



Special Series on

Using National Education Management Information Systems to Make Local Service Improvements: The Case of Pakistan

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Education management information systems (EMISs), usually located within the ministry of education, are tools that can help governments improve education system administration by providing information that can be used in strategic planning, resource allocation, and monitoring and evaluation. Frequently, however, they are underutilized and become merely a reporting mechanism. Using the data at the point of collection—usually individual schools in a decentralized environment—and feeding them into service improvement action plans can circumvent problems with the national EMIS, and allow the data to become instrumental in improving local education service delivery outcomes.

The Advent of Education Management Information Systems

Health and education expenditures in most countries across the world usually account for 15–35 percent of the national budget. In many countries, part of this money is also spent on establishing and maintaining a health and education management information systems (HMIS/EMIS) that collect and store important output and outcome data to assist with sector policy, management, and evaluation. In the 1980s and 1990s, several events helped highlight the role and potential of EMISs, which then began attracting the attention of governments around the world: the shift in education goals, from access to the quality and performance of individual schools; the availability of low-cost computers, easy-to-use databases, and statistical analysis software; and the decentralization of education provision (Cassidy 2005; Powell and Trucano 2006).

Donors and United Nations agencies such as the World Bank, the United Nations Educational, Scientific, and Cultural Organization (UNESCO), the United Nations Children’s Fund (UNICEF), and the United States Agency for International Development (USAID) also began to focus on EMISs. For example, from 1998 to 2011, World Bank education projects with an EMIS component were implemented in 82 countries around the world, in countries as diverse as Afghanistan, Armenia, Côte d’Ivoire, Djibouti, Iraq, Kenya, Kosovo, the Lao People’s Democratic Republic, Latvia, Lesotho, Mozambique, Nigeria, Panama, Vietnam, the Republic of Yemen, and Zambia. Adoption of the Millennium Development Goals by the United Nations in September 2003¹ motivated countries and governments to improve their performance and accountability on education service delivery. In early 2011, the Bank also launched the Systems Approach to Better Education Results (SABER), which incorporated the EMIS as one of its policy

domains, focusing on the quality of education data and the degree to which resulting information is used in policy planning and dialogue.

In parallel, initial costs of establishing an EMIS have declined with the development of systems such as OpenEMIS, which provides generic and open source EMIS.² Launched by UNESCO, it is a tool designed to be quickly and easily adapted to the needs of information producers and users at national and subnational levels. It also provides seamless integration with DevInfo, the database system endorsed by the United Nations for tracking country progress toward reaching the Millennium Development Goals and other national priorities.

The wealth of existing literature on EMISs focuses on its purpose; management and operation; information and communication technology (ICT) requirements; data collection analysis and verification; and dissemination of its outputs and utilization. The literature also highlights lessons and challenges regarding EMISs that are particularly relevant for developing countries:

- The need to build capacity and generate demand for EMIS data so that they are used in policy making.
- Poor data quality and limited data verification decrease the demand for data.
- Provision of timely information is not easy; there are substantial lags between initial data collection activities and the publication of final results.
- Substantial donor and sustained high-level support/political will are essential.
- A top-down EMIS approach, with national ministries specifying their information requirements, is not sufficient.

The above challenges are also relevant to Pakistan, which established a national EMIS (NEMIS) in 1993 to collect, maintain, and disseminate data to support policy making, planning, and management at each level of government. There are extensive challenges with Pakistan's system. Zaidi (2003) refers to a series of problems with the EMIS at the district (lack of funding, shortage of human capacity, absence of EMIS vision, and organizational issues), provincial (delays in district data submission, data entry problems, and resource constraints), and federal levels (lack of authority, leadership, and financial and human resources). A more recent assessment of the EMIS at the federal, provincial, and district levels in 2008 and 2011 shows that the challenges identified by Zaidi still exist (Government of Pakistan 2011).

This note argues that using EMIS data directly at the source, by schools and local government in a decentralized setting, can help bypass problems with the national system, create the right incentives for improving data quality, and improve education indicators due to informed decision

making. Some districts in Pakistan began following this path, but these efforts were undone when the Local Government Ordinance (LGO) of 2001, which created and gave decision-making autonomy to local governments, lapsed and was discontinued after 2010. Piloted in the Khyber Pakhtunkhwa (KP) province and expanded successfully to Punjab and Sindh provinces,³ 44 districts and approximately 921 schools used the EMIS. Pakistan's experience provides lessons that can be relevant for other countries.

The next section outlines Pakistan's NEMIS and its data collection process. A brief description of the local government context follows, including local authority under decentralization and challenges in the education system. Pakistan's success in using its EMIS to improve education indicators is then highlighted, including the steps followed by district governments in developing and using the performance management tool (PMT) for education, which incorporated EMIS data. The final section discusses the results of the PMT for education, factors for success, and the potential for replication.

Pakistan's Education Management Information System

Pakistan's NEMIS is based within the Academy of Education Planning and Management (AEPAM), an autonomous organization within the federal Ministry of Education. AEPAM produces an annual report that summarizes education information for the entire country, based on data collected from the four provincial EMISs—each having its own questionnaire and organizational structure, as well as data from the Federally Administered Tribal Areas, Islamabad Capital Territory, Azad Jammu and Kashmir and Gilgit Baltistan. The NEMIS also provides advisory services to provincial EMISs, but has no formal authority over their management and functioning. District EMIS cells are responsible for the collection and transmission of data to provincial units/wings, but ultimate responsibility for filling out the questionnaire (often referred to as an annual school census form) rests with the principal and head teacher of each school.

Figure 1 shows the flow of EMIS data from the principal and teachers of each school to the NEMIS. The data flow is often complicated by the following factors:

- Use of existing administrative records from individual schools, some of which are not regularly updated.
- Limited data verification at each level.
- Spotty or nonuniform consolidation and data entry of all school forms at the district EMIS cell.
- Irregular verification of district data during consolidation and entry into provincial databases.

- Limited meta data or reconciliation of data fields in the NEMIS, because each province has a different EMIS questionnaire.
- Lack of understanding of the value of available information.
- Inadequate capacity to use EMIS data; when used, decisions are focused primarily on facility construction/expansion and textbook provision.

A final challenge has been the large time lag between annual data collection and the printing and distribution of the statistical reports from the NEMIS. In the first few years after the start of the NEMIS, there was a time lag of 26–30 months from the end of data collection to the publication of results. In the early 2000s, this time lag dropped to 18 months and was gradually reduced even further; the most recent *Pakistan Education Statistics Report* was published in 2013 and includes information for 2011–12.

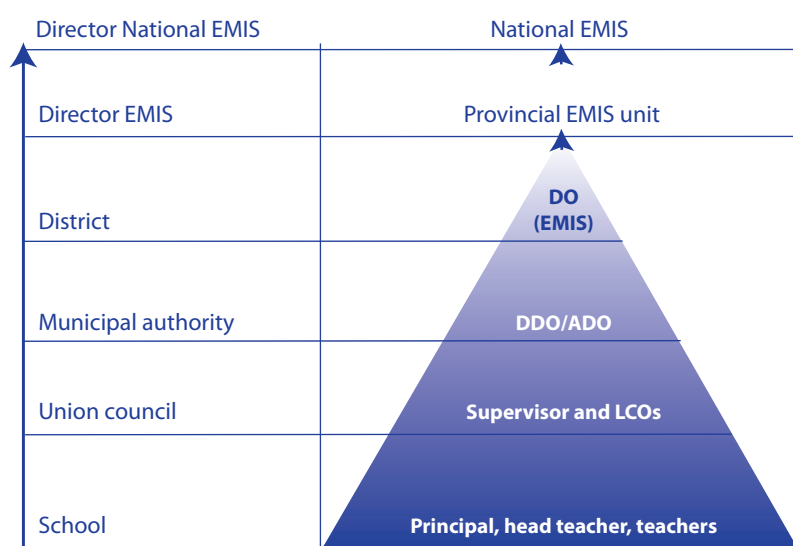
Even though each province has its own EMIS questionnaire, similar information is collected in all four. For example, EMIS indicators reported on in all provinces include: the school building and its condition; enrollment; repeaters (by grade and subject); number of students permanently absent; number of teachers in the school (as well as their qualifications); results of board exams; facilities available in the school; the school management committee or parent-teacher councils; provision of free text books; planned construction; and stipends for girls.

Local Government Context and Authority under Decentralization

The PMT for education was conceived and implemented when a local government system was still operational in Pakistan. Under that system, districts had some autonomy and authority, as specified under the LGO 2001, the brainchild of then President Pervez Musharraf.⁵ One of the first acts of Musharraf after the October 1999 coup, which removed the government of Nawaz Sharif, was the announcement of a “seven-point agenda” for reform that included a devolution plan to be initiated with a series of local government elections. The elections were held between December 2000 and September 2001 and resulted in approximately 200,000 new officials. Other elements of the devolution plan included autonomy of district departments and checks and balances through such monitoring mechanisms as school management committees, parent-teacher associations, and citizen community boards.

Figure 2 illustrates the administrative structure of the districts and district officials involved in educational service delivery between December 2000 and September 2010 in Pakistan. Below the district mayor and district coordination officer there were 10 departments, one of which was education. Each of the 10 departments, including education, was headed by an executive district officer (EDO).⁶ While the federal Ministry of Education maintained overall responsibility for education policy, planning and curriculum development, service delivery was devolved to the provinces and districts. Provincial departments of education coordinated and supported education at the district level and were headed by the provincial minister of education. At the district level, the EDO for education had substantial authority.

Figure 1. Flow of EMIS Data in Pakistan



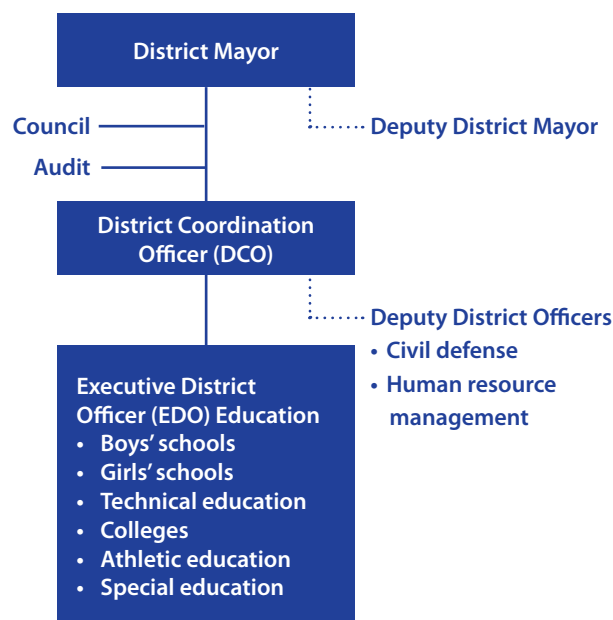
Source: Zaidi 2003.

Note: District officer (DO); deputy district officer (DDO); assistant district officer (ADO); local circle offices (LCOs). LCOs are local teachers resource centers, providing opportunities for in-service training for teachers.

Challenges in Education Service Delivery

Under the 2001 LGO, districts were responsible for all primary (grades 1–5), secondary (grades 6–10) and higher secondary (grades 11–12) education, and could recruit both primary and secondary school teachers up to basic pay scale (BPS) 16.⁷ Authority over hiring, firing, and transfers for BPS 17 and above remained with the provincial government. Funding for education came from the national, provincial and district governments, but most of the expenditures were for salaries—sometimes as much as 95 to 97 percent; leaving very little for other

Figure 2. Administrative Structure of Districts for Education Service Delivery



Source: Nayyar-Stone et al. 2006.

Note: Dotted line denotes direct subordination.

expenses. The result was inadequate school repair and maintenance as well as inadequate furniture, equipment, electricity, boundary walls, and sometimes even drinking water for the students.

Public schools had high drop-out rates, with varying policies aimed at keeping students in school. For example, in Thatta district (Sindh province), only 50 percent of the students who entered first grade moved onto second grade. In Punjab, there was a 40–50 percent drop-out rate between primary and secondary school. In response, KP province adopted a policy of not failing any female students in primary school. In Punjab, some districts had a policy of not failing any students in grades 1–3; and in both KP and Punjab provinces, schools held a “0 period,” where teachers came in early to tutor poorly performing students. Many districts also faced other serious problems, including poor school infrastructure, teacher absenteeism, and unfilled teacher vacancies. In addition, poorly targeted or limited teacher training exacerbated the existing problems in the education sector. Although the LGO permitted district governments to pay monetary incentives and bonuses to staff for good performance, such awards were rare due to limited financial resources.

Within this context, several education sector reforms, both federal and donor funded, were initiated in Pakistan during President Musharraf’s administration.

Federally funded reforms included:

- Free text books for female students up to grade 10.

- Free cooking oil to families as an incentive to enroll girls in school.
- A monthly stipend for female students, Rs 100 per month in KP for primary education, and Rs 200 per month in Punjab for female students in secondary schools (grades 6–8) in 16 districts.
- Local financing under Khushal Pakistan Programs I and II (KPP-I and KPP-II). Under KPP-I, each member of the National Assembly (lower house) and the Senate (upper house) was allocated approximately US\$80,000 each year to carry out minor development projects in his or her constituencies. KPP-I covered multiple sectors such as health, education, sanitation, roads, electrification of villages, gas, and telephone service. KPP-II (also called the Roshan Pakistan Program) was managed by the Prime Minister’s Secretariat in Islamabad and included development work under the prime minister’s directive. Donor-funded reforms:⁸
- Focused mostly on primary education, by decreasing the number of vacant posts in primary education as well as teacher absenteeism.
- Worked on building the skills and capacity of teachers (Asian Development Bank [ADB], Decentralized Elementary Education Project; USAID, Education Sector Reform Assistance; Aga Khan, Canadian International Development Agency [CIDA], and the United Kingdom’s Department for International Development [DfID]).
- Provided performance-based grants for education (World Bank, Education Sector Reform Program).
- Helped form district education management teams (DEMTs), high-level management coordination and decision-making bodies to help smooth implementation of education activities in the targeted districts (USAID, Districts That Work [DTW] project).
- Provided training on EMIS to improve data quality, initiate evidence-based management and decision making, and enhance data analysis and interpretation (USAID, DTW).

Use of EMIS to Improve Education Indicators

The PMT for education was developed after the KP’s provincial education department asked USAID’s DTW for assistance in strengthening its existing EMIS. In response, during a two-day workshop (in December 2008), representatives from 10 districts and the provincial EMIS cell identified the 30 worst-performing primary schools in each district based on EMIS data. By the end of the workshop, the group had outlined improvement targets for the 10 districts, and drafted action plans to achieve these goals.

After the workshop for KP province, workshops were also held for 13 districts from Punjab province (in March 2009) and 10 districts from Sindh (in April 2009). By the end of 2009, seven additional districts from KP and four from Sindh also began using the PMT for education—bringing the number of districts using this tool to 44. Start-up workshops for each district/province were followed by:

- Meetings with district education officials to review their action plans.
- Sharing of workshop proceedings with the DEMT including the list of education indicators targeted for improvement in the district.
- Collecting data on the indicators and verifying the data.
- Holding review meetings with the head teachers of all low-performing schools, along with the concerned district education officers.
- Selecting two master trainers from each district (in consultation with the provincial education department) and training them on implementing the PMT for education in their districts.
- Training of head teachers and parent-teacher committee members by the master trainers, and technical assistance for developing and implementing a school action plan.

The design and implementation of the PMT for education initiative across the three provinces took 15 months, with results seen as early as 6–9 months into the process. Implementation included a substantial amount of training on the various components and stages of the tool (in total, 1,548 officials and teachers were trained in KP, Punjab, and Sindh provinces) and use of the EMIS (61 people were trained across the three provinces). The PMT for education initiative was also supported by various trainer and participant guides and manuals for designing and implementing the tool as well as using the EMIS.

Overall, the process comprised three phases and nine steps.

Phase 1

Step 1: Conduct situation analysis of targeted schools in the district. The districts conducted a general situational analysis across primary schools, with each school defining its basic needs and priorities. The analysis also focused on identifying gaps as well as future challenges and opportunities and helped the schools recognize factors that cause poor performance (step 3). The situational analysis became the foundation for the schools' action plans (step 7).

Step 2: Select key performance indicators from the provincial EMIS. A stakeholder consultation was used to

select the key performance indicators from the EMIS to be used to identify and rank the low-performing schools in the district. The selection of indicators and ranking of schools, with some variation across the three provinces, was conducted by a group comprising provincial and district education officers, head principals from a few schools, EMIS data programmers and operators, and parents of children attending primary school. This group examined and considered several sources and indicators, including Millennium Development Goal indicators for primary education and core education indicators established by the federal Ministry of Education. Different districts chose different education indicators. The most common set included:

- Promotion rates: The proportion of students who successfully complete a grade and are promoted to the next grade.
- Repetition rates: The proportion of students who repeat a grade once or twice.
- Drop-out rates: Proportion of students who leave school without completing the grade in which they were enrolled.
- Teacher absenteeism: Percentage of teachers absent from school.
- Student-teacher ratios: The number of students per teacher.
- Student-classroom ratios: The number of students per classroom.

Step 3: Use performance management techniques and EMIS to identify the initial and then final set of low-performing schools in the district.

- Conduct a trend analysis of provincial EMIS data (examine data for the last three years) to identify low-performing schools in each district based on one or a combination of key performance indicators.
- Select common indicators from the provincial EMIS to identify reasons for the low performance of identified schools. For example, the student-teacher ratio, number of infrastructure facilities lacking in the schools, or the number of parent-teacher meetings held in a year.
- Re-rank the selected schools using both key and common indicators and a school scorecard.

Step 4: Develop district action plans for improving the low-performing schools. The district action plan, which also identified the targets for improvements, included the actions required to achieve the targets; the person(s) responsible; resources required; source of funding; any collaboration/participation of citizens, civil society, or others; time frame (including start and completion time); and remarks. The overall responsibility for implementing the action plan rested with the EDO of education.

Phase II

Step 5: Validate school data. Since there are thousands of schools in each district, only data from the low-performing schools were validated to update any missing data or incomplete forms and ensure that the baseline and targets were accurate for the school. The verification focused on the key and common performance indicators chosen by the district from its EMIS.

Step 6: Train master trainers on developing school action plans. One male and one female assistant district officer were selected in each district and tasked with becoming the master trainers to train other officers and school staff in developing and monitoring school action plans.

Step 7: Develop school action plans. Developed in consultation with stakeholders, the school action plan was the roadmap to achieving the objectives and targets set by each of the low-performing schools in consultation with the district education officers. For each indicator and target, the school action plan included subactivities, responsibility, resource required, sources of funding, collaboration, start and end times, and remarks.

Phase III

Step 8: Implement and monitor district and school action plans. The school action plans were implemented by assigning responsibilities to specific individuals and ensuring sufficient resources. Monitoring helped identify gaps between planned and actual timelines and targets. If targets or deadlines were missed, the school action plan required

identification of the delay and of possible corrective actions to get back on track.

Step 9: Report annually and take actions for improvements. This included reporting on the status of the low-performing schools and highlighting those schools that improved their performance. This was considered critical in keeping stakeholders informed of improvements in the school system.

Results of the PMT for Education:

Factors for Success

Table 1 presents the results of the implementation of the PMT for education across KP, Punjab, and Sindh provinces.

Table 1 confirms the findings of the 2011 NEMIS survey, that EMIS data are primarily used in improving school infrastructure. However, the PMT for education also focused on improving at least one outcome indicator. While KP channeled efforts on decreasing the number of “low-performing” schools—a combination of several output and outcome indicators, Punjab and Sindh provinces sought improvement in teacher absenteeism and reduction in repetition rates, respectively.

There are several factors that made the PMT for education process successful in Pakistan and in turn led to the use of EMIS data in decision-making and improvement in education service indicators:

Championed by the government. The initial request for assistance in improving the provincial EMIS and using the data in the decision-making process came from the edu-

Table 1. PMT for Education Results

Province	No. of districts implementing PMT for education	District action plans realized (%)	Improvement of school infrastructure	Schools with parent-teacher councils activated (%)	Change in province-specific indicators
KP	17	70	Percent of low-performing schools now having: Electricity: 66% Water: 72% Boundary wall: 67%	92	Decrease in “low-performing” schools: 89%
Punjab	13	—	Decrease in schools without: Electricity: 41% Boundary wall: 35% Drinking water: 63% Functioning toilet: 40% Functioning washroom: 50%	93	Decrease in teacher absenteeism: 30%
Sindh	14	70	Decrease in schools without: Electricity: 15% Boundary wall: 31%	88	Reduction in repetition rate: 65%

Source: DTW reports.

Note: — = results not available.

cation department of the KP government. Participation of the provincial EMIS cell and buy-in from the districts ensured local ownership throughout the entire process by central actors.

Built on existing data familiar to all officials. Since the EMIS is based on an annual census, all education officials are familiar with it, and most are involved in its data collection. By the end of a two-day workshop, officials were quickly able to identify key and common performance indicators that needed improvement and develop practical action plans with targets. The development of a practical tool that used existing data led to its quick expansion and acceptance by Punjab and Sindh provinces.

Quick wins generated interest and replication in other districts. Clear and tangible results attracted the attention of other provinces, which then also requested technical assistance in using the EMIS, and led to expansion into additional districts.

Local authority. The 2001 LGO gave provincial and district governments some autonomy over decision making and resource allocation. This autonomy enabled the district and school action plans to be very localized, and additional support and resources were provided by the districts when needed. Linking the EMIS data to district and school action plans helped commit managers and other stakeholders to this process, because they were then able to see how the data benefited the planning process (Mark 2014; Powell and Trucano 2006).

The EMIS originated at the district level. Each school, and the district officer in charge of the school, was responsible for collecting EMIS data. The districts did not have to wait to get current NEMIS data to identify the low-performing schools and prepare their action plans. The lag in data reports from the national level did not affect them. The verification step also helped ensure that the data were accurate.

Use of the EMIS created incentives for verification of data quality. Once schools were targeted for improvement, all of the common and key performance indicators were verified by the individual school before formulation of its action plan. This step ensured that baselines were accurate and targets for improvement realistic. The demand for better data and information for decision making created incentives to improve data quality. Typically concerns about data accuracy prevent government officials from making decisions based on available data. In Pakistan, “some districts felt that the error rate could be as high as 30 percent. Decision makers also show a tendency to disparage the accuracy of the data. If they can sell the idea that the information is inaccurate then they are free to make decisions based on political rather than factual needs.” (Government of Pakistan 2011).

Tremendous support from a large, donor-funded project. The process was introduced and supported by a well-funded donor project, Districts That Work, which signed memorandums of understanding with several districts and worked with them on different fronts, including providing technical assistance support and grants as incentives. Training and technical assistance during design and implementation of the PMT for education, along with necessary manuals and training guides, helped keep the process on track.

Options for Replication

There are legitimate questions regarding replication of the Pakistan experience in other countries. This note does not attribute improvement in education indicators solely to the PMT for education, given the large complementary support provided to the education sector by USAID and other donor projects. Nor does this note claim that similar funding or technical assistance is required to see comparable use of EMIS elsewhere. In fact, the three phases and nine steps of the PMT for education can be greatly simplified. The process worked in Pakistan largely due to the support provided by the DTW project at a time when districts still had considerable local authority. Evidence suggests that this tool is no longer in use by the provinces.

Nevertheless, elements of the Pakistan initiative do provide lessons that can be applied elsewhere. In many countries, schools and local governments are already familiar with EMIS data because they are responsible for its collection. In a decentralized setting, where fiscal, administrative, and policy autonomy reside at the local level, the EMIS can provide quality data for use in evidence-based decision making, and modest capacity-building efforts can be enough to make that possible.

The majority of countries worldwide already have an EMIS. Many officials have, at the ready, information to improve education service indicators. Even data of uneven quality can be used to make service improvements. Refining the data can become an ongoing process. With the existing reservoir of data that EMISs represent worldwide, the potential for improvements in the education sector is substantial.

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Notes

1. Two of the eight goals and 6 of the 48 indicators focus on education.
2. The system was initially conceived by UNESCO to be quickly and easily customized to meet the specific needs of the educational systems of its member states (see www.openemis.org).
3. This initiative was funded by the U.S. Agency for International Development, under its US\$26 million Districts That Work project, and was implemented by the Urban Institute from August 2006 to March 2010.
4. This report includes information for 2011–12 and trend analysis for some indicators spanning six years, 2006–7 to 2011–12. There is also a note that data for the number of public and private education institutions are based on the latest National Education Census conducted in 2005–6.
5. Pakistan is a federal country, with a national government and four provinces: Punjab, Sindh, Baluchistan, and Khyber Pakhtunkhwa. The LGO 2001 formed three tiers of government under the provinces: district, municipal, and union councils.
6. The 10 district departments included: agriculture, community development, education, finance and planning, health, information technology, law, literacy, revenue, and works and services.

7. Each BPS has a large range; BPS 16 had a minimum of US\$58–US\$193 per month (2008 rates). BPS 22 had a maximum range of US\$265–US\$530 per month.

8. The most active donors were: USAID, World Bank, DfID, and ADB.

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