachers. Data on teachers includes name, CNIC[129] and a government ID number, designation, age, gender, highest education qualification, and highest professional qualification, date of first appointment and current appointment, and transfers. See Table 10. There is a Continuous Professional Development MIS (CPD-MIS) that collects data on teachers' CPD. Data on non-teaching staff includes designation and gender.

IMU collects monthly aggregate teacher attendance, based on one visit per school per month. The teacher attendance register is also examined, and teachers with high absenteeism rates are reported to the District Education Group for follow-up action.

SMIS is designed to include the same teacher / non-teacher information as collected annually in the ASC. The intent is to keep data on teachers up to date, and additionally to include daily individual attendance data, however these have yet to be done in practice.

The Biometric Attendance System collects individual teacher and non-teacher attendance daily for upper secondary schools.

Which other information is collected, e.g. school-level information? (school infrastructure, school improvement plans, school materials, financial information, etc)

EMIS (ASC). Table 11 presents the school-level information collected in the ASC, on an annual basis, ASC collects data on free textbooks by class and subject, office furniture, boundary wall and other security measures. Biannually the following is collected on school infrastructure: presence of different types of rooms; number and condition of student desks and chairs, cleanliness, classrooms and other rooms in need of reconstruction or major repair, area available for new construction. Biannually, data on existence and data for budgeting, including bank number, account balance, amounts received and spent, etc.

[129] National Database and Registration Authority, Government of Pakistan. n.d. Computerized National Identity Card (CNIC). https://id.nadra.gov.pk/identity-documents/identity-nic/

The IMU reports monthly on availability of electricity, water, and toilets, based on physical inspection.

SMIS is designed to include the school level data as the ASC and IMU but kept continually up to data. As yet these features of SMIS have not been implemented.

For which indicators are trends over time available / generated?

EMIS

The 2018-19 Annual Statistical Abstract based on the ASC contains almost exclusively data for the current year only. Earlier EMIS reports examined, for example the 2014-15 report contained more multiyear data, so there is less now than earlier in the Annual Statistical Reports on analysis of time series data to examine trends in the education system. However, given the data are available, it is possible to generate such time series data.

Trends over time have been calculated however, for a number of key indicators, for use in planning and budgeting purposes. For example, the 2015 ESP contains analyses of net percentage point change in NER between 2004/5 and 2010/11, and in enrolment by grade.

The EMIS cell used to have a decision support system that was a dissemination system with a user-friendly interface that allowed users to query the EMIS database and retrieve custom tables. This system permitted the generation of multi-annual tables. This system has no longer been used since 2017. No reason was given on why it is no longer in use. ESED, represented by the EMIS cell, is currently participating in a multi-departmental effort to develop a Business Intelligence system, permitting query of ESED databases and generation of user-specified tables, including multi-annual tables.

SMIS

SMIS is designed as a live database, to be updated daily. As such, the SMIS database provides a current view of the education system, but by the same token it does not provide historical views of what the system looked like at earlier points in time. That is, the system will have individual data on all teacher currently at a school but will not have data on the teachers who were in the school in the past, such as a year ago. The strategy for dealing with this and to have capability to generate table or analysis of historical data is to take and retain a copy of the database at specified times. This could be done once annually or could be done more frequently, such as quarterly. These snapshots of the database would be used for generation of annual (and potentially quarterly) data and indicators.

Attendance data, which is reported daily would be an exception where the system can retain historical attendance records of individual students, and be able to generate reports of attendance on any date or range of dates, as for each date the system would have a record of students present and students absent with and without excuses.

4.4.2 Normative questions

Is the level of disaggregation of the different indicators available from the system sufficient to perform the necessary targeting of children according to existing plans (i.e., target specific interventions or resources for a disadvantaged group, like poor rural girls, or children with disabilities, or children from a disadvantaged ethnic group)?

Existing programmes for targeting of children include the Girls Stipend Programme for girls in middle secondary school, and grants to children in areas under-serviced by government schools attend private schools.

A separate MIS has been established for the Girls Stipend Programme, which contains individual student data for all girls' middle schools, tracks monthly attendance, and distributes stipends to qualifying students (those with an 80% attendance rate for the month in question). Under the EMIS Road Map to be developed, this MIS would be integrated with SMIS at the point at which SMIS is successfully implemented for (Girls) Middle Schools.

The OOSC Census has been used to identify geographic areas with large numbers of OOSC, and where there is insufficient capacity on government schools. This information has been used for targeting areas for a voucher programme, under which out of school children are given vouchers to attend low cost private schools. This programme is managed via the Education Voucher Scheme MIS (EVS-MIS). This represents another of the Programme Specific MISs to be integrated with SMIS under the proposed EMIS Road Map.

At present there are no programmes targeting disadvantaged children – such as poor rural children, children with disabilities, or from disadvantaged ethnic groups. This may be because data to do such targeting are not available. Such data will be available when SMIS is successfully implemented. In implementation of SMIS, consideration needs to be given to ensuring individual student data contains all the relevant equity dimensions.

Is the level of information collected about teachers sufficient to be able to comprehensively review teacher management practices and detect potential issues, such as ghost teachers, teacher absenteeism or performance, gender imbalance in teacher placement, disparities in teacher qualification between regions etc?

IMU monthly data on teacher (and student) attendance has been successfully used to identify non-functional schools, and to take actions to ensure that all schools are functional. The teacher attendance data has been used to address the issue of ghost teachers, and cases of repeated absence have been referred to District Education Group for administrative action. The result has been a decrease in teacher absenteeism since the introduction of the IMU (see Section1.7).

The EMIS (ASC) data contain the details on teacher characteristics to permit the study of issues such as gender or qualifications imbalances between regions, as well as imbalances in STRs. Addressing such imbalances was one of the ten core policy area under the ESP, through roll-out of a teacher rationalization plan to districts (see section 1.7).

4.5 Efficiency of data collection and administration

4.5.1 Descriptive questions

In which areas has the system increased and in which areas has it reduced the time spent on management and administration tasks by staff at different levels (e.g., school, education department, Ministry of Education)? For teachers, did it increase or reduce teachers' contact time with students?

SMIS has been implemented in higher secondary schools but not to a point where the system is used operationally by schools. Individual student data have been captured but are not being kept up to date. Attendance data is not being reported in the system. For SMIS to have an impact at a school level, it has to be used. Examples of usage will be to capture individual student attendance in the system. This review is also recommending development and implementation of a drop-out prevention module, which automatically generates follow-up actions to be taken when students are absent without permission.

In areas where it has increased the time required – both for existing tasks and for new tasks – do users feel this is justified in terms of the purpose and impact of these tasks? Why or why not?

SMIS is not being used, and hence this is only a theoretical question at this juncture. In the future, SMIS with collection of equity variables at a student level will permit improved targeting of programs to benefit at risk students. The data will also permit analysis of the progression, retention and drop-out rates by equity groups, which can further help in development and targeting of programs for disadvantaged groups to improve equity in education. Without SMIS, the extent of targeting and analysis by equity groups is very limited.

4.5.2 Normative questions

According to users, how could the system be improved to increase efficiency?

EMIS ASC is very efficient in terms of collection and production of key indicators, but efficiency of use of the resultant data could greatly be improved via a dissemination system that enabled users to access the data and export it into EXCEL or SPSS or other software for further use and analysis.

Users noted the potential of Biometric Attendance System for teachers, but also for students as potential efficiencies. These are discussed more Section 3.2.4. Also extended use of biometrics for teacher and student attendance, would allow IMU to turn its monitoring and data collection to other Departmental needs (See Section 3.2.3).

There are number of different and independent MISs. This results in repetition of data collection and entry. The result is far from a fully integrated system, in which where there would be no or little duplicate of data collection.

An SMIS with an automated dropout prevention module could be a cost-effective means of handling and preventing dropouts.

4.6 Two-way vertical information flows from school to regional/national and in between

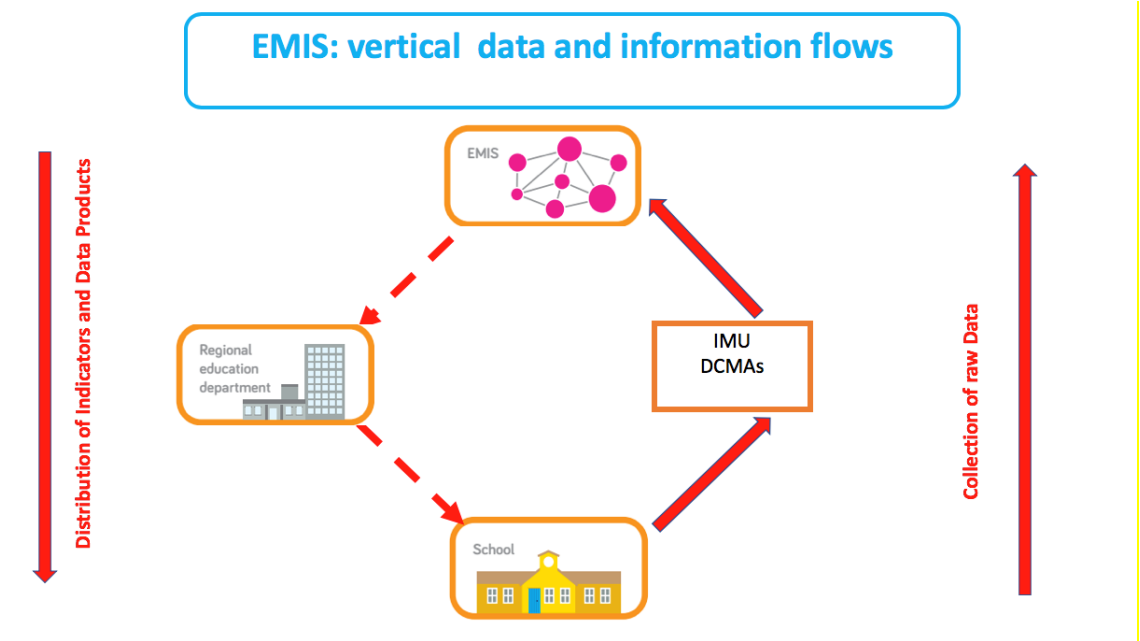
4.6.1 Descriptive questions

Which processed information (e.g. indicators, trends, analysis) is communicated or otherwise accessible at local and school levels?

Figure 4.1 shows the vertical flow of raw data during data collection, and distribution of final data products. On the collection side, schools are sent the ASC questionnaire, which are completed by headteacher. IMU DCMAs visit schools, verify the data reported by the headteacher, and enter it into the mobile collection app. The data is sent to the IMU database where it undergoes cleaning and is then transferred to the EMIS cell. The EMIS cell process and produces data and information products. Currently the most important of these in the Annual Statistical report. Ideally, the EMIS cell would produce a range of data products designed for and distributed to Districts and Schools. This is a weakness currently. Although during the mission, visits to district offices and schools at different levels were not possible, it appears that there is very little in terms of such a reverse flow of data and information products.

While in the medium term, the plan will be to replace EMIS with SMIS, in the intervening period, it should still be a priority to develop data and information products for Districts and schools, accompanied by training in the use of these products. This will begin the development of capacities which will need to be further strengthened with the introduction of SMIS.

Figure 4.1: EMIS: Vertical Data and Information Flow

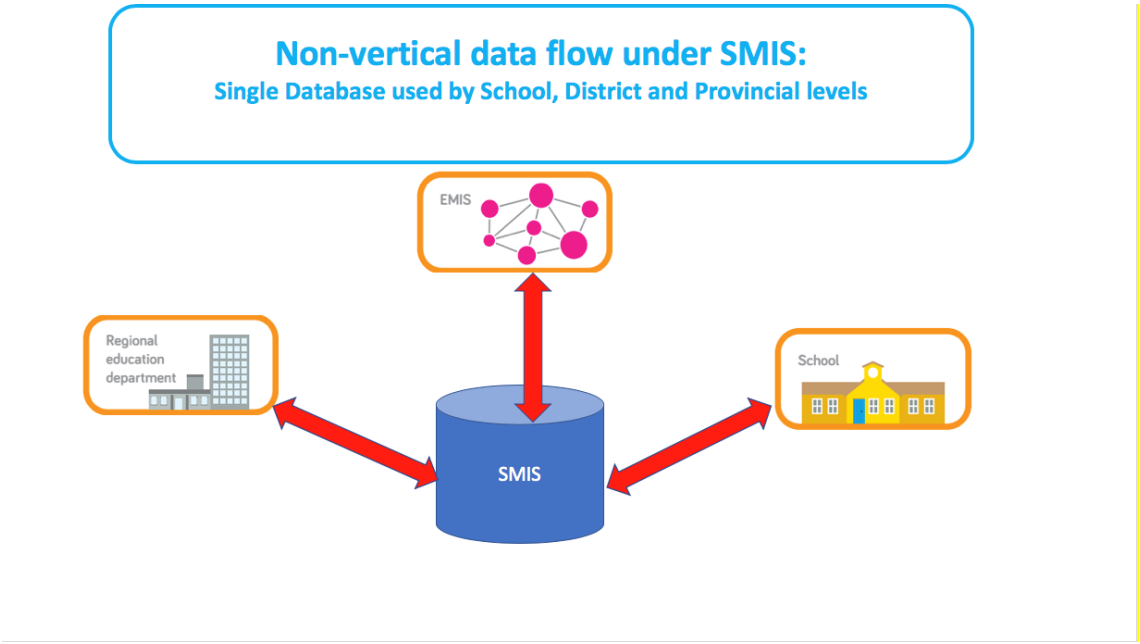


Source: Analysis of information obtained by EMIS expert via interviews with ESED leadership during on site visit.

Figure 4.2 describes the desired model of data and information flow under SMIS. SMIS will be an online database, which is being continuously used and updated by School, district, and provincial officials, each with rights and privileges within the system. The system will have dashboards and

query systems that allow users to generate tables, and pre-defined data products, such as school report cards. This model, which relies on schools having at least intermittent access to the internet, will solve the problems under the current model with the reverse follow of data and information products from the centre to district and schools.

Figure 4.2: Non-Vertical Data and Information Flow under SMIS



Source: Analysis of information obtained by EMIS expert via interviews with ESED leadership during on site visit.

At what level (e.g. school, subnational) and in which format (e.g. dashboard, school profile / report card) is the information communicated?

EMIS

The main product from EMIS at present is the Annual Statistical Report, which is available for download on the ESED website, where it can be accesses by Districts, and by schools with Internet. However, it is a lengthy report in PDF format of about 250 pages, mostly data tables. Some of the tables contain District level data, others are for the Province. The Report and especially in its PDF or print formats is not readily usable for Districts. It is not suitable for analysis, as the data are not in a format usable by Excel or other data analysis software. The Annual Statistical Report contains no school level data, and hence is not a viable product for them.

In the short term a school report card should be developed for schools. It should be a 1-2-page report with a few key data and indicators, such as enrolment by class, STR, student and teacher attendance rate (from IMU), and availability and sate of repair of key infrastructure and supplies. It can be distributed to schools in print form by Districts, as well as being available for download on the Internet.

SMIS

In the senior high schools where implemented to data, schools have access to raw data and to school level reports. However, higher secondary schools visited were not aware of the report generating capabilities of the system.

The capability for generation of indicator and reports needed at district and provincial levels based on SMIS has yet to be developed. As the central EMIS vehicle in the future, SMIS needs to have a report generation and data dissemination capability that responds the needs for data and indicators at all levels of the education system. This has yet to be developed.

IMU

The IMU dashboard is online and updated live as data is collected and sent by DCMAs. It is publicly accessible. Teacher and student attendance rates, and availability of key infrastructure are reported at provincial and district level. Currently some of these data are publicly accessible at a school level, but availability of school level data ought to be expanded, to make it comparable to what is available at district and provincial levels.

4.6.2 Normative questions

How relevant is the information to the needs of users? What are the information gaps? (including based on user perspectives on information they would like to have)

Elementary and Secondary Education Directorate expressed the need for an EMIS officer in each DEO. Without such an officer, districts are unable to access and use the EMIS data they require for planning and operational activities.

In addition, DESE expressed the need for transactional, sub-annual district module to be part of an overall integrated EMIS, for use by districts in carrying out their programmes of school visits, classroom observations, etc.

The district level data in the Annual Statistical Report, are not in a usable format for districts. Districts would be beneficiaries of a data dissemination system, that would permit them to retrieve and generate data tables for the district, sub-district areas, and individual schools.

SMIS could not be fully assessed as the reporting functions of SMIS have yet to be developed. Until SMIS is fully implemented, there will be a gap in terms of the availability of equity related data and indicators.

EMIS. A School report card containing key indicators at the school level from EMIS and IMU would be helpful. This could be disseminated on a dashboard, and also print copies provided to schools. (see Recommendation 6.3.2)

Has the adoption of the system led to an increased or reduced ownership of information at school and sub-national level for planning and decision making?

With the limited extent of implementation and usage of SMIS to data it is too early to say.

The idea of an SMIS module for dropout prevention was described to the two schools met during the onsite visit, and both thought such a module would be helpful to deal student absenteeism

and prevent dropouts, dealing with them in a systematic fashion, and with SMIS easing the size of the workload involved.

4.7 Integration with other relevant databases, within and cross-sectoral, including financial, demographics, learning assessment

4.7.1 Descriptive questions

Which separate systems/databases have been completely integrated into one system (i.e. an EMIS), or are planned to be integrated?

The EMIS (ACS) is currently the central MIS for education. At present there are a number of independent MISs, which are not integrated with EMIS (ACS). These include the SMIS (partly implemented), Girls Stipend MIS, the School Quality Management Initiative, Induction Program, Continuous Professional Development, Conditional Grants, OOSC census, biometric attendance and HRMIS (see Section 3.2.11).

Over-time as it is successfully implemented, the SMIS is expected to become the central MIS, and overtime also linkages and integration between SMIS and the independent MISs will be developed.

At present there is no road map or articulated plan on how to get from the current situation to the future goal of a fully integrated system.

Are there any links/integrations between separate systems, e.g. between the EMIS and civil registry; which ones and how has this been achieved (e.g., through an API, or manually) and for which purpose?

There are currently no links between separate systems such as a civil registry and EMIS/SMIS, but there is potential for such linkages to play a valuable role in the future, in targeting of support of education of disadvantaged students. A number of registries and potential benefits of future integration with SMIS are discussed below.

Benazir Income Support Programme

The Benazir Income Support Programme (BISP),[130] is an income support programme. It is based on a registry of low SES families developed in 27 Priority Districts nation-wide. Districts of Khyber Pakhtunkhwa covered include: Mansehra, Bannu, Nowshera, Charsadda, Kohat, Haripur, Malakand, Dera Ismail Khan, Mardan, and Dir Upper.

National Socio-Economic Registry

The National Socio-Economic Registry (NSER)[131] was initially established in 2010-11, when BISP with the support of World Bank conducted a national level Poverty Score Card survey through which complete information on the socioeconomic and welfare status of almost 27 million households was collected across the country, to expand the BISP to all districts of the country.

[130] Benazir Income Support Programme, Government of Pakistan. n.d. https://bisp.gov.pk/

[131] Benazir Income Support Programme, Government of Pakistan. n.d. **National Socio-Economic Registry (NSER)** https://bisp.gov.pk/nser/

As a result of this huge exercise, a National Socio-Economic Registry (NSER) was established containing basic information on household size, education, employment, disability, assets etc.

The database was used to decide eligibility of households and identification of 'recipients' for Conditional and Unconditional Cash Transfer Programs of BISP. Outside of BISP, there have been more than 30 government/non-governmental institutions that are currently using BISP data for targeting of their programmes.

On one end, where these registries are useful to many development organisations to help incentivize and improve lives of the marginalized communities; on the other hand, these pose a great challenge as they change to a considerable degree overtime. The change in demographic profiles, economic registries, age, earning etc. necessitates recollection/update of the socioeconomic data to improve targeting performance. Globally such registries are updated after an interval of 4-5 years to determine whether or not support to the existing beneficiaries be continued or new families meeting the eligibility criteria be entered in the program.

Given the aforementioned factors, BISP has decided to carry out national rollout of NSER Update. Households are visited by interviewers equipped with Android mobile devices, to update the NSER.

Waseela-e-Taleem (WET)

The Waseela-e-Taleem (WET)[132] is an initiative that conditions cash payments on primary school enrolment for the children of eligible families. WET financially supports the primary education of 4 to 12 years old children of BISP beneficiary families for their enrolments and retention. Each beneficiary child receives a cash transfer of PKR 750 per quarter upon meeting the admission verification in 1st quarter and attendance requirement of 70% in subsequent quarters till completion of the primary education. It is part of a strategy aiming to link cash transfers to attainment of human development goals.

At present, WET has been implemented without linkages between EMIS/SMIS and the BISP/NSER, but it points to the benefits of such linkages in the future. Through such linkages, SMIS will not have to collect data itself to identify students from low SES families, these can be identified via linkage to NSER. In the future conditional grant programmes could use NSER and or SMIS criteria to target students/families for a particular cash transfer. SMIS could provide the data for the initial and ongoing verification of applicable conditions (e.g., through attendance and retention data it collects), and BISP/NSER systems could potentially be used for payment of the conditional grants. These systems are central to the core function of BISP and are advanced and continually being improved to take account of new technologies. Such integrated mechanism could apply to conditional grants, regardless of the source of the grants (e.g., grants coming directly from the ESED budget, or ones coming from other sources such as the WET grants, resulting in efficiencies over the current situation where BISP handles its own Conditional-grants (including verification that attendance and retention criteria are met), and ESED does its own conditional transfers, including development of modules for and administration of payments.

[132] Benazir Income Support Programme, Government of Pakistan. n.d. Waseela-e-Taleem (WET) https://bisp.gov.pk/waseela-e-taleem/

National Database & Registration Authority (NADRA)

As discussed in Section 3.2.2.2, consideration should be given to adoption of the Child Registration Certificate (CRC), as a unique Student identifier. This is elaborated on here, as well as other potential benefits of linkage of SMIS with NADRA.

The National Database & Registration Authority (NADRA) issues Computerised National Identity Cards (CNICs).[133] These are smart cards issued to persons aged 18 and over. There is a small fee to obtain the CNIC, but as it is needed for such a wide variety of activities, including obtaining a driver's license, buying a train ticket, National Tax Number, bank account, passport, cellular connection etc, the majority of the adult population have a CNIC. It is a blend of state-of-the-art technology and well-defined business rules to guarantee its authenticity and validity. The unique 13-digit identification number is recognized all over the country. It also contains biometric fingerprint data.

The Child Registration Certificate (CRC)[134] is a registration document used to register minors under the age of 18 years of CNIC holders. The CRC is issued to a parent or guardian of the minor. It is also known as a b-form.

The b-form ID together with the parent's CNIC number provide a unique identifier to minors. Capture of the parent's CNIC and the child's CRC identifier at the time of school registration, and its capture in SMIS will provide SMIS with a unique identifier capable of being used to track the student through the education system up to the age of 18, when it could be replaced by the individual's CNIC number. Even if all children do not currently possess CRC, collection of it for those who do and encouraging its use at the time of registration would help.

In the future, the school registration process could be streamlined under an SMIS, linked to NADRA. When parent with CNIC appears for registration of their children possessing a CRC, the baseline data on the parent name, address, etc could be obtained electronically from the CNIC card (directly from the card if it contains this information, and if not via linkage to the NADRA database). Baseline information on the student (name, gender, date of birth) could be similarly obtained via linkage to the CNIC/CRC database. This could streamline and simplify the school registration process and reduce the amount of information that needs to be collected and independently entered into SMIS. It would also establish a linkage between the NADRA and SMIS databases, that could be used for other purposes.

There are also long-term benefits of having such a unique student identifier in SMIS. It will permit longitudinal tracking of individuals' educational experiences, throughout Elementary and secondary education, and onwards to their experiences in the labour markets, for example via linkages with the income tax records. Such rich databases will be useful, amongst other things to study the long term social and economic returns of education. These can provide empirical data that show education is a public investment, with returns to society and the economy, that justify the upfront expenditures.

[133] National Database and Registration Authority, Government of Pakistan. n.d. Computerized National Identity Card (CNIC). https://id.nadra.gov.pk/identity-documents/identity-nic/

[134] National Database and Registration Authority, Government of Pakistan. n.d. Child Registration Certificate (CRC). https://www.nadra.gov.pk/identity/identity-crc/

National Identity Card for Overseas Pakistanis (NICOP)[135]

NICOP is a database of Pakistanis who have emigrated. Linkages of education and NICOP data will enable understanding of the education attainment of persons emigrating from Pakistan. This may be more of an issue for Higher Education, and for examination of the net flows of Highly qualified human capital into and out Pakistan (the Brain Drain/Brain Gain), and implications on GDP due to remittances to family members by persons abroad, on the pros and cons of public funding of Higher Education.

Sehat Sahulat Program (SSP)[136]

The SSP is a program of health insurance to targeted beneficiaries – those who are eligible under the BISP program. Currently this corresponds to people who are living in 23 priority districts nation-wide and earn less than 2$ a day, are eligible to enrol in the Sehat Sahulat Program. Benefits under SSP include free coverage per family of up to 250,000 PKR for priority health care services and 50,000 PKR for secondary health care services per year. There are additional benefits, such as coverage of funeral costs. Additionally, there are optional additional benefits that members can purchase at low cost. for extended coverage.

Linkages between SSP and SMIS, will be able to examine education participation (enrolment, dropout, attendance), and outcomes (retention, transition) of students of families enrolled in SSP, versus those not enrolled, to analyse the impact of medical coverage students from low SES backgrounds.

Does school level information (i.e., through a school level information management system or SMIS), feed into the EMIS, and to which extent? Is this for all schools or only certain types of schools (e.g. public schools, pilot schools, schools with required ICT infrastructure)?

Given the partial implementation of SMIS, data from SMIS do not as yet feed into EMIS that would be the basis for generation of annual data on the education system.

In the future the vision is that SMIS, fully implemented and maintained at the school level, would replace the need for an ASC as it exists today. The ASC is an annual snapshot of the education system, currently obtained by collecting detailed, mostly aggregates data for a particular reference point, directly from schools. There is still a valid reason for having a snapshot of the education system at a standard reference point, for the production and tracking of annual indicators.

Under the scenario of a comprehensive, continually updated SMIS whose content includes everything collected in the ASC and more, an annual snapshot of the Education System would be generated by a point in time snapshot of SMIS. This could be done for the reference data in question, via a full copy of SMIS database. Alternately it could be done by use of SMIS to populate a set of tables corresponding to the data currently collected by the ASC. There would be no need for schools to physically fill in forms, or for data collectors to visit schools to obtain the information. The option of a physical copy of the SMIS database at specified reference points would be more robust, as it would allow for the generation of any data products possible from the information

[135] National Database and Registration Authority, Government of Pakistan. n.d. National Identity Card for Overseas Pakistanis (NICOP). https://www.nadra.gov.pk/identity/identity-nicop/

[136] Ministry of National Health Services, Regulations & Coordination, Government of Pakistan. n.d. Sehat Sahulat Program (SSP). https://www.pmhealthprogram.gov.pk/

contained in SMIS, for the times at which copies were made, whereas the other option of pre-populating a set of tables would limit the potential for historical data analysis to whatever data was contained in those summaries.

4.7.2 Normative questions

Which other existing data systems should be linked with the system being evaluated, in order to enable monitoring of progress on all aspects of the education sector plan (or blueprint of national education priorities)?

One model moving forward is for SMIS to become an enterprise system collecting, through a number of different modules, all of the information related to the education system. Currently there are separate MISs developed or yet to be developed pertaining to different elements of education system.

Another vision of SMIS is that it would be a major Departmental system, co-existing with a number of other major departmental systems, such as the Financial Information Management System, a Human Resources Management Information System, with well-thought out and developed set of relationships and points of linkages between the systems. This may be a preferred route to follow, since the other systems already exist in some form or another. It may be instructive to examine best practices and experiences of other countries in this regard.

Taking the example of HRMIS and SMIS, ideally there ought to be a central database of all teachers used by both systems, and HRMIS and SMIS would collect and update certain data about teachers – with SMIS the source of data on the school and teacher attendance, teacher observation, etc., and HRMIS could be source of official data on teacher qualifications, CPD, etc.

In ESED, the Directorate of Curriculum and Teacher Education (DCTE) responsible for examinations and assessments of learning outcomes currently conducts these without the benefit of MISs for managing the processes. Such MISs should be developed, and they should be integrated with SMIS – so that relationships between education learning outcomes, and education inputs – teachers, teaching practices and student characteristics can be studied and better understood to inform education policy and practices (see Section 3.2.6). The same is true of the LitNum assessment.

4.8 Integration of an early warning system or mechanisms to prevent dropout

4.8.1 Descriptive Questions

At the school level, is there a system for digitally registering/monitoring absenteeism? Does it distinguish between excused and unexcused absenteeism?

SMIS database contains fields that allow for daily reporting of student attendance/absenteeism data, but at present these data are not being collected through SMIS. Currently the system makes no distinction between excused versus unexcused absence. No methodologies have been specified for how to collect the student attendance information. Typically, the source of the information would be the paper attendance registers maintained by classroom teacher, with

capture by either the classroom teacher or an administrative support person. Procedures also need to be developed for how to distinguish excused absences.

If yes, how is it being used – is it used to detect and prevent dropout? Does it include other indicators besides absenteeism to monitor risk of dropout? Does the system allow recording of teacher's absenteeism?

As noted above, SMIS is not being used to report student attendance/absenteeism.

One of the recommendations of the current review is to develop and implement a module for Dropout Prevention within SMIS.

SMIS also allows for the recording of teacher's absenteeism, but this data is not currently being collected via SMIS. In upper secondary schools where SMIS has been implemented, teacher and non-teaching staff attendance is being reported daily by the biometric system. At present these data are being reported centrally to the HRMIS system. There should be linkages between HRMIS and SMIS, at present although linkages are planned.

Is there a case management or referral system, e.g. automated requests for action sent to the principal, or education department, or other, according to specific referral rules like days of absenteeism?

There is no module for case management and dropout prevention. Some of the features needed for such a module exist within the system, such as the capability to send SMS to parents, but an automated module incorporating rules for follow-up actions for different cases of unexcused absenteeism needs to be developed, such as automated SMS messages to parents for first offenders, escalating to telephone calls and/or personal visit for multiple offenders. This would be part of the recommended development of a dropout prevention module.

4.8.2 Normative questions

In the case there is no early warning system imbedded within the system, given the current technical architecture of the system, how complex and costly would it be to develop one?

The design of the SMIS is very modular, and the development of a dropout prevention module would be relatively straightforward.

Development of such a module would provide schools a practical tool to help address the important issue of dropout. It is recommended that such a module be developed, along with methodologies for collecting excused and unexcused student absenteeism be developed and implemented as part of the next phase of SMIS implementation and roll-out.

In the case there is one, has it led to a follow-up of the at-risk children through concrete actions like contacting parents, or counselling for example?

N/A

4.9 Level of automation

To which extent are processes automated, e.g. for generating specific indicators, summaries/tables, reports, dashboards, visualizations, GIS mapping, etc.

EMIS (ASC)

Dissemination of EMIS data is not highly automated. The principal vehicle at present is the Annual Statistical Report. It is available in both hard and soft copy. It reports on a number of indicators both at provincial and district level, with disaggregation by gender. The report is mostly tables of indicators or raw data, with little analysis or interpretation of the data. Virtually all the data in the report are for the current year only, so there is no view of or interpretation of trends in the data. Moreover, the report does not yield data in a format in which it can be used. The soft copy of the report is a PDF, where data from tables cannot be readily exported into other software for further manipulation and analysis.

In the short term, it would increase user access to data if excel versions of all the tables on the publication were made available on the ESED website. In the medium-term a dissemination system is needed with a dashboard that would permit users to choose from a number of standard tables (with some customization), and also allowing users to define their own queries. Work is underway through the Business Intelligence Initiative to develop such a dissemination system for ESED databases (see Section 3.2.1.2).

IMU

The IMU has an online dashboard where its data are available as follows: Monthly student, teacher and non-teaching state attendance rates, and % of schools visited during the month by the District Education Office, for Khyber Pakhtunkhwa and by district. Some data is available at the school level. These data are used by ESED leadership in monitoring performance. These are also indicators that are included in the ESP 2015 Joint Monitoring Framework. Additionally, these indicators form part the District Performance Monitoring Framework (DPMF) developed to monitor functioning of the district governments. The system evaluates the performance of the districts using more than 190 KPIs across major sectors.[137]

[137] Chief Secretary, Government of Kybher Pakhtunkwha. n.d. District Joint Monitoring Framework. http://dpmf.pmru.gkp.pk/home_new.php

5 Responses to Questions on Use and impact (institutional and socio-cultural dimensions)

5.1 Level of school and local level implementation, ownership, and use

5.1.1 Descriptive Questions

At which levels and by which types of staff is the system being used, i.e. school admin staff, principals, teachers, and education officers/staff at various sub-national administrative levels?

Use of EMIS Based on the ASC

Provincial level. Data are being used by the Education Sector Reform Unit (ESRU) and Planning Divisions. They obtain the data they need by requesting it from the EMIS cell. These user areas and others expressed the need for capacity building of skills in data analysis and use of data for decision making.

District level. Districts lack an EMIS officer. They have little access to the ASC data other than what is in the published reports. Directorate of ESE also expressed the need for a District EMIS officer to support Districts in their work, including the development of District plans that are evidence based.

School level. There is no use currently, as there are no data products generated and provided to schools designed for their use. School Reports are planned, and this needs to proceed. Best practices and Lessons Learned from other jurisdictions should be examined, not only for the contents of the School Reports, but also the training in use of the reports. Training should not only be of headteachers, but also there is a need for building capacity of SMC chairpersons, member and PTCs in understanding the importance of evidence-based planning, what data is available, and how it can be used. Headteachers once trained themselves, can in turn train teachers, SMC and PTCs. It is important that these trainings be appropriate to the audiences involved, which may have low numeracy skills at the outset.

SMIS

Province and District Levels. SMIS will become the source of data and indicators at these levels in the future, in the same way that EMIS based on the ACS is today. The report and indicator generation modules are yet to be developed, but once they are, users will require training in their use.

School Level. In upper secondary schools where SMIS has been implemented, individual student data was initially captured, but these data are not being maintained, and schools are not making any use of SMIS.

Is the system being accessed by parents, by SMC member? How?

Parents and SMC members are not accessing the SMIS system at present. Provisions for establishment of parental accounts, and their access, roles and privileges will need to be built into the system, for example to view attendance and examination results of their children, and similarly for SMC members.

If the system is mobile-compatible, which components can be used via mobile?

SMIS system is web based, and therefore can be accessed via mobiles. To date, in Higher Secondary schools where it has been implemented, SMIS focal points have used computers, which are preferred to Mobiles for entry of large volumes of data, and for viewing of data.

In the future, as these are developed, it is recommended that different categories of users have different levels of access to the system. SMC members and parents would have view only privileges to certain reports and would need a password protected account to access these. Some views of the system should be public – such as aggregate student and teacher attendance rates, and viewable without the need for an account.

5.1.2 Normative questions

How and to which extent is it being used at the different levels? If it is not used, or used in limited ways, why?

Reasons for lack of use of SMIS are discussed further in Section 3.2.2. In summary, there was not sufficient emphasis given to uses of the system when it was initially implemented. Clearly defined uses and modules supporting those uses need to be developed as part of the next phase of implementation of the system.

To which extent does lack of access to Internet/computers/mobile phones (e.g., for school staff, district education staff, parents) limit access and usage?

In the upper secondary schools where SMIS has been implemented to date, access to the internet has not been an issue. The schools have access to the internet as a by-product of the biometric staff attendance system and have computers for administrative use.

The system is currently not used by other school staff, but lack of access to the internet/ mobiles is not the issue.

As the SMIS is rolled out to high schools, middle schools, and primary schools, issues of electricity, access to the internet, and availability of mobile phones, tablets or computers for use and access to the system will be issues that need to be addressed. For schools without access to the internet, approaches can be adopted such as the school maintaining SMIS in an off-line fashion, and syncing its data with the central SMIS database at such time as internet access becomes available: e.g., at the time of a district or IMU official visit (see Section 3.2.2).

5.2 Easy to use

5.2.1 Descriptive Questions

Based on feedback from users familiar with work processes prior to introduction of the new system, how difficult was it to adapt to the new system? Which areas / processes are, or were, the most difficult?

The SMIS has not been adopted as a working system, as previously discussed.

How much and which types of training was provided if any, for which staff, and was it sufficient?

The SMIS focal point in each school received four days of training at the time of implementation of the system in Higher Secondary Schools. During the mission, the training syllabus was not examined, but from discussions with the SMIS focal points, the training did not impart the trainees with all the needed skills. For example, neither SMIS focal point was aware of the report generation features of the system.

Also, there will be a need for step down training of head teachers, SMC chairperson and members and other teaching staff on the system, and their roles in use of the system.

In the next phase of implementation of the system, the training modules and approaches need to be revised. One-time training is insufficient, due to staff turnover and other factors.

5.2.2 Normative questions

According to users, how could the system be improved in terms of ease of use?

As the system was not being used, no direct user feedback on this was obtained.

According to users, which kinds of training/capacity development would be preferred (e.g., face to face workshops, documentation/user guides, webinar/tutorial videos, helpdesk).

These suggestions are from the consultant. Given the low level of awareness generated by training to date, feedback on modalities of training were not solicited from schools.

As SMIS represents a significant departure from the way record keeping has been done previously in school, face to face workshops are the recommended as initial means of training. Two persons per school need to be trained initially, the head teacher and a designated SMIS focal point, who would typically have some technical skills in use of computers, and mobile devices.

5.3 Usefulness

5.3.1 Descriptive Questions

Does the system communicate information through schools (or otherwise) to the community/parents? How useful is this information? How is it communicated?

EMIS (ASC)

Currently no data or information is communicated to schools, and via schools to community/parents. A short-term a School Report Card will be a key product for schools. There are models of this and its uses from other countries. The School Report card would contain a number of basic data and indicators for the school, and ideally a comparison of the school's data to targeted norms, and/or averages for the same type of school in the District. This could include from EMIS: enrolment by class, number of teachers, STR, number of textbooks and pupil textbook ratio, and from IMU: teacher and student attendance rates, and availability of functioning water, toilets, electricity, and wall.

The School Report Card should be posted in the school, where it is visible to parents. Further, material on its uses and interpretation should be developed. Headteacher could use this material to present the School Report Card to the SMC and PTC.

SMIS

SMIS produces a number of school level reports. Production and use of these reports need to be covered during training. Head teachers can use PTC meeting and Parent teacher meetings to make presentations on SMIS and how it can be accessed and used by parents.

5.3.2 Normative questions

Does the system meet all identified needs in terms of management and monitoring at school (i.e., does the system provide all the necessary information needed for school level management) and different administrative levels? Why or why not?

SMIS is not currently being used for management and monitoring purposes by schools. The system has features such as for recording daily attendance, but these are not being used at present. Also, there is no linkage currently between teacher attendance data collected via Biometrics and SMIS. (see Sections 3.2.2 and 6.2.1 for discussion of reasons for this).

Is the information or data presented in an easy to understand format for decision makers at the school and sub-national level, and which features would improve the utility of the system and encourage greater use?

SMIS does not have well-developed reporting capabilities. Strengthening these capabilities, and incorporation of a Dropout Prevention Module would encourage greater use of the system (see Sections 3.2.2 and 6.2.1 for further discussion).

5.4 Transparency

Which indicators/information are made available to the public? To schools? To parents?

EMIS based on Annual School Census

As noted earlier, dissemination and accessibility of indicators and information is a weakness of the current system. As per Figure 17, under EMIS based on ASC, mechanisms for the feedback or accessibility of results of EMIS to districts and down to schools is not well developed.

Currently the main product of the EMIS is the statistical yearbook. It can be accessed on-line AT ESEDs website, and it contains data and indicators at both the province and districts level.

No specific products have been developed with schools and parents as the intended audience. It is recommended that school report cards to be developed and distributed to schools, along with instruction and training on the use and interpretation of the data they contain. In turn, head teachers can make these available, and explain how they can be used and interpreted to the SMC and parents via the PTC.

As mentioned earlier, work is underway to develop a dissemination system using Business Intelligence approaches. This system will provide the platform for dissemination of data to users internally within ESED, and also to external education stakeholders, and the public at large. Some sub-set of the key indicators should be publicly accessible, which will provide another means of access to the data to schools, SMCs and parents. It remains to be determined what these public views should contain, and whether they contain any school level data, or just higher-level aggregates.

ESED could also use the occasion of the release of EMIS data annually, to organize an information where the media is invited, and where ESED leadership can highlight principal findings, as they relate to the state of education in Khyber Pakhtunkhwa. This is a potentially highly visible way of using the media to disseminate key results.

IMU

IMU has a publicly accessible dashboard as described in Section 3.2.3. Key monitoring data collected by IMU are teacher and student attendance rates. The public dashboard contains these at district and province level, but not at a school level, it should be extended to the school level, to allow the head teacher, SMC and parents to view this data. Also, summaries of attendance data should be included in the school report cards.

SMIS

The dissemination system being developed initially for EMIS based on the ASC will also be used for SMIS. In fact, the phased transition from EMIS based on ASC to SMIS, should be transparent to users for indicators based on the content that is common to both the EMIS (ASC) and SMIS. As SMIS gets introduced for different levels of education, indicators showing disaggregation by equity dimensions will become available. The issue will still be what information to make publicly available, at provincial, district and school levels.

In addition to the information made available through the dissemination system, there needs to be an identification of what SMIS data can be accessed by a parent: on his/her own child, on the school; means of setting up accounts for parents; and likewise for SMC members.

5.5 Sustainability

5.5.1 Descriptive Questions

What are the recurring costs for maintenance and use? What percentage of the education budget does that represent?

For 2019-20 financial year, the total budget of the Elementary & Secondary Education Department is 146 Billion Rs of which 20 Billion are for Development, and 126 Billion is for recurring salary and non-salary expenditures.[138]

Budgets for current expenditures related to EMIS, for salary and non-salary expenditures associated with data collection and dissemination are covered in the overall budget of the Department.

What are the budgeted amounts for further development of EMIS/SMIS? costs What percentage of the education budget does that represent?

In the Development budget, 15 Million PKR have been allocated for improvement and strengthening of EMIS in its operational activities during the current Financial Year. It is planned to increase this amount to 19 Million PKRs for the next three years.

The 15 M PKR (100,000 USD) for EMIS development, represents a small budget. About three-quarters of it is allocated to training and skill set development. The EMIS cell prepared an internal Concept note on EMIS strengthening, which provided the justification for this budget.

The EMIS Development Budget is insufficient for the work ahead in developing and implementing the EMIS roadmap. As noted earlier, given its scale and complexity – these should be developed and implemented via TA component of an IDP sector support program.

Which capacity is required from staff to maintain and further develop the system?

The development of SMIS has been done using Technical Assistance under the DFID programme of support to Education. The EMIS cell has not typically developed systems, but has maintained them. Recently the EMIS cell has added three new IP specialists. Increasing its capacities for maintenance of systems and for further development of existing systems. Major developmental initiatives would still benefit from external TA, as part of programmatic support to Education by an IDP.

[138] Information provided in response to Evaluability Questionnaire

5.5.2 Normative questions

How could sustainability be improved, e.g. in terms of automating routine processes rather than depending on staff to have the time and capacity to do this?

Currently in the absence of a user-friendly dissemination system, allowing users to access standard or customized reports, as and when they require data, users make a request to the EMIS cell, who develop scripts for retrieval of the required information. This consumes time of scare resources and delays the availability of the required data. Automation of the dissemination of data will improve efficiency and remove bottlenecks.

In the longer term, as SMIS is implemented, there is potential for automation of the school registration process (see Section 4.7.1.3). Currently a lot of information on students and parents is collected manually, and this information will need to be entered into SMIS. In the future, the parent could provide CNIC and CRC cards, and this information could be uploaded into SMIS directly from the smart cards, or via linkage to the NADRA database. This would streamline the registration process, and eliminate the time needed to manually enter this data, and also eliminate the errors resulting from manual entry of the data.

Extending the use of biometrics to taking teacher attendance at all levels, and also to taking student attendance will greatly reduce the time taken by schools to collect and report these data. The Biometric Attendance System will yield accurate daily attendance data for individual teachers and (hopefully) students, at which point there will be no need for IMU to independently collect this information each month. The IMU data collectors whose services are already in demand for collecting other data, such as LitNum can be freed up for such purposes.

How much of a burden does the adoption of the system represent at school level, because of IT investments and HR needs (teachers/admin staff need enough IT skills to use the system)?

Note: Adoption if the system is only considered a burden, when some of the IT investments needed and HR needs of schools are inadequately addressed by the strategy for adoption of the system

SMIS has only been introduced to Higher Secondary Schools. These schools have computers, and a person with basic IT Skills who can serve as the SMIS focal point. Usually, this is one of the teachers who performs this function on a voluntary basis in addition to his/her normal workload. In the longer term some means of compensation for the focal point could be considered, such as some reduction in teaching responsibilities, in order to make this more sustainable in the long term.

Headteachers and the SMIS focal person both received training in the use of the system. As noted, there were problems with the approach taken to implementation, most notable of which was introduction of all module of the system at once rather a gradual approach of starting with a few key modules, and secondly that the system was not tied to any immediate uses.

These combined to limit the success of the introduction of the system, and these points need to be addressed in a re-launch of the system to make it successful. Burden per se was not an issue, except that trying to introduce all the modules of a complex and extensive system was too much to cope with at one time.

As SMIS is piloted and extended to other levels of education, the situation with regards to availability and reliability of grid power, back-up power, internet connectivity, and IT equipment at the school level needs to be assessed, and measures token to bring these to some standard that are workable. These will have cost implications, such as procurement of tablets for use with SMIS. The feasibility of workarounds to deal with unreliable grid power and internet connectivity need to be identified and piloted. (See Section 3.2.2.3)

5.6 Effectiveness and impact

How effective is the system in terms of improving and facilitating monitoring and management processes? (compared to how it was before).

In its limited implementation to date, as already discussed SMIS has not yet been used to facilitate monitoring and management processes.

As part of the further development of the system, and its relaunch, the system needs to generate indicators and data needed at the school level for management and monitoring, and a module for dropout prevention is recommended, which will tie the system to an important use, that will be easier to accomplish using the system, than by manual means.

How is it being used and what was its impact in improving access, equity, quality?

SMIS in its limited implementation to data has had no impact in improving access, equity or quality.

The IMU system and monthly monitoring of teacher and student attendance, with follow-up by districts has led to increased student and teacher attendance rates. Also, IMU has tracked on a monthly basis the status of key infrastructure (boundary walls, water, toilets, electricity). Making this infrastructure available to all schools was one of the core policy areas under the ESP. The monitoring has helped leadership to have an accurate and up-to-date picture, to better manage the delivery of these improvements. In these ways IMU monitoring has contributed to the access and quality of education. (See section 1.7.3.)

The Girls' Stipend MIS (GSM) has provided stipend to girls attending public middle schools and who maintain an 80% attendance rate. There has been no direct evaluation of the benefits of conditional cash transfer programmes, such as the GSM, however between 2014-15 and 2018-19, the percentage increase in enrolments of girls in middle (and lower secondary) schools was greater than that for girls at other levels, and for boys at any levels. It is likely the GPS played at least a partial role in this increase. (See Table 4.)

For access: can we link system-use to reduction of the numbers of OOSC, drop-outs, or progress in terms of intake, transition, survival rates?

As noted above, the Girl's Stipend Programme appears to have had a role in increased participation of girls in middle school, and possible in the transition to lower secondary education.

For equity: can we see an impact of system adoption on a reduction of the gap between the most disadvantaged student population groups and the rest of the population, in terms

of access, participation, learning? Is there better targeting of specific interventions for disadvantaged populations, potential cost-savings etc, since the system is in use?

As noted, the Girls Stipend Program appears to have help address gender parity in middle schools.

SMIS, with collection of equity data on individual students has potential for more targeted support to disadvantaged students, but these have yet to be realized.

For quality: can we see an impact in terms of learning outcomes of students? Can we see an impact in terms of infrastructure development for schools (perhaps better targeting of the education development budget)? Can we see an impact in terms of teacher absenteeism?

IMU monitoring has resulted in reductions in teachers' absenteeism, which should impact on quality of education. As noted, the monthly monitoring of school infrastructure by IMU has also contributed to the targeting of efforts under the ESP to improve key school infrastructure, yielding improved conditions, supporting student attendance and providing an environment amenable to learning (see Section 1.7.3).

5.7 UNICEFs Role

5.7.1 Descriptive Questions

What role did UNICEF's Country Office or Field Office team play in the design, development, adoption and use of the system being evaluated? How does UNICEF's team plan to get involved in strengthening of improving those systems in the future?

UNICEF has played an important role in supporting EMIS in Khyber Pakhtunkhwa. UNICEFs role is typically small from a budget perspective but can be significant in convening key stakeholders and providing technical support. Specific areas of support have included training and workshops, the Nonformal Education Management Information System, and contributions to funding of the 2017 OOSC Census.

The Peshawar Field Office has supported: monthly meetings between IMU and District offices, where they sit across the table and review issues identified via the monitoring, other intermittent meetings, and printing of over a million forms. In the former FATA, UNICEF supported data collection and design of tools, generation of reports, and technical assistance for data entry.

5.7.2 Normative questions

What is UNICEF's comparative advantage in the field of management and monitoring systems for decision making as school and sub-national levels, and which aspect of those systems 'development and usage is UNICEF best positioned to support governments with?

The review examined the roles UNICEF has played in supporting EMIS in Khyber Pakhtunkhwa, in Pakistan, and at Regional and International levels, and found these roles were both important, consistent with the UNICEFs mandate, and, with relatively small investments, have leveraged and contributed positively to EMIS strengthening and development at all levels.

At the regional level, UNICEF ROSA has sponsored the current review, as a means of developing better understanding of the changes, progress and bottlenecks in greater use of EMIS/SMIS to improve education access, equity, and quality. Better understanding these issues through country studies, and identification of lessons learned can help when devising strategies to strengthen EMIS/SMIS. UNICEF EAPRO has similarly undertaken reviews of EMIS in Eastern Asia and the Pacific.

UNICEF has also played a critical role internationally in partnership with the UIS in developing a framework for measuring and dealing with OOSC and putting this important issue on the radar both internationally and nationally.

UNICEF plays an important role at national and global levels in supporting member states to collect, analyse and report on child-related SDG indicators, for which UNICEF has been identified as custodian, co-custodian, or supporting agency for the purposes of global reporting. In this role, UNICEF supports countries and provinces/states to identify existing or potential data sources to produce SDG indicators, and strategies for developing the required data, such as embedding the collection of equity variables into EMIS and SMIS, and for augmenting traditional EMIS with data from other sources, such as Household Surveys and Population Censuses. This is a crucial role for UNICEF to play both in Khyber Pakhtunkhwa and Internationally, now and in the future, providing a crucial input into EMIS strengthening efforts.

6 Conclusions, Recommendations and Lessons Learned

This section presents findings on opportunities for strengthening of the Khyber Pakhtunkhwa EMIS. It covers the technical, the institutional and the socio-cultural dimensions. It also includes recommendations on the role UNICEF can play in support of the development and implementation of such systems.

6.1 Conclusions

EMIS in Khyber Pakhtunkhwa is currently in a transition phase between a long-standing EMIS based on an Annual School Census, and a modern EMIS with a number of different modules responding to information and management needs at all levels of the education system – provincial, district and local and school, and to diverse needs of the Departmental Secretariat and Directorates. The new EMIS needs to be an integrated one, with SMIS serving as the central vehicle or backbone of the system. To date, progress has been made on development and implementation of a number of modules and elements of the new EMIS, but without a documented overall vision and design for the new system, and how modules will fit into an overall Integrated EMIS.

In this Section, requirements to conceptualize, develop and implement the needed Integrated EMIS, are considered in relation to stated review objectives:[139]

> **Review Objective i.** *To determine the strengths and limitations of the systems, from which lessons can be drawn for the improvement of the system as well as other monitoring and management systems in the region.*

Strengths

EMIS based on the Annual School Census since it started in 1998, has been the central EMIS vehicle of the Department. Its principal output is the Annual Statistical Report, providing an annual snapshot of the students, teachers and schools at provincial and district levels. In 2017, the data collection methodology was improved, by having IMU Monitors visit schools, verify data prepared by the schools, and capture the data on mobile devices. This has improved accuracy of data, and led to faster publication of data, just 4-5 months after collection. In 2017, coverage of EMIS was extended to include private schools.

The Independent Monitoring Unit (IMU) was introduced on a project basis in 2014. IMU has over 500 Monitors, who visit all public schools once per month, and take teacher and student attendance. Monitors also verify whether schools have the following functional facilities each month: boundary wall, water, toilettes, electricity. IMU has an online publicly accessible dashboard, that is updated in real-time, displaying results of monitoring at national and district levels.

EMIS is a dynamic system evolving on many fronts. Developments in recent years include IMU Monitoring, use of biometrics for teacher attendance in Higher Secondary Schools, development

[139] For objectives v. and vi. see Sections 6.2 and 6.3.4 respectively.

of SMIS and its roll-out to Upper Secondary Schools, program Specific MISs, an OOSC Census, and the recent development and introduction of LitNum, an assessment of literacy and numeracy learning outcomes of Grade 2 students.

Limitations

Limitations in Use of Data. Despite the long-standing existence of the EMIS based on the Annual School Census, and the more recent development of other EMIS modules, there are limitations in the use of data. This is considered further under Objective iv.

Lack of Integration of EMIS modules. While Development of a number of different EMIS modules is a good thing, it is not being done in integrated way. What is missing is an overall vision, architecture, and design of how the modules will fit together into an Integrated EMIS (IEMIS), and a road map for how to get from where EMIS stands today to the goal of a fully integrated system. This is considered further under Objective iii.

> **Review Objective ii.** *To determine the requirements and constraints of the systems for scale-up and wider use, especially at the lowest level admin and school levels, and in contexts with limited ICT infrastructure.*

SMIS, and Biometric Attendance System (BAS) for teacher attendance have both been implemented for Higher Secondary Schools, which already had computers, electricity, and in most cases internet connectivity. Upgrades included solar/ and or battery backup to allow for continuous use of the biometrics during periods of power outages.

Plans are to scale up both systems to other levels of education. For each level, an analysis is needed of existing IT infrastructure versus requirements of the systems. Infrastructure required for both systems are internet connectivity, grid electricity and back-up. Hardware requirements include biometric devices for BAS, and tablets for SMIS.

It is recommended to pilot BAS for students. Potential benefits are substantial. It would yield daily attendance per student minimizing the time spent by teachers in taking and capturing attendance. Also, it would free up IMU to concentrate on other data collection and monitoring activities, for which there is already a great demand. Taking student attendance would require multiple biometric devices per school (likely one device per 150-200 students).

Capacity building at a school and local level, particularly in the use of SMIS, is a critical aspect of scaling up. Moreover, it will not be a one-time event, but an ongoing requirement over a number of years. (See Objective iv. for further details.)

> **Review Objective iii.** *To determine the key technical aspects required (existing and yet to be developed) for the successful implementation of the two systems and more broadly – extrapolating from the evaluation findings – for other monitoring and management systems.*

It is recommended that an EMIS Steering Committee comprising senior ESED leadership to be established:

- To oversee and guide the IEMIS development process, including development and approval of a road map for moving from the existing EMIS environment to the future IEMIS, and

providing overall direction to its implementation, including commissioning studies and taking decisions with respect to recommendations of the studies on:

- A needs analysis to examine data needed to satisfy policy and operational requirements at all levels of the education system, and to identify data gaps where current MISs are not providing the required data. Policy requirements include the data needed for monitoring ESP 2020, the Tribal Strategy, Sustainability Development Goals, as well as requirements and potential opportunities for interoperability with Information Systems of other Government departments.
- Design of the system architecture for an Integrated EMIS to meet the needs. The systems architecture will feature SMIS as a central vehicle or backbone to the Integrated EMIS, and will identify other modules required (existing or new), and how they will be linked to SMIS.
- Whether to adopt a Unique Student Identifier within ESED. As SMIS and other EMIS modules are increasingly based on individual student data, use of a Unique Student Identifier will greatly facilitate linkages between SMIS and other modules, and will facilitate tracking of students over time and across levels of education.
- Development of a road map for development and implementation of the Integrated EMIS. The road map will define the steps and activities to be undertaken, starting from the current status of EMIS to arrive at the goal of the Integrated EMIS.

- To engage an Implementation Partner with expertise and experience in large scale EMIS development projects to work closely with ESED throughout all phases of the needs analysis, architecture and design of the Integrated EMIS, and the preparation and implementation of the Roadmap, through support of International Development Partners.
- To ensure efficient and effective functioning of existing MISs that comprise the existing EMIS environment
  - by ensuring information needs and objectives of each MIS are being met via dialogue between data users and data producers to identify data collection and data analysis priorities;
  - by ensuring roles and responsibilities of EMIS unit and IMU are clearly defined in relation to each MIS
  - by commissioning comprehensive reviews of individuals MISs, including SMIS, LITNUM, OOSC Census, and taking decisions with respect to recommendations of the reviews.

> **Review Objective iv.** *To determine the key institutional, technological, financial and socio-cultural aspects which have positively or negatively shaped the use and impact of the two systems.*

ESED leadership recognizes the need to strengthen the analysis and use of EMIS data at all levels of the education system. This involves technical aspects to increase access to data, and socio-cultural aspects to build capacity in analysis and use of data creating a culture for data use

Technical

- Strengthen the Annual Statistical Report, by: increasing its analytical content, reducing the volume of raw data, inclusion of key indicators currently missing such as Student Teacher Ratio, Adjusted Net Enrolment Rate and EMIS-based indicators of Out of School Census, including analysis of trends over time, and introducing a complementary website where data tables currently in the report can be downloaded in Excel format to enable users carry out their own analysis of the data.
- Develop and implement an online data dissemination system, enabling users to retrieve pre-defined data / indicator tables, as well as to query the EMIS data base to generate customized

retrievals. To date, users wanting customized data had to request the EMIS cell to generate it for them, which has limited the access to and use of the data.

- Development of a school report card, containing key school level data from the EMIS and teacher and student attendance data from IMU, to be provided to schools in print form, as well as on a web site.

Socio-cultural

- **Building Skills in Data Analysis and use of data for Evidence based Decision Making across ESED.** The need to build skills within ESED for data analysis and use of data for evidence-based decision making was identified as an important and urgent issue by all ESED leadership.

  A capacity development programme is needed to build the needed skills in data analysis and use of data. The capacity building is needed at all levels within the department – provincial, district, and school levels, geared to the needs at each level. It is recommended that the EMIS unit be the focal point for this capacity-building programme. A first order will be to build-up these skills within the EMIS unit itself. It is recommended a statistician position be created within the EMIS unit, whose responsibility will be to build these skills within the EMIS unit. Consideration can be given to staffing it via secondment from the KP Bureau of Statistics. Once its skills in data analysis and data use are built, the EMIS unit will become the focal point to build these skills across the department. The EMIS unit would also be responsible for carrying out baseline analysis of EMIS data each year, according to priority theme and issues identified in the ESP and other key departmental documents. In this way the EMIS unit will not just be producing data, but information based on analysis of the data, in a format ready for use by decision makers.
- The skills needed across the rest of the department will be less on detailed techniques of data analysis, rather covering basic descriptive data analyses. More focus will be on the use of data for decision making, include the definition, use and interpretation of data and indicators. Efforts at the province level need to be focused use of data in carrying out provincial roles of policy development, monitoring and evaluation of system performance, budget preparation and planning. Likewise, efforts at the district level will to focus on use of data in carrying out district responsibilities, such as monitoring teacher and student attendance, and school improvement plans. Capacity building at school and local level will be in use of the School Report Card and in use of the SMIS. It will include training of headteachers and EMIS focal points on multiple occasions as different modules of SMIS are introduced. Headteachers will in turn build capacity of SMC members and PTCs. Training will include use of SMIS to prevent dropouts, use in preparation of school improvement plans, etc.

> **Review Objective v.** *To evaluate the impact of the system's use on school efficiency, by reviewing progress made in terms of teacher and student attendance, student survival rates and drop-outs, or any other relevant progress which could be attributed to the system's use.*

The Independent Monitoring Unit system for collection, dissemination and use of monthly data from all public schools on teacher and student attendance, and school facilities has led to improvements in school efficiency.

When the IMU was initiated in 2014, it discovered a number of schools with no teachers, leading to staffing the schools. The teacher and student attendance rates feed into cross sectoral district performance indicators. The District Education Group meets monthly to review the data, and take decisions are taken, for example including salary deductions and dismissal of chronically absent

teachers. As a result, teacher absenteeism has dropped to 13% in 2019, from 19% in 2014. Over the same period, student absenteeism fell to 22% from 26% (See Section 3.2.3.1).

One of the 10 policy goals of the ESP 2015 was to equip schools with the following functional facilities: boundary wall, water, toilets, and electricity. IMU reports on these on a monthly basis for every school. The use of the IMU data to monitor and follow-up has been important in the progress made towards meeting these goals, which have been met or are close to being met in most cases (see Section 1.7.3).

6.2 Lessons Learned for Application to Other Environments in South Asia

> **Review Objective vi.** *To capture in the evaluation report all these lessons learned, covering technical, institutional, financial and socio-cultural dimensions, which would enable development partners to better support the development and effective use of existing and emerging education monitoring and management systems in South Asia.*

The approach in the current review has been on examining the current status of EMIS production and use, at each level of the education system, and on making recommendations for strengthening the overall system and each of its modules. Lessons learned – what has worked, what has not worked, and ways of strengthening going forward - are implicit in this approach, and as such are captured throughout the current report. While most lessons learned relate to Khyber Pakhtunkhwa, hopefully they can also be informative to other jurisdictions wanting to strengthen EMIS.

Below specific instances of lessons learned that involve different suggested approaches to EMIS strengthening are considered.

6.2.1 Simplify Implementation of SMIS tied directly to Uses at the school level

Implementation of SMIS is a major undertaking. The SMIS will be the pivotal component of the Integrated EMIS going forward. The initial implementation of SMIS for Higher Secondary Schools did not sufficiently incorporate a number of ingredients for success, namely: starting with a simplified version of the system tied directly to uses at the school level, sufficient initial training, follow-up support and further training by District offices, and strong support to the Initiative by senior most Departmental leadership.

A second phase of implementation is needed incorporating the above ingredients. Comparison of SMIS experiences with those of the Girls Stipend MIS, provides a lesson learned opportunity. The GSM is a simple system that collects individual student data for all students enrolled in Girls Middle Schools, attendance data on each student, and is used for awarding and distributing grants to qualifying students. The Girls Stipend MIS had all the ingredients for success that SMIS didn't – it was simple, and directly tied to a use that was accomplished with less effort on the part of the headteachers than would have been required had the system had not existed, and its use – the payment of stipends to students - was highly important to the students and also to headteachers. In contract, in the SMIS implementation, schools captured the individual student data, but no uses were made of this data at the school level. It is a complex system with numerous modules, and all modules of the system were introduced at once, overwhelming those being trained.

Drawing on these lessons learned it is recommended to relaunch SMIS for Higher Secondary schools, with a simplified initial implementation of selected modules only – those for capture and updating individual student data, for daily capture of individual student attendance, and a new module for dropout prevention, that would be used on a daily basis to identify students at risk of dropout and to take preventative action. Additional features of the system would be introduced once these core features are successfully operationalized. (See section 6.3.1.3. for further details.)

6.2.2 IDP Technical Assistance in Overall Support of EMIS Strengthening

Design, development, implementation and use of EMIS is a complex undertaking, especially an Integrated EMIS designed to meet a comprehensive set of information and management needs of the Department, at all levels – provincial, district and school level. It is difficult for any organization to possess all the skills internally to accomplish all aspects of this. Khyber Pakhtunkhwa has had Technical Assistance from the DFID education project in strengthening of its EMIS, and previously from GTZ. With the DFID Education Project drawing to a close, further IDP support for EMIS strengthening will be needed going forward.

6.2.3 Partnership with Khyber Pakhtunkhwa Bureau of Statistics

KPBOS has expertise in the survey design, collection, compilation, analysis and dissemination. There are a number of ways in which a partnership with KPBOS would help ESED. In the last round of the OOSC census, ESED carried out the census without the involvement of KPBOS. It appears this may have led to issues with the methodology, interviewer selection and training, leading to potential problems with the data collected. Consistent with its mandate, KPBOS could carry out any future OOSC Census, with ESED as client.

Through partnership with ESED, KPBOS would develop a better understanding of the information needs of ESED and identify existing data from the Census of Population and from Household surveys such as MICS that could address some of these needs. Going forward, the partnership would position KPBOS to improve education content of future survey and census instruments. For example, potentially a question could be added to the Census of Population, on school attendance for the school-aged population, using standardized international best-practice methodology developed by MICS, that might replace the need for a separate OOSC Census in the future. Even if ESED had to pay for the marginal extra cost of an additional question, the cost would be far less than conducting an independent survey or census to obtain this information.

KPBOS has expressed openness to the secondment of a statistician with expertise in survey design and data analysis to work in the EMIS cell of ESED. Having a statistician in the EMIS cell will help to apply statistical design mentality to the development of MIS and will help in the building of data analysis skills in initially in the EMIS cell, and then more broadly to senior leadership of ESED.

6.2.4 Partnerships in Use of GIS

Development and use of GIS is an area which requires highly specialized expertise, yet the requirement for GIS exists across a number of sectors, Education, Health, ICT, Transportation, Water, Local Government Planning, etc. In Khyber Pakhtunkhwa, an integrated GIS system is being developed by the provincial Planning Department as a GIS hub for all departments. Line

ministries such as Education and Health provide the GPS coordinates for different layers of the system and are also end users of the system. An important use of GIS in education is to find locations underserved by existing schools, to help in locating new schools. GIS analysis can also examine the efficiency of the current location of schools, to demonstrate the power of such tools and objective criteria, so that ultimately they will carry more weight in deciding on location of new schools, in which political criteria currently feature prominently, at times to the detriment of system efficiency and equity.

It should be noted there are GIS efforts underway in a number of other provinces, so GIS an area where there is potential for coordination, and potentially a uniform GIS system, yielding data for provinces and districts, while also allowing for roll-up to a national level. AEPAM and FMET could potentially take this up with ministries at the Federal level, if it is not already being looked into. Any considerations towards a national/provincial cross sectoral GIS, could also examine use of open source platforms. GIS has excellent open source libraries, which can avoid expensive license fees. UNICEF ROSA is developing an open source GIS platform which can be freely used by government, building on multiple open source libraries.[140]

6.3 Recommendations

This section includes recommendations on strengthening EMIS at an overall systems level, for strengthening individual MISs that will make up component modules within on overall integrated EMIS, and recommendations on how these component parts can be harmonized and integrated to form the overall integrated MIS.

6.3.1 Recommendations on EMIS Improvement and Strengthening at Province Level

6.3.1.1 Strengthening EMIS Usage, usefulness and impact

Department- wide strengthening of capacity in data analysis and use of data for decision making is needed. The need for a capacity building programme targeted at senior leadership of ESED at both central and district levels was a common theme that came up in meetings with leadership during the country visit. It is essential to strengthening use of EMIS at central and District level.

It is recommended that the EMIS Cell be responsible for a departmental capacity building programme in analysis and use of EMIS data, including to identify capacity building needs at all levels (province, districts, and school), to develop training materials required, to conduct capacity building training for Provincial and district leadership, and to train district officials who in turn will provide step-down training at the school level.

In order for the EMIS Cell to play this role, its own capacity in data analysis and use of data needs to be strengthened. Current staff of the Cell have professional backgrounds in IT. The EMIS Cell should add a statistician position – ideally for an individual with expertise in education data and data analysis. ESED should look into an arrangement with the Khyber Pakhtunkhwa Bureau of Statistics for secondment of a statistician to ESED to work in the EMIS Cell, to build capacity in

[140] Development of an Open Source GIS platform, Internal Report, UNICEF ROSA, 2019.

data analysis and use of data within the EMIS cell, and to enable the EMIS Cell to play the lead role in development and implementation of the Departmental Capacity Building programme.

6.3.1.2 Road Map and Workplan for development and implementation of an Integrated EMIS

ESED needs a vision, architecture and design for an Integrated EMIS, and a road map identifying steps and activities needed to move from the current EMIS to the desired IEMIS. The managerial structures and measures required for this have been described in Conclusions for review objective iii.

The current situation is a departmental EMIS, whose central vehicle is EMIS based on the Annual School Census, which yields annual, mostly aggregate data. There are a number of programme specific MISs, developed in a “silo” or stand-alone fashion. An SMIS system has been developed, but to date, efforts to implement it in higher secondary schools have been problematic and will need to be strengthened in a number of respects. Central to the IEMIS will be an SMIS containing a database of individual student data with equity variables, including gender, disability, and others, that will be accessed and used by other system modules. For example, a provincial examinations module (yet to be developed) will access the student list from SMIS and use it to obtain student identifiers need for registration and for student verification when appearing for exams. The linkage of the two systems at an individual student level will permit analysis of examination results by the equity dimensions contained in SMIS. At present, while the need for the IEMIS is recognized, there is no comprehensive plan or road map on how to get there from where things stand at present. It is important to start with a vision of IEMIS and proceed to a high-level design and architecture of IEMIS. The Road Map will be a plan for development of individual components, and how and when to integrate the standalone MISs with SMIS. In the past, ESED has benefitted from expert TA support in development of EMIS. The preparation of overall system design and architecture, and preparation and implementation of the Road Map, are major undertakings that would similarly benefit from expert TA under future IDP support programmes.

6.3.1.3 Strengthening the Design and Implementation of SMIS

SMIS will be the core or “back-bone” of the future IEMIS. Its development and implementation to date in Higher secondary schools was problematic in a number of respects, as discussed below.

Further analysis is needed on the path forward for SMIS. In particular, in terms of the issues related to the functionality of the SMIS, there is a fundamental question of what is the best route to follow: (i) making the changes to the existing SMIS, or (ii) redeveloping SMIS from scratch taking into account from the outset a full analysis of requirements of SMIS and requirements for integration needed with other modules. This further analysis should be undertaken as part of the development of the Road Map for IEMIS.

Issues with implementation to date included: First, implementation was not tied to any direct use of the system at the school level. Second, the attempt to introduce all modules of the complex system at once was overwhelming, rather efforts should have concentrated initially on a few key modules. Third, as a backbone of the future IEMIS, there will be a need for integration of modules and data at an individual student level. Fourth, the SMIS system did not have a dissemination module capable of generating the indicators required at school, district and province levels.

To address these issues, the following is recommended:

Issues related to functionality of SMIS system

- **Develop a Dropout Prevention Module** featuring: monitoring of student attendance daily, distinguishing approved from unapproved absences, automatic generation of SMS message to the parent on cases of unauthorized absence, and escalation to other means of personal follow-up for repeated absences. Such Modules have had success in reducing dropout in other countries, thus reducing one of the principal causes of OOSC. The Maldives EMIS provides an example of such an "early warning system (EWS)" for dropouts.[141]
- **Develop a Dissemination Module for SMIS.** This module will generate all the indicators and summary data needed at all levels - at school, district and Provincial level. It can be specific to SMIS, or an overall dissemination system for all modules of the future IEMIS.
- **Incorporation of Unique Student Identifier, and its use in SMIS and other IEMIS modules containing Student level data.** This pending an ESED decision on Adoption of a Unique Student Identifier A unique student identifier will greatly facilitate the integration of different student-level modules.
- **Develop a strategy for Linkage between SMIS and other MISs.** The MIS should be the source of individual student and teacher data, that would be accessed by all other MISs using individual student or teacher data. A systems design is needed for what student and teacher data is contained within SMIS, and additional student variables are contained in other systems, and how these are linked.

Operational Issues related to how the SMIS is rolled out and training needs

- **Re-launch SMIS in Higher Secondary schools.** Once the Dissemination and Dropout Prevention modules have been developed, SMIS should be re-launched in Higher Secondary Schools, with the re-launch including the following: high level support from ESED leadership; uses of the system focusing initially on capture of individual student data, capture of daily attendance, the dropout prevention module; the report generation module and use of SMIS for production and reporting of indicators at school, district and provincial levels, including equity indicators required under SDG 4; a revamped training programme supporting these uses; introduction of broader functionality of the system when the above functions have been successfully implemented.
- **Sequential roll-out to other levels of education**, once SMIS has been successfully implemented for Higher Secondary.

6.3.1.4 Strengthening Existing MISs: Technical

MIS systems already in place or being developed and that will be part of the future IEMIS, were examined and recommendations made on how each of them could be strengthened. (See Section 3.2.) These are summarized below.

ASC-based EMIS

The ASC-based EMIS is still the central EMIS vehicle of ESED. The data being collected correspond to international best practices for an EMIS. Further, since 2017 when the IMU took responsibility for data collection using mobile devices, the EMIS data have been available in timely fashion. ASC-based EMIS can be further strengthened in the following ways:

[141] Interventions on student absence and out of school children in Maldives, Internal Presentation, Maldives Ministry of Education.

Strengthen Annual Statistical report. The Annual Statistical Report should be re-vamped to present more indicators, and less raw data. Key indicators that are missing and should be added are STRs, ANER, and indicators of OOSC. All indicators should include a gender breakdown, wherever applicable. There is also need for presenting the evolution of indicators over time, especially key ones tracking progress under the ESP. There is a need for better analysis and interpretation of the data and indicators. Downloadable excel spreadsheets of all tables and charts in the report should be accessible on the ESED website. This will provide access to the data in a form that permits further use and analysis, and can be viewed as a short-term step to increase access to data, until such time as a data dissemination system is developed and implemented.

Develop a school report card and provide it to schools. The School Report Card ought to contain key data and indicators for the school that can be used in developing school improvements plans. It should be distributed to all schools in print form, and should be posted prominently, where visible to parents and teachers. In addition to EMIS data, the School Report Card should include attendance data from the IMU. Schools need to be trained in use of the School Report Card in preparation of School Improvement Plans, and how to present findings from it to SC and PTCs in easily to understand terms. Consideration can also be given to making the School Report Cards publicly accessible online. Publicly accessible data on school performance may create demand for improvement of schools.

Develop a Data Dissemination System. A data dissemination system is needed that features a user-friendly dashboard permitting users to: (i) select from a pre-determined set of key indicators and data, and (ii) to query the EMIS database to generate custom tables. Access to and training in use of the system is needed for all senior ESED leadership, both at provincial and district levels. Consideration should be given to whether to make the dissemination system publicly available or to restrict it to Departmental Leadership. Many countries make it publicly available. In this way Education Stakeholders can access the data they require, and do not have to request it of the EMIS cell, which is an inefficient means of accessing education data, and represents a drain on the resources of the EMIS Cell, which could be better utilized in supporting and strengthening EMIS.

Historical Revision of Population-Dependent Indicators based on the 2017 Census of Population. EMIS indicators such as GER, NER, and ANER, use projections of the school-aged population as a denominator. The population projections are also used in producing EMIS-based estimates of the OOSC. The projections currently being used by EMIS are based on the1994 Census of Population. As such, they now contain high levels of errors due to the lengthy projection period. Projections based on the 2017 Census are not yet available from the Bureau of Statistics, that is, projections based on the 1994 Census were used for the 2017-18 and the 2018-19 EMISs. If projections based on the 2017 Census become available in time they will be used for the 2019-20 EMIS.

It is recommended that projections based on the 2017 Census based also be used to revise population-dependent indicators from the 2017-18 and 2018-19 EMISs (and 2019-20 EMIS if needed.) This revision will ensure a consistent time series from the 2017-18 EMIS onwards. Without such revisions, there will be a time series break for the year when projections based on the 2017 Census begin to be used. Such time series breaks, make it problematic to analyse trends over time in key indicators.

In addition to a new series of projections based on the 2017 Census, it is also possible for KPBOS to revise historical population estimates for the 1994 to 2017 Intercensal period. Such intercensal estimates are much more accurate than post-censal estimates, since they are anchored at either end by the Census results. However, initial indications, obtained during the consultant's meeting with KPBOS, were that no historical revision of population estimates for the 1995-2016 period are planned. Such revised population estimates would permit ESED to revise its population-dependent Education Indicators, and obtain consistent time series dating back to the inception of EMIS in 1998, most importantly from 2010 onwards.

It is recommended that ESED examine with KPBOS its feasibility to revise the 1995-2016 population data, and in the event KPBOS does not plan on producing these, that ESED consider funding KPBOS to carry out these revisions, either directly or through IDP support.

Independent Monitoring Unit

As per its mandate, IMU should pursue continuous improvement of monitoring. It can do this by engaging with Senior leadership about priorities for monitoring of schools now and moving forward, and on the basis of needs and priorities, examine means of improving and optimizing the monitoring. The monitoring of schools should be a dynamic process, evolving as needs and circumstances change.

The IMU online dashboard should be extended to provided teacher and student attendance rates, and availability of infrastructure at a school level. While doing so, it can also allow for display of results disaggregated by level of education, and by boys' versus girls' schools.

Biometric Attendance System

Use of biometric devices has been successfully introduced for teacher attendance in Higher Secondary schools. It should be extended sequentially to other levels, beginning with small scale pilots for each level of education in order to identify and solve problems unique to each level relating to availability of electricity, internet, etc., before full scale implementation. Additionally, it is recommended to pilot the use of Biometrics for student attendance and examine experiences elsewhere and introduce it if feasible.

Directorate of Elementary and Secondary Education

Development of a District EMIS module to manage DESE work processes. DESE is responsible for the delivery of Elementary and Secondary Education in Khyber Pakhtunkhwa, based on the standards and curriculum developed by the Secretariat and DCTE respectively. Within the Integrated EMIS centred around the SMIS, there is a need for district module, accessing the SMIS data but having different views and options relevant to district needs for management and information on their work activities. These include tracking school visits, observation of teachers and recommendations, management of budgets and SIPs. Initial steps in creation of this module would involve development of specifications, based on an in-depth review of work processes and flows between schools and DEOs, and also between DEOs and the central level. The design of the module should also examine the relationships with other MISs. In addition to being fully integrated with SMIS, it should be examined which Program-specific MISs, such as the Electronic Teacher Transfer system can be integrated into the district module.

Staffing of EMIS Focal-point Posts Centrally and in DEOs. Actions to seek approval and staffing of an EMIS focal point posts within DESE at central and District levels should also be undertaken, and capacity building needs of DESE at both central and district levels should be addressed along with those of rest of Department.

Directorate of Curriculum and Teacher Education

As ESP 2020 will have Learning assessment, teaching and learning materials, and the school curriculum as its focus, it is recommended that the following MIS requirements for DCTE be taken up as an activity under the new ESP:

Development of MIS to manage DCTE assessment work. DCTE needs an MIS to manage its teacher assessment activities, which include the Teacher Competency Survey examining management of the classroom, and the Teacher Content Survey examining teacher of subject matter knowledge, both carried out on a 5-10 % sample of schools annually. Data is collected by senior trainers hired by DCTE using an app developed by IMU, but thereafter all processing and analysis within DCTE is currently done manually. An initial study is needed to detail the MIS requirements, including integration with SMIS, to be followed by development and implementation of the MIS.

Review of MIS for Board Examinations and Linkages to SMIS. A review of existing MISs for board examination for grades 9, 10, 11, and 12 is needed. It can examine the pros and cons of each board developing its own examinations and own MIS, when the curriculum is the same for the whole province. It can examine how systems and processes for registration and verification of student IDs when sitting for exams can benefit from linkage to SMIS. As SMIS will contain the master list of all students, along with photos and unique student identifiers, registration MIS can be simplified by accessing these from SMIS, and flagging those students registering for different exams, examination site, etc. Further, if SMIS collects biometric data on students (through adoption of the Biometric Attendance System for taking student attendance), this information can also be accessible to the examinations system, and student can be checked in for examinations using biometric devices, to eliminate falsification of students appearing for the examinations. Further, linkage of examination results to individual student data in SMIS will permit analysis of results for disadvantaged students, and the impact of teacher and school characteristics on test results.

6.3.2 Recommendations for EMIS improvement at the local and school levels

6.3.2.1 Development of Data and Information Products for Use at School and Local Level

A current weakness of EMIS is the lack of information products generated for and available to schools and local levels for use in planning or managing operations. The ASC-based EMIS collects data from schools, and the EMIS cell generate reports and information products, but currently none of these are for schools. There is a plan for development of a School Report Card, and this needs to be followed through on. School Report cards are but one example. The different EMIS modules ought to be generating reports for the school level, as follows:

- Annual school report Cards from EMIS(ASC)
- Monthly School Attendance report from IMU

- Report on results of classroom observation for District EMIS module
- LitNum - feedback on results and how use and interpret it
- School level reports that can be generated on demand via SMIS

For these information products, the issue of dissemination to schools also needs to be considered. The information products can all be put online, accessible by schools with internet connectivity. However, print versions of these reports should also be provided to schools, given lack of internet access for many schools. Also print versions of the reports will be helpful for presentation and discussion with SMC and PTCs. As SMIS is implemented at various levels of education, headteachers will be able use SMIS to generate a number of reports on their own.

6.3.2.2 Capacity building in EMIS Modules and in Use of EMIS Data at School and Local Level

There is need for a programme of capacity building in use of EMIS data at school and local levels. Building and sustaining such capacity is a big undertaking and needs careful planning. It needs to be done together with making data available to schools, so that the learning is done using real data, and becomes a practical exercise, and not a theoretical one. It is not a one-time training, but has to be ongoing, to cope with changes, and to deal with new MIS features as they are introduced.

Training needs to focus on the dual role of headteachers and schools as collectors of data, and as user of data, specifically the interpretation and use of the information products developed for them, in order to manage school operations and for planning purposes.

A programme of training at periodic intervals will be needed, in order to cover the collection (where applicable) and use of data from the different EMIS modules. Training needs will be heaviest for SMIS, since schools will be responsible for collecting and entering the data themselves, and for generation and use of reports. Due to the complexity of the system, it is recommended the training take place for selected groups of modules at a time.

6.3.3 Recommendations concerning further work which may result from this review

6.3.3.1 Review to inform strengthening of LitNum

LitNum is a new initiative comprising an assessment of literacy and numeracy learning achievement to be conducted at multiple points during the school year for a sample of Grade 2 students. The first data collection occurred in October 2019, with the second assessment planned for January 2020. IMU DCMAs administer the assessment to a sample of nine Grade 2 students in every public school each time the assessment is conducted. Mobile apps have been developed, selecting the sample of students, and for administering the assessment to each student.

There are a number of issues surrounding LitNum that ought to be considered and reflected upon, in order that modifications to strengthen the programme can be introduced at timely junctures as feasible. A departmental working group should be convened to consider these, and TA Expertise in Assessments brought on board to support the process. The review should include: examination of the purpose of LitNum; what data is needed at different levels – province, district, school; how to design LitNum in a cost-effective manner to meet these data requirements including the

sampling methodology; the pros and cons of using LitNum as a performance indicator; how LitNum can be used to monitor and analyse equity gaps in learning outcomes and analysis of key factors influencing learning and barriers to learning; and how and by whom these findings can be translated into measures to improve teaching practices and learning conditions in schools.

6.3.3.2 Review of Measures for Collection, Analysis and Use of Data on Out of School Children

An Out of School Children Census was carried out by ESED in 2017, with plans for a repeat in 2020. There has been some debate about the resulting estimates of OOSC, which were lower than figures from household surveys such as BICS. EDED carried out the 2017 OOSC Census without Involvement of the Khyber Pakhtunkhwa Bureau of Statistics, who have both a mandate and expertise in the conduct of such surveys. The observed discrepancies may be attributable to methodological problems in data collection.

It is recommended to conduct a review that will have as an objective to define a strategy for collection and use of data on OOSC. The review will examine and make recommendations on: what data is needed on OOSC at provincial, district and local levels; what are existing or potential data sources for data on OOSC; what actions will be undertaken based on new data collected, and does the capacity to undertake follow-up actions exist; whether another OOSC Census should be conducted in 2020, and if so what improvements and changes should be made, or whether a sample survey or another course of action is recommended. The review can also examine incorporation of EMIS-based indicators of OOSC into the set of indicators produced by EMIS and included in the Annual Statistical Report.

6.3.4 Recommendations concerning role of UNICEF in supporting EMIS

> **Review Objective vii.** *To determine UNICEF's relative strengths and weaknesses in supporting Governments in the design, development and adoption and use of such systems, and thus to outline on which aspects UNICEF is well positioned to lead, and on which others UNICEF is not yet where it needs to be.*

The current EMIS review has been important in taking stock of the current state of EMIS in Khyber Pakhtunkhwa, and what is needed to strengthen it. UNICEF should be proactive in working with ESED and Education IDPs to ensure that the review is used as a starting point for preparation of an EMIS roadmap as recommended in the report.

UNICEF can also consider extending reviews such as the current one to other jurisdictions. For a relatively small investment in resources and time, such studies can help identify both short term as well as longer term efforts needed to strengthen EMIS, and to increase awareness among Education Ministries, and well as IDPs supporting education.

UNICEF can also consider means of disseminating and making the findings of such reviews available to other countries and states/provinces responsible for EMIS, within the ROSA region and beyond. Lessons learned and best practices from such studies can be of help to others in planning and undertaking programmes of EMIS strengthening.

UNICEF possesses good expertise at regional, national and sub-national levels in EMIS and can continue to play an important convening role in getting key stakeholders and experts together,

technical and strategic advice with a focus on equity, bringing in best practices from other provinces and countries.

UNICEF can continue to play a management role in EMIS Strengthening Projects funded by IDPs, as it has done on a number of occasions,[142,143] drawing on its management and technical expertise in EMIS to procure and manage an implementing partner to carry out the EMIS development.

UNICEF plays an important role in supporting member states to collect, analyse and report on child-related SDG indicators at national and global levels for which UNICEF has been identified as custodian, co-custodian, or supporting agency for the purposes of global reporting. In this role, UNICEF supports countries and provinces/states to identify existing or potential data sources to produce SDG indicators, and strategies for developing and collecting the required data, including strategies for embedding the collection of equity variables into EMIS and SMIS, and for augmenting traditional EMIS with data from other sources, such as Household Surveys and Population Censuses. This is a crucial role for UNICEF to play both in Khyber Pakhtunkhwa and Internationally, now and in the future, providing a crucial input into EMIS strengthening efforts.

6.3.5 Recommendations relating to the Review methodology

The recommendations set out below relate specifically to the methodology of this review and are applicable to UNICEF or other international and national development partners[144] interested in supporting EMIS development in general or with a specific focus on enabling SMIS.

Ensure adequate time and resources for a full review.

EMIS are becoming increasingly complex and now include consideration for School based systems, Student Tracking, Human Resource Development, Financial Management and greater interoperability with other government systems. A comprehensive review can help form a wholistic picture of how such EMIS have been developed and function to serve all areas of the education system, but such systems also require substantial resources to review and evaluate effectively.

Revision of the international methodologies for the review and evaluation of EMIS

This review highlights the need to periodically revise the methodologies for the review and evaluation of EMIS. As EMIS evolves to become increasingly complex, often being comprised of multiple operational systems and often involving a large number of stakeholders spread across different agencies, there is a need to regularly revise and add to tools such as SABER and DQAF for review and evaluation of EMIS. The Framework for Monitoring Out of School Children and Children at Risk of Dropping Out145 presents an extension of EMIS standards considering the need for data on Out of School Children. The need for EMIS to respond to SDG monitoring requirements, especially SDG 4 on education, the methodologies being developed by UIS for SDG 4 indicators, and efforts by UNICEF to support countries in adaptation of EMIS systems and

[142] UNICEF Annual Report 2015 Sierra Leone, p. 32.

[143] UNICEF Annual Report 2013 South Sudan, p. 20.

[144] International development partners include agencies (such as UNICEF, the UNESCO Institute for Statistics (UIS), UNESCO, Department for International Development (DFID), and the World Bank) supporting EMIS development at the global level. National development partners may include NGOs, commercial partners and others active at the national level supporting EMIS development within countries.

[145] UNICEF & UIS (2016). Framework for Monitoring Out of School Children and Children at Risk of Dropping Out, Geneva: UNICEF. https://www.unicef.org/eca/reports/monitoring-education-participation.

other means of production of these indicators, represent a further example of new and emerging standards for EMIS.

The approach to this review complemented SABER, and DQAF methodologies. The evaluation questions developed by UNICEF ROSA are organized into several dimensions based on the UNICEF & UIS framework for monitoring education participation,[146] grouped under 'technical' and 'use and impact', They are focused on design and use of EMIS at school and local levels, and on identifying factors in the EMIS leading to improved access, equity and quality at school levels.

Given that EMIS is constantly evolving, so too there is a need for a flexible/adaptable toolkit that can be readily adapted and contextualized over time and for different systems. Further development of the methodology used in this review may prove a useful complement to enhance existing methodologies such as DQAF and SABER.

[146] Ibid.

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B. Annex 2. Meetings conducted

Schedule for Visit of Douglas Drew - Consultant **to conduct Regional Study of EMIS Khyber Pakhtunkhwa**				
24th November to 14th December 2019				
Date	**Activity**	**Timings**	**Responsibility**	**Remarks**
27.11.2019	Arrival in Islamabad	1:40		
27.11.2019	Hotel Islamabad	03:30 -12:30		
27.11.2019	Travel from Islamabad to Peshawar	13:30 - 16:30		Introductory visit to UNICEF office, and Check in at WFP Guest House
28.11.2019	Meeting with UNICEF Peshawar - Education and CFO	09:30 - 11:00	Fawad & Gulnaz	Brief on objectives of visit, discuss schedule
	Security Briefing	11:00 - 11:30	Kamran Khan	
	Meeting with the Secretary, ESED	12:00 - 13:00	Fawad, Gulnaz	Briefing of and feedback from Secretary and his team on the Mission Objectives and Schedule
	Meeting with Director ESRU	13:00 - 14:00	Gulnaz	Uses of EMIS data, and needs wrt EMIS
	Sitting with EMIS Cell	14:00 - 16:00	Salahuddin	Discussion on all relevant details and any required arrangements
29.11.2019	Meeting with Director DESE	10:00 - 11:30	Gulnaz, Salahuddin	Uses of EMIS data, and needs wrt EMIS
	Meeting with Chief Planning Officer and Planning Cell	11:30 - 13:30	Gulnaz, Salahuddin	Uses of EMIS data, and needs wrt EMIS
30.11.2019	Saturday			
01.12.2019	Sunday			
02.12.2019	Sitting with EMIS Cell	Full Day	Salahuddin	Demo and review of EMIS and SMIS

03.12.2019	Meetings with District Stakeholders - Swat, Peshawar, Dera Ismail Khan (DEOs, Head Teachers and EMIS focal persons from the already identified schools	Full Day	Gulnaz, Salahuddin, and Tariq Hayat	Round table discussion of uses of EMIS and SMIS by DEOS and Schools, strengths and weaknesses
04.12.2019	Meeting with DCTE Director	09:30 - 11:30	Salahuddin, Gulnaz	Activities of DCTE, Use of EMIS data, need for MIS
	Meeting with SRSP	12:30 - 13:30	Fawad and Momina	Discussion of work of SRSP in relation to EMIS and Capacity Building
05.12.2019	Visit selected schools	09:00 - 13:30	Tariq Hayat	EMIS Code 34183 Government High School Sheikh Abad, Union Council Sheikh Junaid, Peshawar EMIS Code 36666 Government Muzammil Shaheed Higher Secondary School Chamkani, Peshawar
	EMIS - sitting with EMIS Cell	13:30 onwards	Tariq & Shah Hussain	Review of EMIS databases
06.12.2019	EMIS - sitting with EMIS Cell	09:30 - 12:30	Tariq and Salahuddin	Review of EMIS databases, EMIS issues and priorities
07.12.2019	Saturday			
08.12.2019	Sunday			
09.12.2019	Meeting with Bureau of Statistics	10:00 - 11:30	Gulnaz	OOSC, KPBOS sources of data on education, potential secondment of a KPBOS Statistician to work in EMIS cell of ESED
	Meeting with Adam Smith International	12:00 - 13:30	Gulnaz & ASI	ASI support to EMIS
	Meeting with IMU	14:30 - 16:30	Gulnaz & DD IMU	IMU monitoring and data collection for the ASC
10.12.2019	Meeting with SRSP field team working with District Education Office	11:30 to 12:30	Gulnaz & SRSP Field Team	Training of PTCs and other Capacity Building

	Desk Work in Office	13:30 to 16:00		
	De-briefing with Secretary, ESED	16:30 - 17:00	Secretary ESED, Dir EMIS, Fawad, Gulnaz	Presentation and feedback on key findings from mission
11.12.2019	Desk Work in Office	09:30 - 11:00		
	Travel from Peshawar to Islamabad	11:00 - 15:00		Check in at Chez Soi
12.12.2019	NEMIS and AEPAM National EMIS and initiatives in relation to Khyber Pakhtunkhwa EMIS	09:30 to 13:30	Dr. Khwaja Sabir Hussein, Joint Director AEPAM	NEMIS developments and issues, and requirements from Provincial EMISs
	NFEMIS	14:00 - 15:00	Ilya Muhammed, JICA	Nonformal EMIS developed by JICA
13.12.2019	De-briefing of UNICEF Country Office	09:30 - 10:30	Ellen van Kalmout, UNICEF CO, Education Team, and Jawaad Vohra MM Country Rep	Debrief and feedback on Mission
	Meeting with DFID	11:00- 12:00	James O'Donoghue, Education Adviser, DFID	Quick Debrief on Mission
	Departure for Airport	23:30	UNICEF Driver	
14.12.2019	Return Flight	3:05		Outbound flight from Islamabad Int. Airport

C. Annex 3. Review Dimensions and Questions

The draft evaluation questions are organized into several dimensions based on the UNICEF & UIS framework for monitoring education participation. These dimensions are grouped under 'technical' and 'use and impact'. Both quantitative and qualitative data collection and analysis methods will be used to obtain relevant information for each evaluation dimension, from a range of stakeholders at different levels.

In addition, questions are divided into two categories: descriptive questions, and normative ones. Descriptive questions are aimed to provide information and verifiable facts about the systems being evaluated. Answering normative questions involves making judgments, based on application of explicit criteria for weighing evidence. Bidders are encouraged to propose scales for evaluating evidence for normative questions.

Technical

Review dimension	Review questions
1. Relevance and comprehensiveness of indicators for monitoring access, equity and quality	Descriptive questions: • Which indicators are routinely generated and monitored, and do they enable monitoring of the status and progress in terms of access, progression (e.g., survival and transition rates) and learning? If not: what are the gaps? • Are the indicators generated by the system disaggregated by gender, location, ethnicity or other aspects which would allow for an analysis focusing on equity? • If learning outcomes are not integrated within the system, what other measures of education quality are available within the system? • Are those indicators automatically calculated within the system and if so at what level (school, lower level admin or national)? • Are the values of the indicators publicly accessible through a web-platform, and at what level (school level, lower level admin or national)? What are the data access restrictions?
	Normative questions: • Are the data collected and the automated indicator calculations within the system sufficient to provide the information necessary to track progress on agreed targets at the different levels? (At national/provincial level, or district level: looking at the results framework of existing education sector plans or equivalent, does the system enable monitoring of all results? At school level: is the information provided by the system sufficient to facilitate school management practices and to monitor progress on agreed improvement plans?)
2. Data quality management and mechanisms	• Descriptive questions: • Who collects the information (e.g. school admin, teachers), and how is it entered? (e.g. paper-based, mobile, web-based, PC)? • Which measures are in place to prevent data errors, e.g. data validation during data entry, partially pre-filled data collection instruments, help desk, documentation? • Which measures are in place to resolve data errors, for example, cross-checks of the same data from different sources, detecting/fixing out of range or unusual data values, and how and at which level is this being done?
	Normative questions: • Is the system in use error free? If not: is the level of error remaining in the system acceptable and what are the risks/consequences of those errors, on planning, decision making, resource allocation etc.

Review dimension	Review questions
3. Measures for safeguarding personal and confidential information	Descriptive questions: • Does the system define different levels of access and editing rights according to user type/role? Which ones? • Which security and data protection measures are in place to ensure that confidential information (e.g., individual student records, financial information), are only accessible to those with the rights to access them?
	Normative questions: • In the present condition, how safe/vulnerable is the system, and what would be recommended additional security measures to be adopted, in order to protect individual student data, or school financial information?
4. Types of information and levels of disaggregation	Descriptive questions: • For the key indicators, which levels of disaggregation are available, e.g., by gender, age, ethnicity, religion, residence location, socioeconomic status, parents' profession and status (e.g., both parents, single parent, guardian), etc.? Which of these are routinely generated? • Which information is collected regarding teachers and non-teaching staff characteristics? • Which other information is collected, e.g. school-level information (school infrastructure, school improvement plans, school materials, financial information, etc.) • For which indicators are trends over time available / generated?
	Normative questions: • Is the level of disaggregation of the different indicators available from the system sufficient to perform the necessary targeting of children according to existing plans (i.e., target specific interventions or resources for a disadvantaged group, like poor rural girls, or children with disabilities, or children from a disadvantaged ethnic group)? • Is the level of information collected about teachers sufficient to be able to comprehensively review teacher management practices and detect potential issues, such as ghost teachers, teacher absenteeism or performance, gender imbalance in teacher placement, disparities in teacher qualification between regions etc?
5. Efficiency of data collection and administration	Descriptive questions: • In which areas has the system increased and in which areas has it reduced the time spent on management and administration tasks by staff at different levels (e.g., school, education department, Ministry of Education)? For teachers, did it increase or reduce teachers' contact time with students? • In areas where it has increased the time required – both for existing tasks and for new tasks – do users feel this is justified in terms of the purpose and impact of these tasks? Why or why not?
	Normative questions: • According to users, how could the system be improved to increase efficiency?
6. Two-way vertical information flows from school to regional/national and in between	Descriptive questions: • Which processed information (e.g. indicators, trends, analysis) is communicated or otherwise accessible at local and school levels? • At what level (e.g. school, subnational) and in which format (e.g. dashboard, school profile / report card) is the information communicated?
	Normative questions: • How relevant is the information to the needs of users? What are the information gaps? (including based on user perspectives on information they would like to have) • Has the adoption of the system led to an increased or reduced ownership of information at school and sub-national level for planning and decision making?
7. Integration with other relevant databases, within and cross-sectoral, including financial, demographics, learning assessment	Descriptive questions: • Which separate systems/databases have been completely integrated into one system (i.e. an EMIS), or are planned to be integrated? • Are there any links/integrations between separate systems, e.g. between the EMIS and civil registry; which ones and how has this been achieved (e.g., through an API, or manually) and for which purpose?

Review dimension	Review questions
	• Does school level information (i.e., through a school level information management system or SMIS), feed into the EMIS, and to which extent? Is this for all schools or only certain types of schools (e.g. public schools, pilot schools, schools with required ICT infrastructure)?
	Normative questions: • Which other existing data systems should be linked with the system being evaluated, in order to enable monitoring of progress on all aspects of the education sector plan (or blueprint of national education priorities)?
8. Integration of an early warning system or mechanisms to prevent dropout	Descriptive questions: • At the school level, is there a system for digitally registering/monitoring absenteeism? Does it distinguish between excused and unexcused absenteeism? • If yes, how is it being used – is it used to detect and prevent dropout? Does it include other indicators besides absenteeism to monitor risk of dropout? Does the system allow recording of teacher's absenteeism? • Is there a case management or referral system, e.g. automated requests for action sent to the principal, or education department, or other, according to specific referral rules like days of absenteeism?
	Normative questions: • In the case there is no early warning system imbedded within the system, given the current technical architecture of the system, how complex and costly would it be to develop one? • In the case there is one, has it led to a follow-up of the at-risk children through concrete actions like contacting parents, or counselling for example?
9. Level of automation	Normative questions: • To which extent are processes automated, e.g. for generating specific indicators, summaries/tables, reports, dashboards, visualizations, GIS mapping, etc.

Use and impact (institutional and socio-cultural dimensions)

	Review questions
1. Level of school and local level implementation, ownership, and use	Descriptive questions: • At which levels and by which types of staff is the system being used, i.e. school admin staff, principals, teachers, and education officers/staff at various sub-national administrative levels? • Is the system being accessed by parents, by SMC member? How? • If the system is mobile-compatible, which components can be used via mobile?
	Normative questions: • How and to which extent is it being used at the different levels? If it is not used, or used in limited ways, why? • To which extent does lack of access to Internet/computers/mobile phones (e.g., for school staff, district education staff, parents) limit access and usage?
2. Easy to use	Descriptive questions: • Based on feedback from users familiar with work processes prior to introduction of the new system, how difficult was it to adapt to the new system? Which areas / processes are, or were, the most difficult? • How much and which types of training was provided if any, for which staff, and was it sufficient?
	Normative questions: • According to users, how could the system be improved in terms of ease of use? • According to users, which kinds of training/capacity development would be preferred (e.g., face to face workshops, documentation/user guides, webinar/tutorial videos, helpdesk).
3. Usefulness	Descriptive questions: • Does the system communicate information through schools (or otherwise) to the community/parents? How useful is this information? How is it communicated?
	Normative questions: • Does the system meet all identified needs in terms of management and monitoring at school (i.e., does the system provide all the necessary information needed for school level management) and different administrative levels? Why or why not? • Is the information or data presented in an easy to understand format for decision makers at the school and sub-national level, and which features would improve the utility of the system and encourage greater use?
4. Transparency	• Which indicators/information are made available to the public? To schools? To parents?
5. Sustainability	Descriptive questions: • What are the recurring costs for maintenance and use? What percentage of the education budget does that represent? • Which capacity is required from staff to maintain and further develop the system?
	Normative questions: • How could sustainability be improved, e.g. in terms of automating routine processes rather than depending on staff to have the time and capacity to do this? • How much of a burden does the adoption of the system represent at school level, because of IT investments and HR needs (teachers/admin staff need enough IT skills to use the system)?

	Review questions
6. Effectiveness and impact	Normative questions: • How effective is the system in terms of improving and facilitating monitoring and management processes? (compared to how it was before) • How is it being used and what was its impact in improving access, equity, quality? (e.g. through the approaches outlined in the BACKGROUND section - purported concrete achievements of monitoring and management systems). • For access: can we link system-use to reduction of the numbers of OOSC, drop-outs, or progress in terms of intake, transition, survival rates? • For equity: can we see an impact of system adoption on a reduction of the gap between the most disadvantaged student population groups and the rest of the population, in terms of access, participation, learning? Is there better targeting of specific interventions for disadvantaged populations, potential cost-savings etc, since the system is in use? • For quality: can we see an impact in terms of learning outcomes of students? Can we see an impact in terms of infrastructure development for schools (perhaps better targeting of the education development budget)? Can we see an impact in terms of teacher absenteeism?
7. UNICEF's role	Descriptive questions: • What role did UNICEF's Country Office or Field Office team play in the design, development, adoption and use of the system being evaluated? • How does UNICEF's team plan to get involved in strengthening of improving those systems in the future
	Normative questions: • What is UNICEF's comparative advantage in the field of management and monitoring systems for decision making as school and sub-national levels, and which aspect of those systems 'development and usage is UNICEF best positioned to support governments with?

D. Annex 4. Evaluability Questionnaire

Note:

The Director, Directorate of Planning, Research and Statistics (or equivalent head of the organizational unit that has responsibility for EMIS of the State/Provincial Ministry of Education will coordinate and supervise the completion of this questionnaire. Respondents for this questionnaire should work under the guidance and supervision of the DPRS and will include consultations with technical team members of the central level EMIS team, technical experts who participated in the design and development of the system, and possibly members of monitoring teams at sub-national levels. For the data use questions, decision makers at various levels should also be consulted.

Education Management Information Systems (EMIS) refer to all activities of collection and use of education data at the state or provincial levels.

School Management Information Systems (SMIS) refer collectively to all activities of collection, digital capture and use of data at the school level, for the purpose of managing school operations and for school planning purposes. Data from SMIS are also a potential source for feeding data to the state/provincial/national EMIS. An electronic SMIS can be an independent system, or an extension of the EMIS, and may also include school management and administrative functions (such as admissions, automated reporting, accounting, staff management, etc.)

Part I: Profile of SMIS, EMIS and Interrelationships

A. Profile of School Management Information System (SMIS)

1. Does the Management Information System have an SMIS (School Management Information System), with digital data for individual students? Yes / No
   If Yes, answer question 2,
   If No, go to question 10.

A.1 Baseline biodata on individual students

These are biodata on the students that typically do not change (such as name, Unique ID,…).

2. Equity related variables included in Baseline Bio Data on Individual Students.

The variables in the table below help to classify students on the basis of equity dimensions. Indicators and analyses of the equity of educational systems is important and is at the core of Sustainability Development Goal 4 (SDG 4) on education.

Indicate whether these data below are collected at the time of school registration, via another source and specify that source, or whether the variable is not included as part of the baseline data on individual students.

2. Individual student data: Source of equity related variables			
Equity related Variable	**Availability**		
	Available from School Registration	**Available from another source: (specify)**	**Not Available**
2.1a Disability status			
2.1b Washington Group disability/impairment categories[147]			
2.2 Member of ethnic minority			
2.3 Language spoken at home			
2.4 Orphan Status			
2.5 Living distance from school			
2.6 Occupation of mother (proxy for socio economic status)			
2.7 Education level of mother (proxy for socio economic status)			
2.8 Occupation of father (proxy for socio economic status)			
2.9 Education level of father (proxy for socio economic status)			
2.10 Attended pre-school/ECE			
2.11 Other: specify			

[147] These have evolved over time but typically encompass difficulty seeing, hearing, walking, cognition, self-care, and communication – see also http://www.washingtongroup-disability.com/wp-content/uploads/2016/12/WG-Document-4-The-Washington-Group-Short-Set-on-Functioning-Question-Specifications.pdf

3. How was the baseline data on individual students' data captured/entered (tick the correct answer)?
   - 3.1 Electronic – offline □
   - 3.2 Electronic – web-based / online □

4 At what level is student data entered electronically
   - 4.1 At the school level for all schools □
   - 4.2 At the hub school / nearest school with required ICT facilities □
   - 4.3 At the district level □
   - 4.4 Combination of the above, please describe _____
   - 4.5 Other, please describe _____

A.2 Recurrent Data on Individual Students

These are data that are collected "routinely" during the school year, such as student attendance, and student test and assessments.

5 What recurrent student data and tracking mechanisms are included in School Management Information System (SMIS):

5. Recurrent Data on Individual Students				
Type of recurring Student data	**Recorded electronically in SMIS**	**Recorded on paper**	**Not recorded**	**Comments**
5.1 Attendance of individual students				
5.2 Reason for absenteeism				
5.3 Flagging of students at risk of drop-out				
5.4 Results of tests and exams				

A.3 Other Content of SMIS

In addition to data on individual students, indicate what other data are included in the School Management Information System (SMIS).

Check whichever is applicable.

6. Other Content of SMIS				
Element	**Recorded electronically in SMIS**	**Recorded on paper**	**Not recorded**	**Comments**
6.1 Individual Data on Teachers at the school (qualifications, subject, in service training, etc)				
6.2 Teacher attendance /absenteeism data				
6.3 Individual data on non-teaching staff at the school				
6.4 Data on school infrastructure (such as number of classrooms by state of repair, ICT equipment, water, status of toilet facilities for boys and girls, library, etc)				
6.5 School supplies (number of textbooks, student notebooks, etc)				
6.6 Student examination results				
6.7 School budget and expenditures				
6.8 School plans				

A.4 Updating of Content of SMIS

For the following, please indicate whether the information in the School Management Information System (SMIS) is updated whenever there is a change:
Note – this form can be skipped if templates / screenshots – in English - can be provided where all this information is captured.

7. Updating Content of SMIS

Activity	Yes, this is recorded on **electronically**	Yes, this is recorded **on paper**	No, this is not recorded
7.1 Student drops out			
7.2 Student reason for dropout			
7.3 Student transfers to another school			
7.4 Student transfers into the current school			
7.5 Teacher transferring out			
7.6 Teacher transferring in			
7.7 Student school assessment results			
7.8 School budget			
7.9 School improvement plan			

A.5 Flow of data to and from SMIS to other levels of EMIS: Relationship of School Management Information System (SMIS) to Annual School Census

Historically, the source of data in EMIS was via the conduct of an Annual School Census, during which a paper and pencil form was completed for each school, with subsequent data entry of the forms. With the existence of School Management Information System (SMIS), other means are emerging of populating EMIS with the data it requires.

This question asks you to identify the relationships between SMIS and EMIS that best describes the situation for your SMIS.

8. Relationship between SMIS and EMIS	
Type of relationship	**Does the type of relationship characterize the actual relationship between SMIS and EMIS?** Please answer Yes or No to each item as applicable (Y/N). Feel free to add comments.
8.1 Data entered through the web-based school management information system is automatically included in the EMIS	
8.2 Does the school management information system have offline capability (i.e. able to enter data offline, and transfer to the EMIS when there is Internet connectivity or via other means)	
8.3 Indicators / tables can be automatically generated by the SMIS for inclusion in the annual school census / reporting	
8.4 Schools need to manually calculate aggregated data and report them for the annual school census / reporting	

9. What activities related to EMIS are conducted by the district office

9. Activities related to EMIS conducted by the district office		
Activity	**Yes / No**	**Description of activity**
9.1 Data entry through an offline system		
9.2 Data entry through a web-based system		
9.3 Data quality checks/validation checks		
9.4 Data cleaning – fixing data errors		
9.5 Spot checks of schools to verify whether data is accurate		
9.6 Schools visits to check on accuracy of student attendance recorded		
9.7 Schools visits to check on accuracy of teacher attendance recorded		

When school staff logs in to the School Management Information System (SMIS) or EMIS, which kinds of reports can be generated (if any)?

Please list or insert a screenshot (if in English). Examples including absenteeism reports, student report cards, school summary reports, etc.

10. Links to EMIS/SMIS dashboards

10.Kinds of reports generated by School Management Information System (SMIS) or EMIS		
Type of report	Who can access this report? (e.g. public, principal, teacher, parents, students)	Description

11.1 If there is a publicly accessible dashboard / website for EMIS/SMIS, please include the link(s) below:

_____

11.2 If the EMIS/SMIS dashboard is not publicly accessible, please provide a temporary User ID(s) and password(s) to permit access for the purpose of this study, if this is feasible**:**

B. Profile of District Activities and Data Collected

12. District offices carry out a number of activities related to inspection and oversight of schools. In this question we are interested in what data is recorded by District level education officers as they carry out these activities, and whether these are included within EMIS.

12. Data recorded by District education officers related to their activities

Which of the following is recorded by district level education officers	On paper (yes/no)	Electronically **not** as part of EMIS (yes/no)	Electronically as part of EMIS (yes/no)	Comment
12.1 School visit reports by inspectors				
12.2 Classroom observation reports by inspectors				
12.3 Student absenteeism tracking reports and accuracy of school reporting				
12.4 Teacher attendance data reported by the school and accuracy of school reporting				
12.5 Continuous Professional Development (CPD) training undertaken by individual teachers				
12.6 Other: specify				
12.7 Other: specify				

C. Profile of EMIS

Question 8 gave the method which best describes the way in which school level data required for EMIS are obtained.

13. In addition to data provided by schools, potential uses of external data are listed in the table below.

Indicate Yes/No whether these external data are used by EMIS in the manner indicated. If there are other external data used by EMIS or used in a different way, please add them to the table.

13. Use of External data by EMIS and Linkage of EMIS to external Data

External data	Purpose of integration of external data source with EMIS	What is the source of data	Is this data source integrated with EMIS for this purpose? (Y/N).	Comments
13.1 Population projections of the school aged population	To calculate NER, GER, enrolment projections, and other indicators which use the school aged population as a denominator	Census of Population		
13.2 Civil registry – individual population data	Compare individual civil registry records with individual enrolment data to identify out of school children	Civil registry		
13.3 Health management information system	Compare individual health records with individual enrolment data to identify out of school children	Health Information Systems		
13.4 Data on education status of children with disabilities from other Ministries / recorded in other databases				
13.5 Other:				
13.6 Other:				

14. Principal data and indicator products of EMIS.

Please answer Yes or No to each item as applicable. Note: If a digital version or publicly accessible dashboard can be shared, the question below can be skipped.

14. Principal data/ indicator products of EMIS	
Information Product	Please answer Yes or No to each item as applicable (**Y/N**).
14.1 Is there a state/provincial statistical report using EMIS data	
14.1.1 Is a soft copy available online	
14.1.2 Are data tables appearing in Annual Statistical Report available online in excel or csv format	
14.1.3 Do tables have breakdowns by gender, disability and other equity dimensions	
14.2 Web-based online dissemination platform (If No, go to 14.3)	
14.2.1 Is it publicly accessible	
14.2.2 Is it a multi-annual, permitting retrieval of time series data	
14.2.3 Does it permit user customization of tables	
14.2.4 Can tables be exported in formats including excel, csv	
14.3 International reporting of SDG Education Indicators	
14.4 Other Specify:	

15 Reporting of Sustainability Development Goal (SDG) 4 on Education.

Sustainability Development Goal (SDG) 4 on education is to:

"Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all."

This question asks about responsibilities for mapping data sources and for production of SDG 4 Indicators, and in particular the role of EMIS.

15. Reporting of Sustainability Development Goal (SDG) 4 on Education	
Roles and Mapping of SDG 4 Indicators	**Describe**
15.1 Has there been a mapping of data sources and data availability for SDG 4 indicators? Was this exercise carried out at the National level, and what role if any did states/provinces have in this exercise.	
15.2 Has there been an identification of which SDG 4 indicators are to be reported based on EMIS data? If yes, which SDG 4 indicators are to be based on EMIS?	
15.3 What is the role of State/provincial Ministries of Education on reporting of SDG 4? Specifically, for those indicators to be based on EMIS, are the indicators to be calculated by state/provincial EMISs, and then aggregated to the national level?	

15.4 Does the State/provincial EMIS collect data to allow for Parity indices for indicators on education participation and completion? Specifically, which of the following parity indices are available:

Parity Index	Availability (Yes or No)
15.4.1 female/male	
15.4.2 rural/urban	
15.4.3 bottom/top wealth quintile	
15.4.4 disability status	
15.4.5 indigenous peoples	
15.4.6 conflict-affected	

15.5 Does EMIS collect data to allow for production of indicators on proportion of schools with access to School Facilities (see Question 20.20-20.26)

Part II Use of EMIS, Documentation, Data required for analysis of impact of EMIS, and Coverage of EMIS

16. Implementation date of EMIS:

When did implementation of the system commence?

Please indicate month and year: _____.

17. Use of the system: Which of the following concrete actions have been undertaken using data from School Management System (SMIS), at the district level or using EMIS at the state/provincial level, or at the national level using data aggregated across states/provinces? For each, briefly describe the action, and the impact, and whether reports or other documentation are available that describe the Action and its impact.

Note: all action areas are not expected to be undertaken for any given EMIS. Please add any additional school or District actions undertaken based on SMIS or EMIS as applicable.

17.Actions Undertaken using EMIS				
Action Area	Action Done Yes/No	If yes, Describe Action Including level at which done (district, school, etc.)	If yes, Describe the Impact of Action	Documentation Available Yes/No
17.01 Improving the identification of routinely absentee students and more broadly students at risk of dropping out, and subsequently addressing such issues more systematically and effectively.				
17.02 Reducing both student and teacher absenteeism.				
17.03 Improved identification of out-of-school children.				
17.04 Exposing and addressing systemic corruption, including identification of “ghost” schools, staff members and students, allowing for corresponding financial allocations to be used elsewhere.				
17.05 GIS mapping of education institutions to identify areas where children are deprived of education opportunities.				
17.06 Dashboards and reporting systems to better identify and analyse education inequities at different levels, such as inequities in school financing, distribution and availability of resources and qualified staff.				
17.07 Improving efficiencies in data collection, freeing up staff time at sub-national and school levels for other tasks.				

17.Actions Undertaken using EMIS				
Action Area	Action Done Yes/No	If yes, Describe Action Including level at which done (district, school, etc.)	If yes, Describe the Impact of Action	Documentation Available Yes/No
17.08 Improved exchange of information across sectors (e.g., education, health, population), improving cross-sector coordination especially regarding initiatives and interventions for disadvantaged children (e.g., children with disabilities, poor children).				
17.09 Improving the accuracy and reliability of data for planning and decision making.				
17.10 Automating the production of custom reports and snapshots of the performance of the public education system at different administration levels (school level, district level, provincial level etc), through school report cards.				
17.11 Increasing community awareness of school performance, school life, school improvement plans, etc., by producing regular community level information products, such as school posters or community level school profiles				
17.12 Additional Action Area: Specify				
17.13 Additional Action Area: Specify				
17.14 Additional Action Area Specify				

18 Other documentation:

Confirm which of the following documents are available in English.

Please provide soft copies of the documentation to the focal point in the UNICEF Office.

18 Other Documentation		
Document Type	Document	Availability Yes/No
18.1General Education	18.1.1 Education Sector Plan 18.1.2 Education Sector Analysis	

18 Other Documentation		
	18.1.3 National Education Policy and Legislation (Education Law)	
18.2 EMIS Enabling	18.2.1 EMIS policy document 18.2.2 Legislation referencing EMIS	
18.3 Development Partners (including World Bank, UNICEF, UKAid, USAID European Union etc.)	18.3.1 EMIS reports and development plans 18.3.2 Joint sector review documents	
81.4 EMIS System	18.4.1 EMIS architecture document (including: methodology, system architecture, data collection instruments, reports and indicators generated, access privileges to system, BI platform for retiral and viewing of indicators and data). 18.4.2 Terms of Reference for development and implementation of EMIS 18.4.3 EMIS Operational Manual 18.4.4 Architect document for Student Attendance Module	
18.5 EMIS Sustainability and Strengthening	18.5.1 Report on EMIS training and training materials. 18.5.2 Plan for Strengthening of EMIS 18.5.3 Budget for EMIS	
18.6 EMIS Questionnaires and Forms	18.6.1 EMIS Questionnaires for all levels of education 18.6.2 Form for Individual student data collected at time of registration 18.6.3 Classroom observation form 18.6.4 School Visit Form (for inspectors) Others forms as applicable	
18.7 EMIS Dissemination	18.7.1 EMIS reports at school, district and state/province level 18.7.2 Online Data Dissemination System (link to public system, or user id and password to non-public system) 18.7.3 School Report Card	
18.8 SDG 4	18.8.1 Mapping of SDG 4 to EMIS (SDG 4 national review reports etc.) 18.8.2 SDG 4 roadmap (for attaining goals)	
18.9 EMIS Decision making (examples of use of EMIS data for the following)	18.9.1 Use of EMIS data in State/Provincial Education Plan and sector analysis 18.9.2 Use of School Report Cards 18.9.3 Use of EMIS data in School Improvement plans 18.9.4 Other examples of the use of EMIS data for monitoring, planning, research etc. 18.9.5 Actions taken as a result of use of EMIS data	
18.10 EMIS Evaluations and other Research	18.10.1 EMIS Evaluations undertake in the country 18.10.2 Other research relevant to EMIS 18.10.3 Examples of data analysis highlighting quality aspects of the data and the nature of the data (specific content)	

19. Coverage of EMIS

EMIS coverage in this table refers to the percentage of schools for which EMIS data have been reported. The main purpose is to get a perspective on the extent to which EMIS covers all education institutions, and which are not included.

Coverage of EMIS is also important when using EMIS data for estimation of the out-of-school population. If there are coverage gaps in EMIS, then the total of enrolments in EMIS will be an underestimate of the total in-school population. For this reason, it is important for EMIS coverage to be as complete as possible. Also, if coverage gaps are known, it may be possible estimate the number of students in non-covered schools, to derive a better estimate of the in-school population.

Complete Table19.1 and 19.2, which describe the coverage of EMIS. See definitions of schools by public and private school categories, below the table. For coverage rate, if it is an estimate, please indicate this (e.g. “20% - estimated”). If not covered, just indicate 0.

19.1 Coverage of EMIS: Part 1

Sub-sector of education	Coverage of public schools run by the Ministry of Education		Coverage of all private schools		Coverage of private schools run by religious organisations		Coverage of private schools run by NGOs	
	Number of schools	Coverage rate in EMIS (%)	Number of schools	Coverage rate in EMIS (%)	Number of schools	Coverage rate in EMIS (%)	Number of schools	Coverage rate in EMIS (%)
Early childhood Education Centres/ daycares (ECE)								
Pre-primary education								
Primary Education								

19.1 Coverage of EMIS: Part 1								
Sub-sector of education	Coverage of public schools run by the Ministry of Education		Coverage of all private schools		Coverage of private schools run by religious organisations		Coverage of private schools run by NGOs	
	Number of schools	Coverage rate in EMIS (%)	Number of schools	Coverage rate in EMIS (%)	Number of schools	Coverage rate in EMIS (%)	Number of schools	Coverage rate in EMIS (%)
Lower Secondary Education								
Upper secondary Education								
Technical Vocational Training								
Higher Education								
Nonformal Education								

Definitions:

Coverage of Public schools. The coverage of public schools under the authority of the Ministry of Education (MoE) is defined as the percentage of known public schools under the Ministry of Education for which EMIS data is available. The numerator includes all public schools under the MOE for which data has been provided, while the denominator is all known public schools under the MOE.

Coverage of Private Schools. The coverage of private schools is the percentage of private schools for which EMIS data has been provided. Private schools include schools with private ownership. At a given level of education, private institutions are those that are **not operated by a public authority but controlled and managed, whether for profit or not, by a private body** (e.g., non-governmental organisation, religious body, special interest group, foundation or business enterprise). In countries where private institutions are substantially subsidized or aided by the government, the distinction between private and public educational institutions may be less clear-cut especially when certain students are directly financed through government scholarships. The fact that some religious or private schools are not registered with the government nor follow the

common national curriculum may also result in them not being included in official statistics, hence preventing a realistic assessment of the share of enrolment in private education.

Private schools run by religious organizations include Madrasa's, and schools run by other religious organisations. They are a sub-set of private schools. Coverage of private schools run by religious organizations is the percentage of such schools for which EMIS data have been provided.

Private schools run by NGOs are a sub-set of private schools. Coverage of private schools run by NGOs is the percentage of private schools run by NGOs for which EMIS data have been provided.

Table 19.2 asks for information on schools run by ministries other than the Ministry of Education, and whether these schools are included in SMIS/EMIS. Ideally, EMIS should cover all schools, and if this is not the case, information on the number of schools missing and the number of students (approximate), will help to determine the gap in the coverage of EMIS. The following table may include for example special schools for children with disabilities, schools for children in conflict with the law, etc.

Add lines to the table as needed to describe schools run by other Ministries as applicable.

19.2: Schools in the state or province run by ministries other than the Ministry of Education

Ministry	Type of school	Description (level of education, programme of study, duration)	Included in EMIS Yes/No	Number of schools/institutions	Number of enrollments (Approximate)
Ministry of Health					
Ministry of Human Resource Development					
Ministry of Agriculture					

Data Availability. Availability of school and district level data under the new and old system, and means of access through EMIS reports, access to historical database.

Confirm whether the data or indicators in Table 20 are available or can be produced for the most recent year under the new EMIS, and for the last school year in which the old EMIS was used.

While this question only asks to confirm the availability of the data and indicators in Table 20, those which are feasible need to be generated, and soft copies provided to the UNICEF country office.

20. Comparison of data and indicators for period before and after implementation of new system: Indicators at state/province level			
Core Indicator / Data	**Availability under New EMIS: if yes, indicate dimensions (e.g. total/male/female)**	**Availability under old EMIS / pre-EMIS: if yes, indicate dimensions (e.g. total/male/female)**	**Comments**
Attendance and Dropout			
20.1 Student absenteeism rate by level of education (primary and secondary)			
20.2 Student **unexcused** absenteeism rate by level of education (primary and secondary)			
20.3 Dropout rate by level of education (primary and secondary)			
20.4 Teacher attendance rate by level of education (primary and secondary)			
Out of School Children (OOSC) Indicators[148]			
20.5 Age-specific Enrolment Rate (ASER) in primary or secondary education			

[148] Monitoring Education Participation, Framework for Monitoring Children and Adolescents who are Out of School or at Risk of Dropping Out, UNICEF and UNESCO Institute for Statistics, 2016

20. Comparison of data and indicators for period before and after implementation of new system: Indicators at state/province level			
20.6 Population by single years of age			
20.7 Number of children and adolescents who left school, by single year of age			
20.8 Age-specific Out of School Children (OOSC) Rate			
Education Access and Participation			
20.9 Gross Intake Rate (GIR) by level of education (Primary and Secondary)			
20.10 Net Intake Rate (NIR) by level of education (Primary and Secondary)			
20.11 Gross Enrolment Rate (GER) by level of education (Pre-primary, Primary and Secondary)			
20.12 Net Enrolment Rate (NER) by level of education (Pre-primary, Primary and Secondary)			
20.13 Transition rates from Primary to Secondary education			
20.14 Completion rate for Primary and Secondary education			
Education Efficiency			
20.15 Dropout rate by level of education (primary and secondary)			

20. Comparison of data and indicators for period before and after implementation of new system: Indicators at state/province level			
20.16 Repetition rate by level of education (primary and secondary)			
20.17 Coefficient of efficiency			
Education Quality			
20.18 Student per Teacher Ratio (STR), by level of education (primary and secondary)			
20.19 Student per Qualified Teacher Ratio (SQTR), by level of education (primary and secondary)			
20.20 Student Textbook ratio by level of education (primary and secondary)			
Sustainability Development Goal Indicator 4 (SDG 4): Selected indicators based on EMIS data			
School Facilities - by level of education (Primary and Secondary)			
20.21 Electricity			
20.22 Internet for educational use			
20.23 Computers for educational use			
20.24 Adapted infrastructure and materials for students with disabilities			
20.25 Basic drinking water			

20. Comparison of data and indicators for period before and after implementation of new system: Indicators at state/province level			
20.26 Separate toilets/latrines for girls / boys			
20.27 Handwashing facilities (as per the WASH indicator definitions)			

The Information and Communication Technology (ICT) resources typically available to schools, versus those required for SMIS.

SMIS requires a school to have certain ICT equipment and facilities. Please complete the table to capture the level of ICT equipment and facilities for schools.

21. Information and Communication Technology (ICT) resources 22.			
ICT equipment and facilities	**% of schools currently having the ICT equipment/facility**	**Comments** **E.g., workarounds under SMIS when no electricity or internet available at school**	**Funder of equipment procured to support SMIS:** **1 State** **2 National MOE** **3 IDP** **4 other (specify)**
21.1: PC or laptop for school administration use (One or more Functional)			
21.2 PC or laptop for pedagogical use: (One or more Functional)			
21.3 Tablets (One or more Functional)			
21.4 Smart phone (One or more Functional)			
21.5 Internet connectivity at the school			
21.6 Mobile network coverage at the school			
21.7 Electricity			

22 Availability and use of unique student identifier.

The availability of a unique student identifier is an important consideration for School Management Information System (SMIS). If unique identifiers exist and are captured for students, then students can be tracked within education. It will enable identification of students who transfer between schools, and also the transition between different levels of education.

22. Availability and use of unique student identifier		
Question	**Response**	**Comments**
22.1 Does a unique identifier exist for children aged 2-3 (ECE) onwards	Yes or No	
22.2 What are the source(s) of the unique identifier(s):	Yes, to all that apply	
- Civil registration number assigned at birth		
- National or State unique individual number		
- Other specify		
22.3 How is the number obtained	Answer yes to correct response	
- Automatically assigned		
- Parents have to apply		
22.4 Coverage of unique number	Respond yes if covered, no if not	
- Immigrant children (born in another country)		
- Refugees		
- Other exclusions specify		
22.5 How is the unique number captured for students entering school	Answer yes or no	
- Parents bring birth certificate or official id card		
- Other: specify		

23. Measures taken in SMIS and EMIS to preserve confidentiality of private data

Both SMIS and EMIS contain data confidential data on individuals, such as unique identifier, name, date of birth, data on parents, and address. It is important that safeguard be taken to protect the privacy of this data.

Indicate which of the following measures have been taken to protect the privacy of the data.

23. Safeguarding Confidentiality of Private Individual Data			
Measure to safeguard confidentiality of data	**Used for SMIS** (Yes or No)	**Used for EMIS** (Yes or No)	**Comments**
23.1 Only authorized personnel are assigned User IDs and Passwords by the System Administrator			
23.2 Users assigned privileges to access only approved portions of the data. Access to individual student level data is restricted to those needing to enter and work with these data and approved by senior management.			
23.3 The database used by the system for online queries and report generation is a separate encrypted database that has been stripped of all personal identifiers on individual records.			
23.4 The main database is encrypted.			
23.5 Any linkages of EMIS data with date from External files is only done once a formal request has been made and approved by senior management of both Ministries involved. The request identifies measures being undertaken to safeguard the confidentiality of the databases being linked, and the confidentiality of data resulting from the linkage of the two databases.			
23.6 Other measures: specify			

24. Budgets for EMIS/SMIS

Please indicate in the table below whether a budget exists within the approved education budget for the following EMIS/SMIS related activities, and if a budget exists, indicate the amount and the planned activities.

24. Budgets for EMIS/SMIS			
Activity	**Budget exists within the approved Education Budget** (Yes or No)	If Yes, **indicate the planned amount per year within the approved education budget**	If Yes, **Indicate the planned activities**
24.1 Planned improvements to SMIS or activities related to data monitoring, data collecting and use at school and sub-national level (district)?			
24.2 Better data use and dissemination, for example capacity development or development of automated dashboards/reports/snapshots at various administrative levels?			
24.3 System maintenance and upgrades			
24.4 Recruitment of additional staff within EMIS teams, either at central or sub-national levels?