



# Papua New Guinea

SABER Country Report

## EDUCATION MANAGEMENT INFORMATION SYSTEMS

2015

### Key Policy Areas

#### 1. Enabling Environment

Papua New Guinea successfully established an Education Management Information System (EMIS) as the point of reference system that collects, processes, and disseminates education data on a regular basis. The National Plan for Education 2005–2014 set a roadmap for timely collection, management, and utilization of data in decision making. The plan set the foundation for EMIS; however, it did not institute comprehensive EMIS policies or an EMIS budget. Policies do not outline procedures to ensure student data confidentiality, nor do they define processes and procedures for sharing data with other government units. Policies do not require that information be reported back to local levels, especially schools.

### Status

Emerging



#### 2. System Soundness

Using an Oracle platform, EMIS captures demographic data and some financial, infrastructure, and human resources data; however, assessment, salary, and noneducation data are not integrated. Analysis was conducted using Oracle Discoverer, but the tool is being discontinued by the vendor and rolled into the robust Oracle Business Intelligence (BI) tool. Data are sourced annually through a paper-based census, which moves from schools to district offices and on to provincial offices, before going to the Department of Education to be entered into the system. A pilot program introduced EMIS in six provinces, giving them the ability to input and access data through a digital interface. Internal and external audits are not conducted regularly.

Emerging



#### 3. Quality Data

EMIS concepts and definitions (data fields, indicators, metadata, etc.) follow a functional manual documented and approved by the government. Source data from most regions are reliable, although reporting and accuracy decline in rural locations. Systematic validation of data is conducted manually at provincial and district levels. Validation through automated systems started this year. EMIS is accessible through the Department of Education website through a dashboard, which also links EMIS data to the national education strategy. Statistics have been disseminated within 6–12 months after the start of the next school year; however, circulation of the 2015 census was delayed and may impact the timing of 2016 reports.

Established



#### 4. Utilization for Decision Making

EMIS data are disseminated through an annual statistics book and the online dashboard. Lack of internet access and limited communication and training prevent most stakeholders outside of the national government from accessing and using EMIS. Schools are not aware of the dashboard and instead rely on their own internal methods and processes for using data.

Emerging



## Introduction

In 2011, the World Bank Group commenced a multiyear program designed to support countries in systematically examining and strengthening the performance of their education systems. Part of the World Bank's new Education Sector Strategy, the evidence-based initiative called SABER (Systems Approach for Better Education Results), uses diagnostic tools for examining education systems and their component policy domains against global standards and best practices and in comparison with the policies and practices of countries around the world. By leveraging this global knowledge, the SABER tools fill a gap in the availability of data and evidence on what matters most to improve the quality of education and achievement of better results.

This report discusses the results of applying the SABER–Education Management Information Systems (EMIS) tool in Papua New Guinea (PNG). The objectives of this report are to examine the system according to key policy areas, identify successes and challenges in the system, and provide recommendations to support the continued advancement of EMIS in PNG.

## Overview of SABER-EMIS

**Information is a key ingredient in an effective education system. SABER–EMIS aims to help countries improve data collection, data and system management, and data use in decision making.** SABER-EMIS assesses the effectiveness of a country's EMIS, with the aim of informing policy dialogue and helping countries better manage education inputs and processes to achieve overall efficiency and strong learning outcomes.

**A successful EMIS is credible and operational in planning and policy dialogue as well as 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 (Abdul-Hamid 2014). It is crucial for tracking changes, ensuring data quality and timely reporting of information, and facilitating the utilization of information in decision making.

The SABER-EMIS assessment methodology is built on four key policy areas that are essential to EMIS and must be assessed to understand and ultimately strengthen the system. Each policy area is defined by a set of policy levers (actions that help governments reach the policy area) and indicators (measuring the extent to which the policy levers are achieved) (Figure 1).

Figure 1: SABER-EMIS Policy Areas and Levers



Source: Abdul-Hamid 2014.

**A strong enabling environment lays the foundation for an effective EMIS.** Enabling environment refers to the laws, policies, structure, resources, and culture surrounding an EMIS that make data collection, management, and access possible. In essence, this policy area is the context in which an EMIS exists. This defined scope of an enabling environment builds on lessons learned from studies of education management systems.

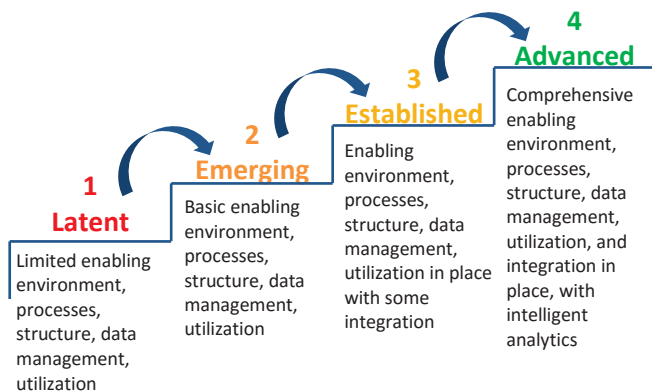
**System soundness ensures key processes, structures, and integration capabilities in an effective EMIS.** Education data are sourced from different institutions, but all data feed into and make up EMIS. Databases within an EMIS are not viewed as separate databases, but as part of the *whole* EMIS. Key aspects of system soundness include what data are covered in EMIS and how they come together in the overarching system.

**Quality data establish the mechanisms required to collect, save, produce, and utilize information in an accurate, secure, and timely manner.** Data quality is a multidimensional concept that encompasses more than just the underlying accuracy of the statistics produced. It means that not only are the data accurate, but that the data address specific needs in a timely fashion. Quality data lay the groundwork for utilization.

An effective EMIS is utilized in decision making by all users (parents, students, teachers, principals, and policy makers) across the education system. An EMIS needs to be used so that measures can be taken to improve educational quality. Accurate information on education sector performance enables the design of more informed policies and programs. It is imperative to understand where decision making occurs, if the capacity to analyze and interpret education data exists, and if specific data are available to inform decisions.

Using the EMIS data collection instrument, policy levers are scored on a four-level scale (latent, emerging, established, and advanced) to assess the extent to which *both* policy intent and implementation are

Figure 2: SABER Scoring and EMIS Development



Source: Abdul-Hamid 2014.

achieved (Figure 2).

## Approach

### Intent and Implementation

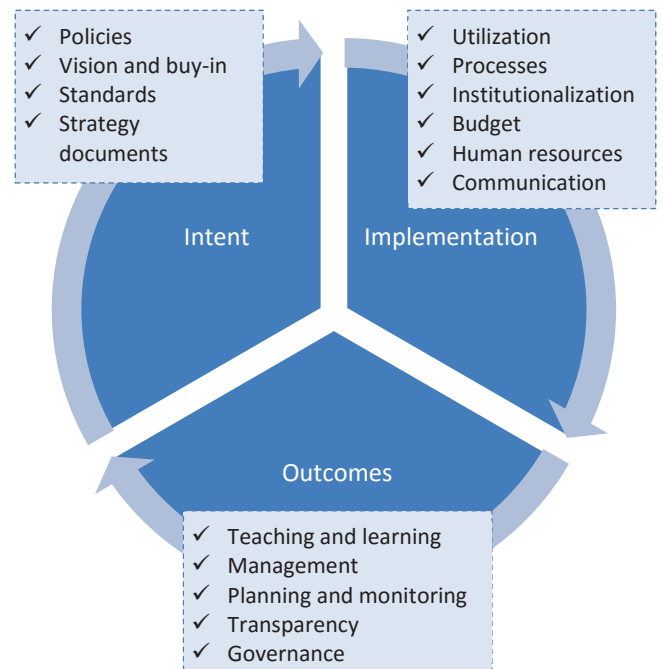
The EMIS assessment examines policy intent and the degree to which intended policies are effectively implemented on the ground (Figure 3). Intent refers to the way in which EMIS and its overarching purpose are articulated by decision makers and documented in policies and legislation, as well as standards and strategy documents. Assessing intent alone reveals only part of the picture.

As such, this EMIS assessment also evaluates policy execution. Implementation refers to the degree to which policy intentions take place during the day-to-day activities of stakeholders (policy makers, county administrators, principals, teachers, and students).

Implementation can be observed through utilization of EMIS by stakeholders, budget allocation, distribution of human resources, availability of professional development activities, communication and dissemination of information, as well as the extent of institutionalization across the system. Once policy intent and implementation are analyzed, the EMIS assessment explores the results of these two key components, with a focus on system effectiveness and efficiency, in addition to strong outcomes in the areas of teaching and learning as well as management and planning. Strong education systems will ultimately use these outcomes to inform the effectiveness of policies and education strategies and make adjustments as necessary, creating the cyclical process illustrated in Figure 3.

In PNG, EMIS intent and implementation were assessed through desk research and analysis of system applications and utilization, as well as interviews with a variety of stakeholders (Table 1).

Figure 3: Policy Intent, Implementation and Outcomes Cycle, with Examples



Source: Authors.

**Table 1: Measuring EMIS Intent and Implementation in PNG**

Policy intent	Implementation
<ul style="list-style-type: none"> <li>Multiple meetings with DoE</li> <li>Extensive review of relevant policies, national strategies, standards, and planning documents</li> </ul>	<ul style="list-style-type: none"> <li>Interviews with stakeholders at national, district, and school levels</li> <li>Analysis of data quality and comprehensiveness</li> <li>Thorough utilization assessment</li> <li>Examination of professional development activities</li> </ul>

Source: Authors.

## Methodology

The EMIS assessment methodology consists of a review of written policies and technical documents as well as interviews with key stakeholders across the education system to ensure proper implementation.

Research and investigation for the PNG EMIS assessment took place between March and May 2015. The authors conducted a comprehensive review of policies, as well as technical documents and other background materials. To further examine policy intent and implementation, a series of interviews and meetings took place with the following entities:

1. National Department of Education (Statistics and EMIS Unit, Information and Communication Technologies [ICT] Division, Assessment Unit, and other education divisions)
2. Provincial Office representative
3. Sample of schools

## Country Overview

PNG is among the world's most culturally diverse countries, home to more than 200 different cultures and more than 860 different spoken languages. PNG has a population of 7.3 million (2013), with an estimated 40 percent under 15 years of age.

Rainforest covers 75 percent of the land, and about 15 percent of the country is spread across 600 islands. Immense mountain ranges stretch over much of the mainland. More than 80 percent of the population live in rural areas and work in subsistence activities such as smallholder farming and fishing. Gross national income per capita in 2013 was \$2,020, and gross domestic product growth was 5.5 percent.

PNG consists of four regions, 20 integrated provinces, the autonomous province of North Solomons (Bougainville), and the National Capital District (NCD). In 1978 the constitutional parliamentary democracy established a provincial government system, leading to a highly decentralized education system. As such, each province has its own education plan, with different procedures for collecting and processing data.

The large rural population coupled with rugged terrain and weak infrastructure pose unique challenges to the provision of quality education and the flow of information across the country. Some regions are inaccessible by road. Internet saturation is low, and fixed broadband penetration is below 1 percent of the population. Various donors are supporting the government to help provide broadband Internet network and services to rural communities. In 2011, 26 percent of people in PNG had access to mobile phones, although that number has grown significantly over the past four years as a result of donor projects and greater competition among telecom providers.

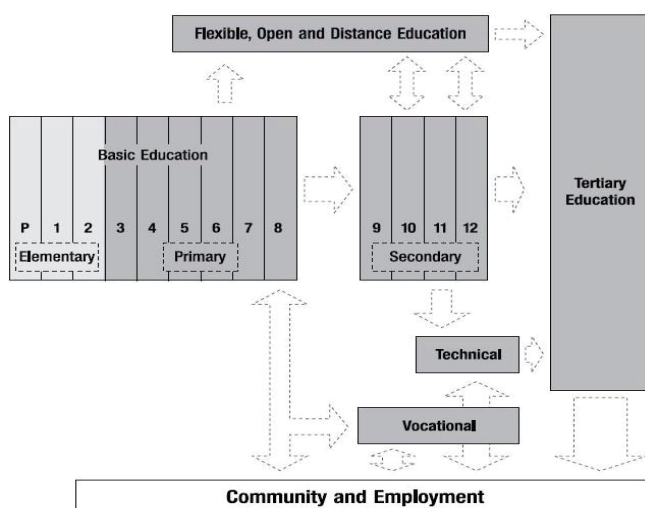
## Education Overview

The education system in PNG has three governance levels: national, provincial, and local (districts and schools). At the national level, the Department of Education (DoE) is responsible for setting and implementing national policies; establishing, preserving, and improving standards of education; and ensuring broad access to quality education. Provincial and local-level authorities are responsible for planning, financing, staffing, and maintaining general education institutions up to grade 12, including preschool, elementary, primary, secondary, and vocational schools (DoE, PNG 2004).

The education cycles include elementary school (preschool to second grade), primary (third to eighth grade), secondary (ninth to twelfth grade), and tertiary, technical, and vocational pathways (Figure 4). Flexible, Open, and Distance Education (FODE) is also available for students who cannot attend school institutions but are able to complete diploma and certificate equivalency programs independently. FODE data are included in the annual *Education Statistical Bulletin*.

Several key documents serve as strategic roadmaps that guide the country’s education system and lay the groundwork for creation of key policies. *Achieving a Better Future: A National Plan for Education 2005–2014* (DoE 2004) and the *Medium Term Development Strategy, 2005–2010* (Department of National Planning and Rural Development 2004) reflect national

Figure 4: Education Structure



Source: DoE 2004.

commitments to access and quality, as well as efficient management and financing of education. Additionally, the *Universal Basic Education Plan 2010–2019* (DoE 2010) aims to ensure that school-aged children have equal access to quality basic education and reach required standards in both literacy and numeracy.

In 2012, as part of the Universal Basic Education Plan, the Tuition Fee Free (TFF) policy was introduced, abolishing school fees and leading to a surge in enrollment. High enrollment numbers put considerable stress on the system, evidenced by high pupil-teacher ratios, especially at the elementary level (Table 2), as well as textbook shortages and gaps in teacher qualifications (EFA 2015).

Table 2: Education Indicators, at a Glance

Schools and enrollment			
Institution	Schools <sup>a</sup>	Enrollment	
Elementary (preprimary)	7,017	773,807	
Primary	3,561	942,998	
Secondary	212	140,123	
Vocational	117	31,546	
Flexible Open Distance Education (FODE)	45	11,804	
Net enrollment rates			
	Male	Female	Total
Elementary	63%	61%	62%
Primary	50	44	47
Secondary	9	6	7
Pupil-teacher ratio			
Elementary			49:1
Primary			35:1
Secondary			31:1

Source: DoE 2013.

a. Schools include government, church, and other agency schools.

## PNG EMIS Results

This section presents the main results of EMIS diagnostics described in the previous sections. Results and scores for each policy area are presented, along with supporting evidence.

### Policy Area 1: Enabling Environment

#### Emerging ●●○○

PNG's enabling environment was assessed in the following areas: (1) legal framework, (2) organizational structure and institutionalized processes, (3) human resources, (4) infrastructural capacity, (5) budget, and (6) data-driven culture.

**Three core policies guide and influence EMIS efforts in PNG: (1) *Achieving a Better Future: A National Plan for Education 2005–2014 (NEP 2005–14)*, (2) the ICT Policy, and (3) the *Universal Basic Education Plan 2010–2019* and resulting TFF policy.** NEP 2005–14 presents the vision, strategy, and roadmap for the country's education system. It builds off of the previous 10-year plan and aligns with other strategic development documents nationally and internationally (e.g., Education for All, Millennium Development Goals). National education targets set forth in the Plan are tracked in EMIS.

**NEP 2005–14 strengthened EMIS infrastructure, processes, standards, and practices.** It called for a centralized system for collection and storage of data to be in place by 2006 and set new requirements for data collection and management; for example, a new census was established. Additionally, the Plan set goals for data utilization in planning and decision making, as well as dissemination of findings. The next five-year education plan is close to finalization and will soon be announced.

**NEP mandated an ICT policy and plan, which further helped to establish EMIS by defining key technical areas.** Under the ICT Policy, technical guidelines for the system are addressed in areas such as software procurement and development, copyright compliance, maintenance and service contracting, inventory management, licensing, security and disaster recovery, and compatibility and integration. Additionally, the ICT Policy calls for technologies to be aligned with business

needs, up to date with current technological products and standards, and deployed efficiently.

**With the goal of providing all school-age children with access to quality basic education, the *Universal Basic Education Plan 2010–2019 (UBE 2010–19)* gave way to the TFF policy, which had significant implications for EMIS.** TFF relieved households from the burden of school fees and positioned the public financing system to cover costs up to grade 12. The TFF application calculation runs in the EMIS database, using data collected through the national school census. Not only do schools need to submit data through the census to receive TFF funds, but the data they submit classify them in a certain funding bracket. This incentive led to an increase in reporting of some school data. Based on interviews conducted during SABER-EMIS data collection (2015), the challenge has been that some schools now exaggerate enrollment numbers in an attempt to reach a higher bracket of TFF funding. For this reason, sound validation processes at the District Education Office (DEO) and the Provincial Education Office (PEO) levels, as well as automated tools to flag potentially inaccurate data, are of critical importance.

UBE and TFF successfully provided more students with access to education; however, the surge in enrollment numbers has put tremendous pressure on the education system as a whole and specifically on the ability of schools to provide quality education. EMIS is not currently equipped to track national quality indicators, but given the challenges in the provision of quality education, greater incentive may exist to position EMIS to integrate learning outcomes data.

**The importance of data utilization is articulated in plans and policies; however, this commitment to data-driven decision making is not as strong in practice.** Decision makers tend to use EMIS for tracking and reporting, but few signs indicate that EMIS is actively being used as a tool for planning. Additionally, EMIS training is demand-driven, and a very limited number of requests have been made in the area of data utilization for planning.

**Processes to share data with other government departments are neither clearly defined nor detailed in policies.** For example, DoE and the Department of Health share data frequently, but no policy is in place to

streamline or even automate these transactions. There is potential here to increase efficiency and drive better utilization of data.

**Currently the government of PNG (GoPNG) does not have a policy that calls for an EMIS budget line; instead the ICT and the Policy, Planning, and Research Division budgets support EMIS staff and resources.** Additionally, most of the financing for EMIS is supported through donor-financed operations supported by the government. This makes strategic planning for EMIS difficult because funding timelines and amounts are inconsistent and unpredictable. Core EMIS staff and seasonal staff are covered under the larger DoE budget, while the ICT budget covers EMIS maintenance, reporting, web-platform updates, and physical infrastructure. Without an explicit EMIS budget, the EMIS Unit lacks the autonomy and planning capabilities to strategically advance EMIS to the next level.

**Additional policy gaps were identified in the area of confidentiality.** Policies do not currently mandate that respondents' data be kept secure, nor do they define processes and procedures to keep data secure. Further, no laws provide a guide to student or parent/guardian rights in accessing student data.

**Policies that guide the flow of information back to schools do not exist.** Feedback loops create an information cycle that brings EMIS analysis back to the school level and can ultimately improve response rates and accuracy of data. Schools are eager to use data but are unable to access it. As a result, many schools use their own internal systems for data processing and utilization.

**At the national level, the EMIS Unit consists of 14 staff members and resides under the Policy, Planning, and Research Division of DoE.** Additionally, the ICT Department, consisting of 10 staff including four database experts, supports the EMIS team. At the national level, the EMIS team has an organizational structure with specific roles, responsibilities, and a structured workflow. Further, work processes are periodically reviewed to maintain and improve efficiency. At the provincial level, skill levels as well as organizational structure and institutional processes vary. The lack of staff to support EMIS poses significant challenges. For example, in some provinces, one person

is assigned to support EMIS; however, he or she also holds another position and responsibilities.

## Policy Area 2: System Soundness

### Emerging ●●○○

PNG's EMIS soundness was assessed in five critical areas: (1) data architecture, (2) data coverage, (3) data analytics, (4) dynamic system, and (5) serviceability.

**The infrastructure supporting EMIS in PNG has improved dramatically over the last decade.** EMIS launched in 2004–2005 using a combination of Microsoft Excel and Access systems. In 2005–2006, DoE identified Oracle as a best-in-class provider and transitioned the entire department to Oracle Application Express, a web-based software development environment that runs on an Oracle database. All data were effectively migrated onto the new system. The department hosts two physical servers (one for redundancy) and two storage devices on site. Each physical server has 27 virtual servers with 6 terabytes of storage. Data center speed is 200 megabits per second (Mbps), with a secondary link on 100 Mbps.

**The continued growth of EMIS data architecture, and functionality in general, is very much dependent on funding.** The EMIS Unit and the ICT Division are strong partners, with the ICT team responding quickly to EMIS Unit requests. The EMIS Unit is adept at running the system with limited resources but could do much more with additional resources and the support of an overarching EMIS Policy with an EMIS budget.

**Budget pressures limit the extent to which the EMIS Unit can engage its external vendor and make necessary upgrades to the Oracle system.** Supporting the EMIS Unit is an external firm, Datec, which was identified through a tender process and due diligence. Datec has been a supportive external firm, with the only limitation being the lack of funding to pursue further EMIS development. Additionally, the EMIS Unit previously used Oracle Discoverer for querying, reporting, data analysis, and web publishing, but Oracle is no longer supporting Discoverer and is in the process of transitioning clients to Business Intelligence (BI). The only challenge with an Oracle system is that it is quite expensive; thus it is critical that the EMIS Unit, the

Policy and Planning Division, and DoE ensure that the necessary financing is in place to maintain the system.

**PNG’s EMIS data are secure. The system utilizes a large database that holds national school census data in addition to other DoE applications such as the TFF application for school subsidies and the quarterly return application for school-level monthly reports of student attendance.** No security violations have occurred in recent years. Oracle tracks audit threats, on-site servers are backed up daily, and an offsite backup takes place weekly.

**PNG is currently piloting a program that provides EMIS access in six provinces (Box 1).** Apart from those provinces, education data are entirely in paper format from schools until they reach DoE at the national level. A good practice in EMIS implementation is the reduction of manual validation and transfer of data by inputting data directly into EMIS through a computer- or tablet-based system as early in the data collection process as possible. The pilot project enables provinces to input data into EMIS, access real-time data from their province, and run their own reports. DoE provides the hardware, software, and training necessary to access and use the system. Provinces use their own budget to cover internet and service provider bills that are roughly K 40,000 (\$14,700) per year. The districts that are most successful with the rollout are those that have at least one dedicated EMIS staff member. For some provinces, provider payments go through DoE, although, as one province found, it is more efficient for the province to pay the fee directly to the provider so as to avoid bottlenecks or run the risk of lapsed payments, which could lead to problems such as power outages.

The continued rollout of this initiative, including dedicated financing to ensure its sustainability and ongoing training for provinces, carries the potential to significantly strengthen EMIS in PNG. Provinces participating in the pilot should also be encouraged to share information with districts and schools and train these local stakeholders on data utilization.

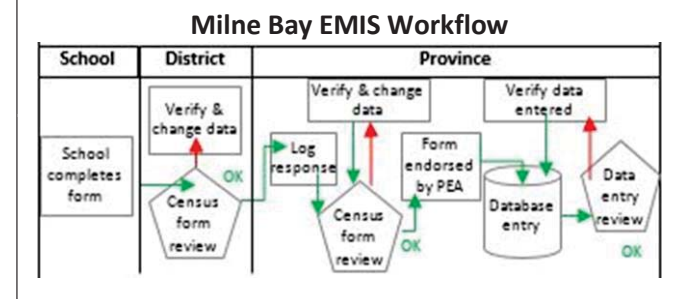
**EMIS is available to the public via the DoE website ([education.gov.pg](http://education.gov.pg)), through the [EducationInfo DevInfo Dashboard](#).** The dashboard is designed to promote fact-based decision making based on reliable data and report education performance to the general

population. The challenge is that with low internet saturation and limited communication materials about the Dashboard, it is not frequently used. Many people cannot access it or are not aware that it exists.

**Box 1: Good Practice in Provincial EMIS Access: The Case of Milne Bay**

One province that has been especially successful with the pilot initiative is Milne Bay, a maritime province consisting of four districts and serving approximately 70,000 students. Part of Milne Bay’s success rests in linking EMIS with provincial strategic planning, which targets three areas: (1) Access, (2) Quality, and (3) Management. Milne Bay also developed both district-level and provincial-level processes (including formal checklists) for census review, validation, protocols for making changes to existing data, and data entry. The result is a 1 percent nonresponse rate for completion of census forms by schools. The province is also eager to test EMIS at the district level by putting computers in district offices with direct access to EMIS.

Milne Bay’s success can also be attributed to the following factors: (1) a dedicated EMIS staff, (2) buy-in from the highest level of the PEO, (3) strategic vision, (4) operational focus on transparency, good governance, utilization, and sustainability, and (5) established data management processes (e.g., validation, revision, entry). EMIS data are regularly communicated to members of the provincial parliament and the provincial assembly, with some decision makers requesting data directly from the provincial EMIS team. EMIS data are currently reporting transitional rates and infrastructure needs to guide planning decisions for construction of new schools and to fill access and quality gaps.





**Data analytics are not automated in the current EMIS; instead, the EMIS Unit extracts data and runs analysis in Oracle Discoverer (soon to be Oracle BI).** That said, descriptive analytics and data tabulations are frequently run. Planning analysis such as projections, predictive models, and scenario analysis is not taking place.

**EMIS data coverage currently includes administrative data as well as some financial and human resources data.** The census collects data from state-run schools and schools managed by church agencies such as the Anglicans, Roman Catholics, Lutherans, and United and Evangelical Alliance. It captures school details (e.g., name, location, registration), enrollment and graduation data, financial data (e.g., sources of funding, bank account information), infrastructure data, teacher information (e.g., registration number, year started, qualification), and additional information such as existence of a Board of Management and information on instructional tools such as textbooks. Extended data on school finances, such as school spending and salary information, are not included. Lack of learning outcomes data creates a significant gap in the extent to which EMIS can inform and support provision of quality education.

**Currently assessment data sit on a Microsoft Access database, effectively siloed from outside data.** In 2004 the Assessment Unit (formerly the Measurement Services Branch) launched FoxPro as the primary data management system. In 2008 an unsuccessful effort was made to integrate Oracle and FoxPro so that assessment data could link with other DoE databases. Dialogue between the Assessment Unit and the EMIS Unit is strongly encouraged as well as efforts to explore integration of data.

**GoPNG uses a number of systems for financial management and payroll; however, they are not integrated with EMIS.** These systems include the Integrated Financial Management System, the payroll management system, and the Provincial Government Accounting System.

**A comprehensive EMIS should include not only administrative data but also financial, human resources, and learning data (Table 3).** This information should be available at both the individual and aggregate level. The type of data entered into the system needs to

follow logic, have fixed methodology, and have a well-defined purpose (Abdul-Hamid 2014). Table 3 compares data coverage best practices with data coverage in PNG.

**Table 3: Data Coverage, Best Practice and PNG**

Type	Best practice	PNG
Admin. data	<ul style="list-style-type: none"> <li>• Demographic</li> <li>• Health</li> <li>• Attendance (enrollment, repeat, dropout, etc.)</li> <li>• School level</li> </ul>	<ul style="list-style-type: none"> <li>• Demographic</li> <li>• Some learning</li> <li>• Some school</li> </ul>
Financial data	<ul style="list-style-type: none"> <li>• Budgets and revenues</li> <li>• Spending</li> <li>• Cash transfers, subsidies</li> <li>• Unit cost per student</li> </ul>	<ul style="list-style-type: none"> <li>• Some budgets and revenues</li> </ul>
Human resources data	<ul style="list-style-type: none"> <li>• General demographics</li> <li>• Salaries</li> <li>• Performance evaluation</li> <li>• Professional development</li> </ul>	<ul style="list-style-type: none"> <li>• Some general demographics</li> </ul>
Learning outcomes data	<ul style="list-style-type: none"> <li>• Classroom assessments</li> <li>• National assessments</li> <li>• International assessments</li> </ul>	

Source: Adapted from Abdul-Hamid 2014.

### Policy Area 3: Quality Data

#### Established ●●●○

The quality of data captured by PNG’s EMIS was assessed in four areas: (1) methodological soundness, (2) accuracy and reliability, (3) integrity, and (4) periodicity and timeliness.

**During the design of the current EMIS, DoE developed an EMIS Operations Manual, complete with metadata, data fields, and indicators that mapped back to NEP 2005–14.** Metadata were defined such that they would integrate with the GoPNG national system, PNGInfo. This level of sophistication gave EMIS a strong foundation for good data. To build upon that foundation, the EMIS Operations Manual should be reviewed and updated and reincorporated into routine use.

**The primary mechanism for EMIS data collection is the national school census, which gained greater response rates after being linked with the TFF education subsidy.** The census collects school details such as

finances, enrollment, progression, repeaters, information on vulnerable children and children with special needs, school infrastructure information, teacher data, and some additional information such as whether there is a Board of Management. With the exception of the provinces participating in the pilot program, all provinces send census data in paper format to the national government to be input into EMIS. Each year, TFF has a National Education Minimum School Fee rate set by the National Education Board. This rate is input into the TFF application, running on the EMIS database, to calculate school subsidies for all schools in PNG. The TFF application uses the rate and final census data—enrollment, school information, school level, school accounts, school locality, school type, and sector—to calculate the amount of subsidy and disburse it directly into school bank accounts.

**DoE publishes an annual education statistics report with a message from the Secretary articulating the intention to use the report as a way to track progress toward NEP 2005–14 and to inform relevant policies and programs.** Data include public and church schools through secondary school as well as technical, vocational, and teacher education and FODE.

**EMIS data are currently released in two primary ways: the EducationInfo Dashboard and the Annual Statistics Book.** Various education stakeholders are made aware of the release of this information through announcements sent by post. Secretary's Circular announcements also share important updates that come directly from the Office of the Secretary. These announcements are usually linked to a formal policy and therefore communicate issues of significance.

**Data are validated at multiple points as they flow from schools to DoE.** School principals complete the National School Census and submit the paper form to the DEO. The DEO is the first line of quality control, validating the data before sending them on to the Provincial Division of Education (PDoE). The PDoE also reviews and validates data and then provides an official endorsement before sending them on to the EMIS Unit at DoE, with the exception of pilot program provinces, which input data directly into the system. Data cannot move on from the PEO without the official endorsement. Standards Officers—DoE staff assigned to district and provincial offices—are the key personnel

responsible for validating, endorsing, and transmitting data.

In 2015 EMIS also started using automated processes to validate data and flag discrepancies. Both manual and automated validation processes are essential and should continue to be strengthened and reinforced. With the linking of census data and the TFF subsidy, some schools have inflated enrollment numbers to receive more money. Validation procedures are also underway to adjust for previously misreported geographical data (Box 2). Sound validation procedures catch these reporting issues early in the data supply chain and prevent much larger quality issues from arising.

#### **Box 2: *Where's my School* Pilot Program**

The EMIS Unit recently launched *Where's my School*, a beta program that uses geographic locations to enable users to view satellite imagery and maps of PNG schools. The *Where's my School* application will eventually alert National/Provincial Education offices and church agencies as well as other stakeholders to the existence and location of schools. This will pave the way for a better understanding of equity in the distribution of education services to schools and students in PNG. Currently the program is slow, and the same internet access limitations apply. Additionally, the quality of data is inconsistent. The strategy to collect geographic data was paired with material distribution to schools. Vendors were given Global Positioning System (GPS) devices and asked to record the location at the point of delivery. Some vendors failed to register, and others recorded inaccurate locations. The GPS was supposed to be automated within the EMIS, but setbacks in data quality have delayed the program. Nonetheless, the program has strong potential, especially as efforts are being made to validate and clean the existing location data. When fully functional, this transparent platform has the potential to contribute to greater accountability across the education system.

**The EMIS Unit does its best to provide professional development on data collection and management at district and provincial levels, although resource constraints exist.** Districts and provincial offices should share relevant training with schools, which would help the EMIS Unit reach its goal of 100 percent coverage for the census; however, training does not reach all levels of the education system. The nonresponse rate for schools is currently 15 percent, mostly from schools in remote regions or those with new and untrained staff. Urban schools, primarily secondary schools, often have their own internal systems for collecting, processing, and using student data that are entirely outside of EMIS.

Australian Department of Foreign Affairs and Trade advisors provide professional development at the national level through continuous on-the-job coaching. Advisors are placed in various government offices and share specialized skills over two-year terms, with options for extension. Apart from advisors, a significant gap is seen in technical training for the EMIS Unit. The upcoming rollout of Oracle BI software is an example of a technical area that could be the focus of a professional development training module.

**At this time, the flow of data is largely unidirectional, from school to the national level, with limited feedback loops.** Feedback loops move the flow of information back to schools to share analysis. This is an EMIS good practice that has the potential to engage schools and increase quality and response rates.

**The EMIS Unit operates with high levels of professionalism and ethical standards.** Staff are encouraged to attend professional conferences. Further, an internal peer review maintains the quality of DoE publications. Access to data is restricted to EMIS staff that require access to perform their duties. For the pilot program, provinces can manipulate only their own data. To ensure that professional conduct continues at the same level, the EMIS Unit may consider establishing a code of professional ethics and ethical standards. Documenting clear guidelines for what constitutes unethical behavior is worthwhile. These formal, approved statements ensure consistent ethical standards during team growth and turnover. Further, approved guidelines and standards on professional

conduct reduce breakdowns in data security and privacy.

**EMIS is linked to the national education plan.** Key indicators are tracked in EMIS, and progression toward the national target as well as time series data are disseminated on the EMIS Dashboard (Table 4).

**Table 4: Framework Indicators by Plan, Compared with National Targets**

Outcome	Indicator	Baseline	Current	Target
A.1.ACCESS: Every six-year-old child enrolled at elementary prep.	Net Admission Rate	11.5	32.9	100
A.2.ACCESS: All children enroll at elementary prep.	Gross Admission Rate	77.1	143.2	100
B.4.RETENTION: A greater number of children completing a full basic education	Gross Completion Rate	45.3	65.0	77
B.5.RETENTION: All children have the opportunity to complete a full quality primary education of nine years to grade 8	Gross Enrollment Rate (Prep. to Grade 8)	69.8	98.3	96
B.6.RETENTION: All children have the opportunity to complete a full nine years of basic education to grade 8	Net Enrollment Rate (Prep. to Grade 8)	53	74.0	85
D.10.MANAGEMENT: Appropriately qualified teachers in all classrooms	% Teachers Primary by Type of Qualifications	57.4		100
D.11.MANAGEMENT: Effective use of resources	Student-Teacher Ratio Primary (Grade 3 to Grade 8)	31.3	35.3	34
D.16.MANAGEMENT: Students taught in a conducive environment	% Permanent Classrooms			100
D.18.MANAGEMENT: Education provided with sufficient funds	Public Expenditure on Education as % of Total Government Expenditure		5.6	-99
E.19.EQUITY: Equal opportunities for both boys and girls	Gender Parity Index	0.8	0.8	100

Source: DoE EducationInfo Dashboard, <http://www.education.gov.pg/Staff/Devinfo%20Dashboard/indicator.html>.

## Policy Area 4: Utilization for Decision Making

### Emerging ●●○○

The utilization of PNG's EMIS was assessed by examining four areas: (1) openness, (2) operational use, (3) accessibility, and (4) effectiveness in disseminating findings.

**A considerable gap is found between national and subnational staff when it comes to awareness and capacity to use EMIS.** Within DoE, top management and, to a lesser degree, middle management staff use EMIS, especially for monitoring and reporting needs. The Policy, Planning, and Research Division, where the EMIS Unit resides, is one of the top users of EMIS data. Outside of DoE, most requests for EMIS data from national government entities come from the National Economic and Fiscal Commission, the National Statistical Office, the Department of National Planning and Monitoring, the National Research Institute, and the Department of Health.

**The EducationInfo Dashboard consists of a homepage, the dashboard, and framework indicators by plan.** The dashboard allows users to search by sector and indicator. Sector includes each education cycle (elementary, primary, basic, secondary, vocational) and education totals. The dashboard is ideal for users who are exploring specific indicators. Users can disaggregate an indicator by gender, district, or province and view trends over the last five years. Indicators are shared through different graphics, usually a PNG map, a trend line, and a bar chart. The dashboard has links where users can download graphics or data, but downloads do not always work. Possibly the largest disadvantage to the dashboard is that users cannot download aggregate data. To download datasets, users must contact the EMIS Unit directly to submit a request.

**The Department of National Planning and Monitoring maintains PNGInfo, which aims to serve as a single point of access for all government data.** Currently requests are made through PNGInfo for EMIS data, but the two databases are not yet fully integrated.

**At the provincial level, school boards use EMIS data, which they may access through the internet or by**

**making a request through the relevant provincial education office.** Provinces that are part of the pilot program are gaining real-time access to EMIS data and have the ability to input, manage, and extract data, although all six pilot provinces are not yet fully utilizing EMIS.

**To announce key EMIS milestones or the annual push of new education data, the EMIS Unit sends an announcement via postal mail to a list of education stakeholders including provincial education heads (with extra copies to be shared with districts), line departments, universities, and libraries.** This communication plays an important role in keeping stakeholders informed and supportive of EMIS developments. Broadening the number of recipients, increasing the frequency of mailings, and adding e-mail communication as well as monthly or quarterly general updates and "How To" guides would help to further engage stakeholders across the country.

**The EMIS Unit has the capacity to interpret, manipulate, and use data on a daily basis; further, the team does its best to share knowledge with colleagues at DoE and at the provincial level.** That said, an influx in funding for capacity-building exercises at all levels of the education system is key to the continued development of EMIS. The EMIS Unit requires access to training on cutting edge programs, such as Oracle BI, as well as other best practices in EMIS. Most of the Unit's training currently comes from independent research. DoE would benefit from targeted training on how to use EMIS for planning.

Efforts to train provinces on EMIS should continue. Designing and delivering EMIS training for both DEOs and schools would engage these critical stakeholders in the EMIS process. Alerting local-level stakeholders to the EMIS vision and roadmap is an important first step. Most schools are not aware of the progress of EMIS and the availability of EMIS data. Most schools do not know that even if they cannot access the dashboard, they can send a request to the EMIS Unit for data. Bringing local stakeholders into the process, keeping them consistently informed, and offering training when possible, even though a "Train the Trainer" network (Box 3), would likely improve overall response rates and data quality.

**Box 3: Train the Trainer Network**

A good practice in EMIS training is the implementation of a “Train the Trainer” network. This is a down-stream network strategy in which central or province-level officers train clusters of local-level officials (district and school staff), who in turn conduct the training with their local-level colleagues. Breakdowns in this strategy occur when trainers move on to other positions, so it is important to identify the right trainers and train a large enough group on a consistent basis. Trainers should be excited about the potential of EMIS and should be committed to working in their current position for the foreseeable future. If possible, providing trainers with a small extra stipend is recommended.

*Source: Authors.*

**The EMIS Unit, with the support of ICT, has a vision for EMIS to be fully integrated with DoE and external government departments and used regularly from the school level to the highest levels of central government decision making.** This vision is a driving force that powers incremental advances in EMIS.

**EMIS is increasingly used by decision makers, evidenced in part by the growing number of requests that the EMIS Unit receives for training on how to use the system.** At the provincial level, and especially among the provinces participating in the EMIS pilot, education stakeholders are increasingly coming to the provincial office to request data to guide decision making. Representatives from Milne Bay remarked that, at times, the governor or members of parliament come to the office to request data.

**Many schools are maintaining their own independent data management processes in addition to delivering on formal data reporting requirements.** This takes place more frequently at secondary schools, especially those with some digital infrastructure (e.g., computers, internet access) and buy-in from the principal. In these schools, an Excel database is often maintained (although paper forms are also frequently used) that tracks key indicators currently not included in the national EMIS. Indicators such as student behavior, teacher absenteeism, and student learning outcomes are captured and tracked (Box 4). Although these data

are outside the scope of the national EMIS, evidence that schools are actively collecting and using these data reveals that in some places school-level capacity around data is quite strong. As PNG’s EMIS progresses, this level of sophistication could be leveraged. For example, when EMIS reaches local schools, schools that have been implementing their own tracking systems will be well positioned to train less advanced schools on utilization techniques.

**Box 4: School Data Utilization: The Case of Jubilee Secondary**

Jubilee Secondary School is a church agency school in the NCD. It receives the TFF subsidy. Jubilee reports the following data:

- National Census to DoE (annually)
- Enrollment and staffing to National Catholic Education Office (monthly and quarterly)
- Assessment data to the Assessment Unit (biquarterly)
- Report cards to parents (quarterly)

To be compliant with the above reporting requirements, while also achieving school-level learning and management outcomes, Jubilee maintains its own database. Teachers collect and track student learning outcomes (e.g., short-term tests, assignments, projects) and behavioral data.

Even more importantly, data are actively used. Students with low grades or behavioral issues receive a series of interventions including meeting with parents and reviews by the Academic Review Committee. This is an example of using data proactively to prevent repetition and dropouts. Administrators also use the database to track teacher absenteeism and teacher in-service training, as well as to manage the budget and plan and track progress toward Jubilee’s School Learning Improvement Plan.

Jubilee Secondary demonstrates an advanced level of data utilization, but it takes place outside of EMIS. Efforts to bring school-level utilization into EMIS should be explored.

**Schools and clients (e.g., parents, communities, and students) are not using EMIS.** Schools are actively reporting data but rarely receiving any feedback. They are unaware of and/or unable to access the EducationInfo Dashboard. PNG's EMIS is used operationally in evaluation and governance and by government (especially central government), but schools and clients mark a gap in operational use (Table 5).

**Table 5: Operational Use, Best Practice, and PNG**

Utilization	Best practice	PNG
In evaluation	<ul style="list-style-type: none"> <li>• School performance</li> <li>• Student performance</li> <li>• Growth reports</li> <li>• Diagnostic reports</li> <li>• Graduation rates</li> <li>• Transition rates</li> <li>• Teacher performance</li> </ul>	<ul style="list-style-type: none"> <li>• Some school performance</li> <li>• Limited student performance</li> <li>• Graduation rates</li> <li>• Transition rates</li> </ul>
In governance	<ul style="list-style-type: none"> <li>• Policy decisions</li> <li>• Accountability</li> <li>• Planning</li> <li>• Management</li> </ul>	<ul style="list-style-type: none"> <li>• Some policy</li> <li>• Limited accountability</li> <li>• Some planning</li> <li>• Limited management</li> </ul>
By schools	<ul style="list-style-type: none"> <li>• Academic performance</li> <li>• Teacher performance</li> <li>• Management</li> <li>• Comparison with other schools</li> </ul>	<ul style="list-style-type: none"> <li>• Limited academic performance</li> </ul>
By clients	<ul style="list-style-type: none"> <li>• Parents access EMIS</li> <li>• Communities access EMIS</li> <li>• Use data to make decisions</li> <li>• Use data to demand quality</li> </ul>	<ul style="list-style-type: none"> <li>• Limited access by clients</li> </ul>
By government	<ul style="list-style-type: none"> <li>• Ratios</li> <li>• Infrastructure capacity</li> <li>• Quality/outcome indicators</li> <li>• Spending efficiency</li> <li>• Teacher salaries</li> <li>• Equality indicators</li> </ul>	<ul style="list-style-type: none"> <li>• Some ratios</li> <li>• Some infrastructure</li> <li>• Some quality/outcome indicators</li> <li>• Equality indicators</li> </ul>

Source: Adapted from Abdul-Hamid 2014.

## Recommendations and Proposed Activities

This section presents a set of recommendations and proposed activities based on the assessment of EMIS in PNG (Table 6). Recommendations and activities aim to improve overall EMIS functionality in a sustainable and effective manner to ensure better access and use of information for decision making, planning, and student learning. The Strengths, Weaknesses, Opportunities, and Threats (SWOT) profile (Figure 5) summarizes key points from the needs assessment and informs recommendations.

Table 6: PNG EMIS Rankings

1. Enabling Environment	<b>Emerging</b> ●●○○
2. System Soundness	<b>Emerging</b> ●●○○
3. Quality Data	<b>Established</b> ●●●○
4. Utilization for Decision Making	<b>Emerging</b> ●●○○

Figure 5: PNG EMIS SWOT Profile

<p><b>Strengths</b></p> <ul style="list-style-type: none"> <li>• Strong desire from decision makers for <i>data-driven decision making</i></li> <li>• Education <i>strategy</i> (NEP 2005–14) lays the foundation for EMIS and links EMIS with national goals</li> <li>• EMIS is <i>established</i> at the central level</li> <li>• Strong data <i>validation procedures</i></li> <li>• Talented <i>human resources</i> at national level, strong EMIS Unit and ICT Department</li> <li>• Sound platform, <i>data architecture</i>, analysis tools</li> <li>• EMIS <i>concepts and definitions</i> follow a functional manual documented and approved by the government</li> <li>• EMIS online dashboard exists and statistics book is <i>published</i> annually</li> </ul>	<p><b>Weaknesses</b></p> <ul style="list-style-type: none"> <li>• Lack of comprehensive EMIS <i>policies</i></li> <li>• Lack of EMIS-specific <i>budget</i></li> <li>• Lack of <i>integration</i> with other databases/information systems (e.g., assessment and finance)</li> <li>• Lack of individual <i>student-level data</i></li> <li>• <i>Manual processing</i> of data in most provinces</li> <li>• <i>Weak internet access</i>, especially in remote areas</li> <li>• Poor accuracy and <i>reporting</i> in remote locations</li> <li>• Lack of regular <i>audits</i></li> <li>• Lack of internet access and limited communication and training prevent most stakeholders outside of the national government from <i>accessing</i> and <i>using</i> the online dashboard</li> <li>• Limited <i>feedback loops</i> for data and information to flow back to schools</li> </ul>
<p><b>Opportunities</b></p> <ul style="list-style-type: none"> <li>• Continued <i>rollout</i> of EMIS digital interface in provinces</li> <li>• Next national education plan to <i>further extend EMIS</i> in PNG</li> <li>• Continued improvements in <i>ICT infrastructure</i> throughout the country and especially in remote locations</li> <li>• EMIS Unit, with ICT Division support, has strong <i>vision</i> for EMIS advancement</li> <li>• Schools are eager to receive data, and many have their own internal <i>data utilization</i> processes, which will make <i>integration</i> with EMIS much smoother</li> </ul>	<p><b>Threats</b></p> <ul style="list-style-type: none"> <li>• Intentional <i>false reporting</i> of data to receive greater subsidy from TFF program</li> <li>• Heavy <i>dependence</i> on donors for funding</li> <li>• Lack of <i>integration</i> of EMIS with other education information systems (e.g., assessment and finance)</li> <li>• Lack of <i>coordination</i> with other government departments</li> <li>• Staff <i>turnover</i></li> <li>• Oracle is <i>expensive</i>, and shifts such as moving from Discoverer to BI are <i>costly</i></li> <li>• Lack of <i>data confidentiality</i> procedures</li> <li>• Not actively reviewing and updating the EMIS operations manual could cause setbacks in <i>methodological soundness</i></li> </ul>

**EMIS in PNG has come a long way, and the basic processes and infrastructure that support collection, management, and dissemination of data are strong.** Establishing sound processes and infrastructure is no small task, and DoE should be commended for the EMIS achievements to date. The following recommendations summarize key improvements that have the potential to continue the exciting growth trajectory of EMIS in PNG.

**The commitment to establishing EMIS and a qualified EMIS Unit would be bolstered by an equal commitment to establish EMIS policies and an EMIS budget.** The biggest obstacle to the enabling environment for EMIS in PNG is the lack of official EMIS policies and a standalone EMIS budget. For EMIS to reach the next level in its development, these gaps must be addressed. Basic policies that mandate EMIS, position the EMIS Unit as the official body responsible for education data, call for an EMIS budget, and set requirements around dissemination and utilization will catapult EMIS forward and ensure institutionalization of the system.

**NEP 2005–14, as well as supporting policies such as the ICT Policy and TFF, catalyzed the development of a much stronger EMIS, supported by a qualified team, good infrastructure, and sound processes.** To continue this momentum, and to support and empower the EMIS Unit in building a long-term and sustainable strategy for EMIS development, the next five-year period should institutionalize EMIS through an overarching EMIS Policy (Box 5).

#### **Box 5: Rationale for a Guiding EMIS Policy**

EMIS policies drive effectiveness and safeguard the system in various ways. Policies that mandate EMIS and EMIS resources establish continuity and sustainability for the system. Further, policies that specify responsibilities and roles for data collection and management prevent interference from external agencies. Similarly, policies that guide processes and procedures for working with other units and other sources of data contribute to improvements in quality, efficiency, and integration. Policies can also help to establish the supply of data into the EMIS by requiring schools to submit data in a timely manner and positioning the EMIS team as the primary data collection authority.

*Source:* Abdul-Hamid 2014.

**An EMIS Policy should define key areas such as an EMIS budget, data collection procedures, data sharing and coordination, integration with external databases, professional development at national and subnational levels, confidentiality, comprehensive and quality data, penalties for false reporting, and utilization of data at all levels of the education system.** Given that the EMIS Unit did not exist at the time that the ICT Policy was drafted, the ICT Policy does not fully support EMIS. The next five-year national education plan will be published in the coming months. The plan will advance EMIS with a new roadmap as well as a log frame that aims to strengthen EMIS indicators and tracking mechanisms. It also provides an opportunity to initiate development of more comprehensive EMIS policies.

**Significant resources have been invested into EMIS processes, structure and software; however, that investment is at risk if it is not supported by regular internal and external audits, coupled with the resources to act on feedback from audits.** Audits are currently taking place on an ad hoc basis, often as a result of available funds. Commitment to and investment in internal and external audits not only protect the larger investment in EMIS, but also defend EMIS when the reliability of data and analysis in the system is questioned

**The unit of measurement in the system should be expanded to the student.** Currently EMIS does not have unique identifiers for students. As a result, it is not capable of linking student performance with teachers. Teacher registration numbers are recorded in the census and could be the basis for a teacher identifier in the future. Course codes are also not included in the system. Student identifiers are generally used in established and advanced systems and enable longitudinal tracking and greater insight into the impact of inputs (e.g., professional development, changes in curriculum, policies, programs) on student learning outcomes. Student identifiers must be designed carefully to ensure privacy and security. This entails a process whereby identifiable data are replaced by nonidentifiable data so as to protect the individual identity of each student. Ultimately, student-level data help answer more detailed policy questions that can inform better decision making (Box 6).



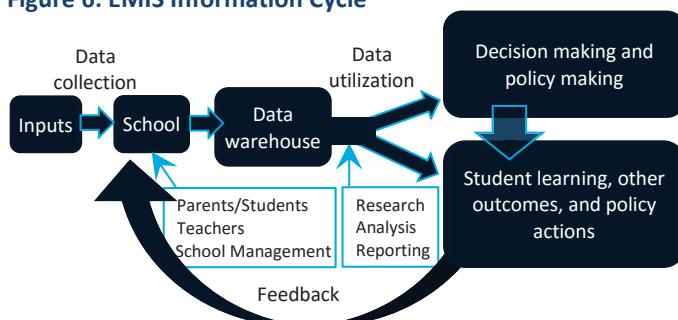
**Box 6: Example of Data Collected by EMIS in Fiji**

EMIS in Fiji (FEMIS) captures individual student data entered at the school level, which contains information such as student identification number, registered birth number, parent details, gender, date of birth, home situation (household income, electricity), school attendance, record of school fees, and financial assistance. In addition, it captures health records of each student, including special needs data. FEMIS also links to the national teacher data system and assessment data system. These links help answer a range of questions, such as: which children with disabilities, in which settings, and under what circumstances, are achieving what educational outcomes? And, which teachers with what qualifications are creating environments that result in good learning outcomes?

Source: Sprunt 2014.

**The unidirectional nature of EMIS in PNG, from schools to DoE, needs to evolve to include feedback loops that carry information back to the local level.** Although a good first step is to establish a strong flow of data from schools to provinces and finally to the national level, with validation procedures at each stage, it is critical for EMIS to institute feedback loops that carry information back down the chain to the local level (Figure 6). Although data are available online, limited internet access prevents school officials, local authorities, and communities from accessing data. Feedback loops increase utilization of data at the local level and improve the frequency and accuracy of source data. Brochures, pamphlets, or briefs that share simple information, both national analysis as well as relevant local data, and promote the online dashboard would have long-term benefits for EMIS and the education system.

**Figure 6: EMIS Information Cycle**



Source: Abdul-Hamid 2014.

**To be fully operational in decision making and planning as well as teaching and learning, PNG EMIS will need to strengthen integration capabilities, both at a technical level as well as through stakeholder dialogue and consensus building.** Dialogue with other units, especially the Assessment Unit, will lay the groundwork for integration. One approach in collaborating with different units or departments is to conduct a workshop designed to identify the key questions that each party needs the data to answer to effectively achieve goals and monitor outcomes. Once questions are identified, the group works backwards to ensure that the system is able to capture the necessary data to answer these questions.

**Investments should be made in capacity building at all levels.** A common threat to the progression of an EMIS is that funding goes toward infrastructure but does not go into training. Education stakeholders at all levels of the system should be trained. This includes engaging local-level staff, especially school principals and teachers, as well as training national government decision makers on how to use EMIS for planning. The EMIS Unit also requires continuous training to stay up to date with relevant tools and techniques.

**PNG EMIS would gain momentum and strength by developing a communications strategy to share the vision, key activities, and engagement opportunities with education stakeholders across the country.** Schools and districts should receive targeted communication materials so that they gain an understanding of the national strategy around education data and PNG’s EMIS. Schools are a critical part of this strategy because they are the source of data. Bringing them into the process and recognizing their important role through simple communication materials has the potential to build excitement around education data and encourage increased participation.

**User feedback should be collected to inform future improvements to the EducationInfo Dashboard.** The dashboard is a critical point of dissemination, but like any online interface, it should continue to evolve based on user feedback and the evolving indicators and outcomes set by the education system. When possible, conducting focus groups and user testing of the site could provide information on how to improve the user experience.

## Acknowledgments

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## Acronyms

BI	Business Intelligence (Oracle)
DEO	District Education Office
DoE	Department of Education
EMIS	Education Management Information System
FEMIS	EMIS in Fiji
FODE	Flexible, Open, and Distance Education
GPS	Global Positioning System
GoPNG	Government of Papua New Guinea
ICT	Information and Communication Technologies

NCD	National Capital District
NEP	National Plan for Education
PaBER	Pacific Benchmarking for Education Results
PDoE	Provincial Division of Education
PEO	Provincial Education Office
PNG	Papua New Guinea
SABER	Systems Approach for Better Education Results
SWOT	Strengths, Weaknesses, Opportunities, and Threats
TFF	Tuition Fee Free
UBE	Universal Basic Education

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<sup>1</sup> PaBER is funded by the Australian government and is coordinated through the Educational Quality and Assessment Programme (formerly the South Pacific Board for Educational Assessment).

## Appendix A: Summary of Policy Lever Benchmarking

Policy area	Policy lever	Score <sup>a</sup>	Weight	Benchmark
Enabling environment	Legal framework	1.45	15%	Emerging
	Organizational structure and institutionalized processes	2.67	15%	Established
	Human resources	2.53	15%	Established
	Infrastructural capacity	2.42	15%	Established
	Budget	2.67	15%	Established
	Data-driven culture	2.29	10%	Established
System soundness	Data architecture	2.86	20%	Established
	Data coverage	1.34	30%	Emerging
	Data analytics	1.33	15%	Emerging
	Dynamic system	1.87	15%	Emerging
	Serviceability	2.23	20%	Established
	Methodological soundness	3.12	25%	Advanced
Quality data	Accuracy and reliability	2.59	25%	Established
	Integrity	1.02	25%	Emerging
	Periodicity and timeliness	1.67	25%	Emerging
	Openness	1.22	15%	Emerging
Utilization in decision making	Operational use	1.04	50%	Emerging
	Accessibility	1.94	20%	Emerging
	Effectiveness in disseminating findings	1.40	15%	Emerging

a. 0–0.99 = Latent; 1–1.9 = Emerging; 2–2.9 = Established; 3–4 = Advanced.

**Appendix B: Extended Rubric, PNG Scores Highlighted in Red**

Policy levers	Indicators	Description of best practices	Scoring				
			Latent	Emerging	Established	Advanced	
<b>1.1</b>	<b>Legal framework</b>	<p>Institutionalization of system: EMIS is institutionalized as an integral part of the education system and the government</p> <p>Responsibility: responsibility for collecting, processing, and disseminating education statistics is given to a clearly designated institution or agency</p> <p>Dynamic framework: the legal framework is dynamic and elastic so that it can adapt to advancements in technology</p> <p>Data supply: the legal framework mandates that schools participate in EMIS by providing education data</p> <p>Comprehensive, quality data: the requirement for comprehensive, quality data is clearly specified in the EMIS legal framework</p>	<p>The system lacks major components of a comprehensive enabling environment</p>	<p>The system contains basic components of a comprehensive enabling environment</p>	<p>The system contains most components of a comprehensive enabling environment</p>	<p>The system contains crucial components of a comprehensive enabling environment</p>	
			<p>The system contains crucial components of a comprehensive enabling environment, which addresses related policy elements and enables the functioning of an effective and dynamic system</p>	<p>An existing legal framework supports a fully functioning EMIS</p>	<p>Basic components of a legal framework or informal mechanisms are in place</p>	<p>Most elements of a legal framework are in place</p>	<p>There is an existing legal framework to support a fully functioning EMIS</p>
			<p>The system contains crucial components of a comprehensive enabling environment, which addresses related policy elements and enables the functioning of an effective and dynamic system</p>	<p>An existing legal framework supports a fully functioning EMIS</p>	<p>Basic components of a legal framework or informal mechanisms are in place</p>	<p>Most elements of a legal framework are in place</p>	<p>There is an existing legal framework to support a fully functioning EMIS</p>
			<p>The system contains crucial components of a comprehensive enabling environment, which addresses related policy elements and enables the functioning of an effective and dynamic system</p>	<p>An existing legal framework supports a fully functioning EMIS</p>	<p>Basic components of a legal framework or informal mechanisms are in place</p>	<p>Most elements of a legal framework are in place</p>	<p>There is an existing legal framework to support a fully functioning EMIS</p>

Policy levers	Indicators	Description of best practices	Scoring			
			Latent	Emerging	Established	Advanced
	<p>Data sharing and coordination: the legal framework allows for adequate data sharing and coordination between the Ministry of Education and agencies and/or institutions that require education data</p> <p>Utilization: the legal framework emphasizes data-driven education policy</p> <p>Budget: the education system budget includes a line item for EMIS</p> <p>Confidentiality: the legal framework guarantees that respondents' data are confidential and used for the sole purpose of statistics</p>					
<b>1.2</b>	<p>Organizational structure and institutionalized processes</p>	<p>The system is institutionalized within the government, has well-defined organizational processes, and has several functionalities beyond statistical reporting</p> <p>Qualified staff operate the system, and opportunities are available to improve their performance and retention</p>	<p>The system is not specified in policies, and what exists does not have well-defined organizational processes; EMIS has limited functionalities</p>	<p>The institutional structure of the system is not clearly specified in policies, it has some organizational processes, and its functionalities are limited</p>	<p>The institutional structure of the system is defined within the government, and it has defined organizational processes, but its functionalities are limited</p>	<p>The system is institutionalized within the government, has well-defined organizational processes, and has several functionalities beyond statistical reporting</p>
<b>1.3</b>	<p>Human resources</p> <p>Personnel: the core tasks of EMIS are identified, and EMIS is staffed with qualified people</p>	<p>Qualified staff operate the system, and opportunities are available to improve their performance and retention</p>	<p>Minimum standards of qualification are not met for the majority of staff that operate the system and opportunities are not available to</p>	<p>Some staff are qualified to operate the system, and limited opportunities are available to improve staff performance</p>	<p>The majority of staff are qualified to operate the system, and frequent opportunities are available to improve staff performance</p>	<p>All staff are qualified to operate the system, and well-established opportunities are constantly available to improve staff performance and</p>

Policy levers		Indicators	Description of best practices	Scoring			
				Latent	Emerging	Established	Advanced
		Professional development: professional training is available for EMIS staff		improve their performance and retention	and retention	and retention	retention
1.4	<b>Infrastructural capacity</b>	Data collection: tools for data collection are available	The system has a well-defined infrastructure to perform data collection, management, and dissemination functions in an integral manner	The system lacks a well-defined infrastructure	The system has a basic or incomplete infrastructure	The system has an infrastructure that allows it to perform some of its functions in an integral manner	The system has a well-defined infrastructure to fully perform its data collection, management, and dissemination functions in an integral manner
		Database(s): databases exist under the umbrella of the data warehouse and have both hardware and software means					
		Data management system: a system is in place that manages data collection, processing, and reporting					
		Data dissemination: data dissemination tools are available and maintained by the agency producing education statistics					
1.5	<b>Budget</b>	Personnel and professional development: the EMIS budget contains a specific budget for EMIS personnel and their professional development	The system budget is comprehensive, ensuring that the system is sustainable and efficient	The system suffers from serious budgetary issues	The system has a basic or incomplete budget	The system budget contains the majority of required categories to ensure that most parts of the system are sustainable and efficient	The system budget is comprehensive, ensuring that the system is sustainable and efficient
		Maintenance: the EMIS budget contains a specific budget for system maintenance and recurrent costs					
		Reporting: the EMIS budget contains a specific budget for reporting costs					
		Physical infrastructure: the EMIS budget contains a specific budget for physical infrastructure costs					
		Efficient use of resources: processes and procedures are in place to ensure that resources are used efficiently					

Policy levers		Indicators	Description of best practices	Scoring			
				Latent	Emerging	Established	Advanced
	<b>Data-driven Culture</b>	Data-driven culture	A data-driven culture prioritizes data as a fundamental element of operations and decision making, both inside and outside of the education system	The system suffers because there is not a data-driven culture that prioritizes data management and data utilization in decision making	The system has a data-driven culture that demonstrates a basic appreciation of data and interest in developing better data utilization practices	A data-driven culture exists that prioritizes data management and utilization within and beyond the education system	A data-driven culture exists that prioritizes data management and utilization within and beyond the education system, and evidence of that culture is present in daily interaction and decision making at all levels
<b>POLICY AREA 2: SYSTEM SOUNDNESS</b>			<b>The processes and structure of EMIS are sound and support the components of an integrated system</b>	<b>The system lacks processes and structure</b>	<b>The system has basic processes and a structure that do not support the components of an integrated system</b>	<b>The system has some processes and a structure, but they do not fully support the components of an integrated system</b>	<b>The processes and structure of the system are sound and support the components of an integrated system</b>
<b>2.1</b>	<b>Data architecture</b>	Data architecture	The data architecture is well defined to ensure full system functionality	The system's data structure does not have a well-defined data architecture	The system's data architecture includes some components; however, it is incomplete	The system's data structure has most elements of the data architecture; however, it has some deficiencies that affect the system's functionality	The data architecture is well defined to ensure full system functionality
<b>2.2</b>	<b>Data coverage</b>	Administrative data: EMIS contains administrative data Financial data: EMIS contains financial data Human resources data: EMIS contains human resources data Learning outcomes data: EMIS contains learning outcomes data	The data in the system are comprehensive and cover administrative, financial, human resources, and learning outcomes data	The data in the system are far from being comprehensive, and coverage is limited	The data in the system include some of the data areas	The data in the system include most but not all of the data areas	The data in the system are comprehensive and cover all data areas

Policy levers	Indicators	Description of best practices	Scoring			
			Latent	Emerging	Established	Advanced
2.3 Data analytics	Data analytics	Tools and processes are available to perform data analytics at different levels on a regular basis	Tools and processes are used to perform limited tabulations	Basic tools and processes are available, but the system is not capable of conducting advanced analytical steps (e.g., predictive models, projections)	Tools and processes are available; however, data analytics are not performed regularly	Tools and processes are available to perform data analytics at different levels on a regular basis
2.4 Dynamic system	Quality assurance measures: the system is dynamic and maintains quality assurance measures	The system in place is elastic and easily adaptable to allow for changes /advancements in data needs	The system in place is not easily adaptable to changes /advancements in data needs, as no quality assurance standards are used	The system in place is not easily adaptable and requires significant time and resources to accommodate changes and/or advancements	The system in place is easily adaptable, but it remains reasonably complex	The system in place is elastic and easily adaptable to allow for changes/advancements in data needs
	Data requirements and considerations: mechanisms exist for addressing new and emerging data requirements System adaptability: EMIS is elastic and easily adaptable to allow for changes and/or advancements in data needs					
2.5 Serviceability	Validity across data sources: information brought together from different data and/or statistical frameworks in EMIS is placed within the data warehouse using structural and consistency measures	Services provided by the system are valid across data sources, integrate noneducation databases into EMIS, and archive data at the service of EMIS clients by ensuring the relevance, consistency, usefulness, and timeliness of its statistics	Serious issues exist related to data validity and consistency	Inconsistencies exist related to data validity and consistency	The data are consistent and valid; however, some concerns still exist	Services provided by the system are valid across data sources, integrate noneducation databases into EMIS, and archive data at the service of EMIS clients by ensuring the relevance, consistency, usefulness, and timeliness of its statistics
	Archiving data: multiple years of data are archived, including source data, metadata, and statistical results Services to EMIS clients: services provided by the system to EMIS clients include ensuring the relevance, consistency, usefulness, and timeliness of its statistics					



Policy levers	Indicators	Description of best practices	Scoring			
			Latent	Emerging	Established	Advanced
<b>POLICY AREA 3: QUALITY DATA</b>						
<b>3.1</b>	<b>Methodological soundness</b>	<p>Concepts and definitions: data fields, records, concepts, indicators, and metadata are defined and documented in official operations manuals along with other national datasets and endorsed by the government</p> <p>Classification: defined education system classifications are based on technical guidelines and manuals</p> <p>Scope: the scope of education statistics is broader than and not limited to a small number of indicators (e.g., measurements of enrollment, class size, and completion)</p> <p>Basis for recording: data-recording systems follow internationally accepted standards, guidelines, and good practices</p>	<p>The system lacks mechanisms to collect, save, or produce timely, high-quality information for decision making</p>	<p>The system has basic mechanisms to collect, save, and produce timely, quality information; however, its accuracy might be questionable</p>	<p>The system has most mechanisms in place needed to collect, save, and produce timely, high-quality information for use in decision making; however, some additional measures are needed to ensure accuracy, security, and/ or timely information that can be used for decision making</p>	<p>The system has the required mechanisms in place to collect, save, produce, and utilize information, which ensures accuracy, security, and timely, high-quality information for use in decision making</p>
			<p>The methodological basis for producing educational statistics does not follow internationally accepted standards, or good practices</p>	<p>The methodological basis for producing educational statistics follows the basics of internationally accepted standards, and good practices</p>	<p>The methodological basis for producing educational statistics follows most required internationally accepted standards, guidelines, and good practices</p>	<p>The methodological basis for producing educational statistics from raw data follows internationally accepted standards, guidelines, and good practices</p>
			<p>Source data and statistical techniques lack soundness and</p>	<p>Source data and statistical techniques have</p>	<p>Source data and statistical techniques follow most required</p>	<p>Source data and statistical techniques are sound and reliable,</p>
<b>3.2</b>	<b>Accuracy and reliability</b>	<p>Source data and statistical techniques are sound and</p>	<p>Source data and statistical techniques are sound and</p>	<p>Source data and statistical techniques have</p>	<p>Source data and statistical techniques follow most required</p>	<p>Source data and statistical techniques are sound and reliable,</p>

Policy levers		Indicators	Description of best practices	Scoring			
				Latent	Emerging	Established	Advanced
		Validation of source data: source data are consistent with the definition, scope, and classification as well as time of recording, reference periods, and valuation of education statistics Statistical techniques: statistical techniques are used to calculate accurate rates and derived indicators	reliable, and statistical outputs sufficiently portray reality	reliability	basic soundness and reliability, but statistical outputs do not portray reality	elements to be sound and reliable, but statistical outputs do not portray reality	and statistical outputs sufficiently portray reality
		Professionalism: EMIS staff exercise their profession with technical independence and without outside interference that could result in the violation of the public trust in EMIS statistics and EMIS itself Transparency: statistical policies and practices are transparent Ethical standards: policies and practices in education statistics are guided by ethical standards	Education statistics contained within the system are guided by principles of integrity	Education statistics contained within the system are not guided by principles of integrity	Education statistics contained within the system are guided by limited principles of integrity (one of the three principles of professionalism, transparency, and ethical standards)	Education statistics contained within the system are mostly guided by principles of integrity (two of the three principles of professionalism, transparency, and ethical standards)	Education statistics contained within the system are guided by all three principles of integrity: professionalism, transparency, and ethical standards
		Periodicity: the production of reports and other outputs from the data warehouse occur in accordance with cycles in the education system Timeliness: final statistics and financial statistics are both disseminated in a timely manner	The system produces data and statistics periodically in a timely manner	The system produces data and statistics neither periodically nor in a timely manner	The system produces some data and statistics periodically and in a timely manner	The system produces most data and statistics periodically and in a timely manner	The system produces all data and statistics periodically and in a timely manner
		<b>3.3 Integrity</b>					
		<b>3.4 Periodicity and timeliness</b>					
		<b>POLICY AREA 4: UTILIZATION FOR DECISION MAKING</b>					
		EMIS stakeholders: EMIS primary stakeholders are identified and use the system in accordance with the legal framework	The system is open to education stakeholders in terms of their awareness	The system lacks openness to education stakeholders in terms of their awareness	The system is open to some education stakeholders in terms of their	The system is open to the majority of education stakeholders in terms	The system is open to all education stakeholders in terms of their awareness and
		<b>4.1 Openness</b>					

Policy levers	Indicators	Description of best practices	Scoring			
			Latent	Emerging	Established	Advanced
4.2 Operational use	<p>User awareness: current and potential EMIS users are aware of EMIS and its outputs</p> <p>User capacity: EMIS users have the skills to interpret, manipulate, and utilize the data produced by the system to ultimately disseminate findings</p> <p>Utilization in evaluation: data produced by EMIS are used to assess the education system</p> <p>Utilization in governance: data produced by EMIS are used for governance purposes</p> <p>Utilization by schools: data produced by EMIS are used by schools</p> <p>Utilization by clients: data produced by EMIS are used by clients (including parents, communities, and other actors)</p> <p>Utilization by government: the system is able to produce summative indicators (derived variables) to monitor education system</p>	and capacity to utilize the system	of their awareness and capacity to utilize the system	awareness and capacity to utilize the system	of their awareness and capacity to utilize the system	capacity to utilize the system
	<p>Data produced by the system are used in practice by the main education stakeholders</p>	Data produced by the system are not used in practice by education stakeholders	Data produced by the system are used in practice by some education stakeholders	Data produced by the system are used in practice by the majority of education stakeholders	Data produced by the system are used in practice by the main education stakeholders	
4.3 Accessibility	<p>Understandable data: data are presented in an easily digestible manner</p> <p>Widely disseminated data: education statistics are disseminated beyond the Ministry of Education and/or the education statistics-producing agency to other EMIS stakeholders</p> <p>Platforms for utilization: platforms are standardized across EMIS and are customizable to user needs</p> <p>User support: assistance is provided to EMIS users upon request to help them access the data</p>	<p>Education statistics are presented in an understandable manner and are widely disseminated using clear platforms for utilization, complemented by user support</p>	<p>The system suffers from serious accessibility issues</p>	<p>The system has major accessibility issues</p>	<p>The system has minor accessibility issues</p>	<p>Education statistics are presented in an understandable manner and are widely disseminated using a clear platform for utilization, complemented by user support</p>

Policy levers		Indicators	Description of best practices	Scoring			
				Latent	Emerging	Established	Advanced
4.4	Effectiveness in disseminating findings	<p>Dissemination strategy: national governments have an information dissemination strategy in place</p> <p>Dissemination effectiveness: dissemination of EMIS statistics is effective</p>	Dissemination of education statistics via EMIS is strategic and effective	Dissemination is neither strategic nor effective	Dissemination is reasonably strategic, but ineffective	A dissemination plan has been implemented; however, room exists for improvement (for full effectiveness in relation to strategic engagement)	The dissemination of education statistics via EMIS is strategic and effective

The **Systems Approach for Better Education Results (SABER)** initiative collects data on the policies and institutions of education systems around the world and benchmarks them against practices associated with student learning. SABER aims to give all parties with a stake in educational results—from students, administrators, teachers, and parents to policy makers and business people—an accessible, detailed, objective snapshot of how well the policies of their country's education system are oriented toward ensuring that all children and youth learn.

This report focuses specifically on policies in the area of **Education Management Information Systems**.

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