THE STUDY ON IMPROVEMENT OF MANAGEMENT INFORMATION SYSTEMS
IN HEALTH SECTOR IN THE ISLAMIC REPUBLIC OF PAKISTAN

SUMMARY

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1. Background

In Pakistan, the public health sector comprises of a large set-up of first level care facilities (FLCF), secondary and tertiary hospitals, and outreach activities at community level. After devolution, the management of the first and secondary level facilities and implementation of most of the outreach activities is the responsibility of the districts. The Provincial Health Departments (PHD) and the Federal Ministry of Health (MOH) are mostly responsible for policy, planning and monitoring & evaluation (M&E), as well as management of tertiary hospitals. In addition to that, MOH also directly manages a number of vertical programs (VPs) implemented through the District Health Departments (DHDs). Health information systems (HISs) to support these various functions evolved at different periods. The health management information system for FLCF (HMIS/FLCF) in Pakistan was established in 1992 and its implementation was completed in 2000. HISs for VPs were established at their own pace after the HMIS/FLCF was developed. However, several issues and needs for the improvement of HISs in Pakistan were pointed out.

In these circumstances, on the request of Government of Pakistan (GOP) to the Government of Japan, a "Study on Improvement of Management Information Systems in Health Sector in the Islamic Republic of Pakistan" was commissioned.

The objectives of this Study are:
- Develop a National Action Plan for the improvement of HISs in Pakistan, , and
- Transfer of relevant technology to the concerned persons

At the initial stages of the Study, Situation Analysis was carried out in the light of Prism framework for assessing the performance of HISs including HMIS/FLCF and its determinants. On the basis of the findings, a draft NAP has been developed for the improvement of the HIS in Pakistan.

2. Situation analysis

Under Prism framework, HIS performance is assessed by "quality of data/information" and "its continuous use", and the determinants of these issues relate to technical, organizational and behavioral factors. In this respect, the two major problems of HISs in Pakistan are that (1) the quality of data/information of HISs is low, and (2) HIS information is not continuously used.

2.1 Quality of data/information

The quality of HIS data/information is measured by (i) Relevance of data/information generated by the system to the management needs, (ii) Data accuracy, (iii) Timeliness of reporting, (iv) Completeness of reporting, (v) Coverage of the information system, and (vi) Analysis and interpretation of data to generate meaningful information. Problems occur in each of these areas.

Direct causes of low quality of data/information are:
- Obsolete design of existing HISs (e.g., HMIS/FLCF, Secondary hospital HIS, HIS sub-systems), as the result of their failure to evolve/improve relevant to the information needs according to the changing situation
- Constraints of human resources and logistics for HISs
- Lack of data quality assurance mechanisms
- Low level of motivation and limited knowledge/skill to collect and report data; deficient capacity for data analysis and interpretation

The indirect causes for the above-mentioned direct causes are:
- Weak institutional mechanism for M&E of the HISs, and planning and implementing their revision
- Weak supervisory system for quality control
- Lack of capacity building of facility/outreach staff on data collection and reporting
- Low motivation of managers to monitor the district health system performance

2.2 Use of information

There are various stages at which information is used (problem identification and study of best practices, plan formulation of solution, requesting support from higher-level organizations and related persons, and evaluation, monitoring and feedback).

- Low quality of data/information generated by HISs, Among various causes described above, most crucial is,
  - Insufficient relevance: gaps between the information collected and needed.

- Less motivation of the district managers to use HISs information. This results from:
  - Lack of capacity to use HISs data for performance improvement
  - Centralized management of HMIS/FLCF and VPs-HISs.
  - Less clarity of coordination roles and mechanisms for the health administration
  - Resource allocation is not according to the performance
  - Little feedback from province to districts based on performance appraisal
  - Information system is not part of the Planning/M&E cell

- Less motivation and capacity of the facility staff/managers to use HISs information. This results from:
  - Lack of self-evaluation and performance improvement at facility level
  - Resources are not allocated according to performance
  - Little feedback from the district based on performance appraisal

2.3 Root causes

The root causes of the low quality and limited use of information are:
- Inadequate policy framework and organizational support for HISs: weak linkage between information and policy, planning/management, and supporting
- Lack of ownership and accountability of HISs at provincial/district levels

- Health system is not managed in performance-based (output oriented) manner

The National Action Plan for the improvement of the HISs in public sector (NAP) takes into account all these causes of low performance of the HISs. Activities in the NAP deal with each of these causes in phases/succession over a period of 10 years.

3. National Action Plan (NAP)

3.1 Objective of NAP

The objective to the NAP is to "reform and create an enabling environment for the HISs in Pakistan to continuously evolve and improve to respond to the information needs of the health sector in Pakistan".

3.2 Basic approach to NAP formulation

The activities to address the direct, indirect and root causes of low quality and use of HIS information are arranged under three broad outcomes. These outcomes of the NAP are:

Outcome 1 : Improved policy framework for management of health system and HISs
Outcome 2 : Improved quality data/information generated by HISs
Outcome 3 : Improved use of information for performance improvement

Implementation of the NAP will result in a number of outputs that will contribute to the achievement of above three broad outcomes. These outputs of the NAP according to each broad outcome are as following:

Outcome 1 :   Improved policy framework for management of health system and HISs

1.1 Policy framework specifying authority and accountability of different tiers of health services management
1.2 Policy framework specifying ownership, authority, accountability, incentives and coordinating functions regarding HISs

Outcome 2 : Improved quality data/information generated by HISs

2.1 Improved HISs emphasize availability of quality data/information
2.2 Mechanism for HIS quality assurance (QA) including supervision in place
2.3 Facility staff capacity for data collection and reporting improved
2.4 District staff capacity for data processing, analysis and interpretation improved
2.5 Resources allocated by each tiers of government for HISs

Outcome 3 : Improved use of information for performance improvement

3.1 Health system managers motivated to use information for performance improvement
  3.1.1 Coordination function and authority of health administration to improve performance clarified

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3.1.2 HISs positioned as an integral part of health planning/M&E in districts & provinces

3.1.3 Information from VPs and DHIS are integrated at district level

3.1.4 Resource allocation based on facility's performance

3.1.5 Improved district staff's capacity for use of information

3.1.6 Improved regular and timely feedback from province to districts based on their performance appraisal

3.2 Facility staff motivated to utilize information for their own performance improvement

3.2.1 Resource allocation based on facility's performance

3.2.2 Established self-evaluation and performance improvement at facility level

3.2.3 Improved regular and timely feedback from district to facilities based on their performance appraisal

3.3 Duration of NAP

The NAP is a 10-year plan consisting of two phases:

- Mid-term: 2006 - 2011
- Long-term: 2012 - 2015

4.   District health information system (DHIS) design

After devolution, decision-making and resource management authority has been transferred to the districts.   Districts are now responsible for improving health services from first and secondary level facilities and outreach. Strengthening the districts for managing their health systems is a priority for the government, and improvement of district health system will contribute to improvement of health status of the population in whole country.   Thereby, improving HIS to respond to the information needs of the districts has emerged as a priority.   In this context, establishing DHIS is a core approach for achieving the objectives of the NAP.

The objective of DHIS is "to provide information for management and performance improvement of primary and secondary healthcare services provided by the public health sector at district level".   More specifically, DHIS will:

- Provide necessary information for monitoring the performance of district health system by incorporating selected key information from HMIS/FLCF, VPs, secondary hospitals and support-systems at district level
- Cater to the important routine health information needs of the federal and provincial levels for monitoring policy implementation

4.1 DHIS specifications

DHIS is a routine HIS that responds to the information needs of the district health system's performance monitoring function.   It provides a minimum set of indicators for monitoring of health services from first and secondary level facilities, and the outreach. The facility level will use information from this DHIS for their self-evaluation and

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improvement as well.

Thus, DHIS will collect, compile, and report relevant data to monitor facility/district performance. This data will be processed, analyzed, interpreted and properly presented to promote the use of information for important decision-making for improvement of performance of the district health system.

4.2 DHIS indicators

DHIS indicators are not an exhaustive list of all possible indicators; rather DHIS provides readily understandable indication of positive or negative deviances. Once a problem is identified through the DHIS, a problem solving process should be initiated. This process may need more detailed information from other sources. Thus, 79 indicators are to be collected through DHIS. The process of selection of these indicators has been consultative using specific criteria like relevance, importance, specificity, feasibility, and utility. The indicators are grouped into 8 broad categories:

- Service delivery: 14 preventive; 38 curative indicators
- Utilization: 13 indicators
- Financial management: 3 indicators
- Logistics: 1 indicator
- Human resources: 2 indicators
- Capital assets: 6 indicators
- Private sector regulation: 1 indicator
- Information system performance: 1 indicator

Comparison between HMIS/FLCF and DHIS:

HMIS/FLCF	DHIS
– 111 indicators	– 79 indicators (66 similar to those in HMIS/FLCF) – 43 (monthly 34 + yearly 9) indicators for BHU (Basic Health Unit)
– Monthly HMIS/FLCF report required to capture 446 variables – Outdoor and outreach	– Monthly DHIS report from RHC requires to capture 140 variables – Cover both outdoor and indoors, as well as outreach (VPs)
– Only FLCF	– FLCF and secondary hospitals with different instruments according to its specialization

4.3 Data flow and use

Data is collected by the respective health care provider (both facility-based and outreach) through the use of relevant DHIS instruments. The data from these instruments is compiled into a facility report. The compiled report is used by the facility in-charge and the care providers to review their own performance, and necessary feedback is given to the concerned staff. The facility report is then sent to the district level where it gets complied at the HMIS cell. The district managers use the compiled information for district's performance review and provide necessary feedback to the concerned facility/unit. At the district level, the primary users of the DHIS information are the

EDOH, DHO/DOH (District Health Officer/District Officer, Health), and other program managers. The District Nazim (Governor) and DCO (District Coordination Officer) are also the users of the information will review a few important indicators case by case, and take necessary action and provide feedback. In this way, information will flow to provincial and national levels that will be responsible to provide necessary feedback to the lower tier.

4.4 Quality assurance (QA) of DHIS information

QA mechanisms for DHIS lie within its design. The coverage of the DHIS will be expanded through the inclusion of the secondary hospitals. Also, the FLCF data collection and reporting instruments will be revised making them more simplified and reducing data burden at collection points. Additionally, the HMIS cell will have upgraded version of HIS software for data compilation and analysis. More importantly, new steps to improve the accuracy of data collection and compilation through quality checks and cross-checking will be introduced utilizing Lot Quality Assurance Sampling (LQAS) technique. Necessary training will be given to the concerned staff and appropriate policy framework and administrative procedures will be put in place for ensuring their implementation. Regular performance review at each level of service delivery, from care provider to federal, will have a direct effect in improving the use of the information generated by DHIS, and thereby the quality of that information.
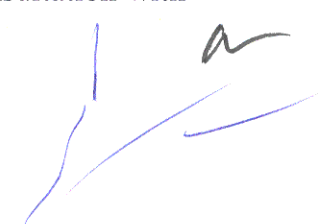
4.5 Continuous use of DHIS information

With the DHIS design, a number of procedures and interventions are specified that will lead to the continuous use of the information generated by DHIS. These include:

- Strengthening the district HMIS cell, with highlighting the information and communication technology (ICT) function for data compilation and analysis
- Strengthening EDOH functions for performance improvement, such as regularly holding performance review meetings utilizing problem solving approach.
- Strengthening facility functions for performance improvement using DHIS data
- Enhancing staff/managers' knowledge and skills (capacity building)

4.6 Role of PHD and National Health Information Resource Center (NHIRC)

4.6.1. PHD Role for DHIS/NAP implementation:

- Provide policy guidelines to the districts
- Capacity building, resource allocation (at least in the initial stages) and M&E
- Compilation and comparison of districts data, and providing feedback
- Coordination among DHDs
- Take necessary measures that come under the purview of PHD
- Ensure continuous review and improvement of DHIS design in consultation with districts and NHIRC

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4.6.2. Role of NHIRC for DHIS/NAP implementation
- Development of national policy framework
- Compilation and comparison of provincial data and provide feedback
- Coordination among PHDs and provide technical assistance for capacity building
- M&E in collaboration with PHDs
- Consultations with PHDs for continuous review and improvement of DHIS design
- Arranging financial and technical support from donor

4.7 Benefit of DHIS

In a nutshell, the benefits of DHIS design can be summarized as:
- DHIS design ensures ownership at all levels
- It augments continuous use of information at all levels by
  - Strengthening of feedback loops within the districts and at all levels
  - Supporting problem identification and solving for performance improvement
- DHIS caters to management needs of devolved district health system
- It enhances coverage of FLCF, secondary hospitals, VPs, and HIS sub-systems, viz. logistics, financial, human resource, capital assets HISs for performance monitoring
- There is flexibility in the design to evolve for future information needs
- Improved data QA procedures at all levels is in-built within the design

5. Implementation of Pilot Test

5.1 Objective

The objective of Pilot Test is to contribute to the finalization of draft NAP.
The specific objectives of the Pilot Test are:
- A. To examine if the quality of data and use of information improve through introduction of DHIS.
- B. To identify issues associated with implementation of DHIS model at district level

5.2 Hypothesis

- A.1. DHIS design improves availability of quality data/information
- A.2. DHIS information contributes to decision-making by the district managers
- A.3. DHIS information contributes to self-evaluation of performance at facility level
- A.4. DHIS design support sharing/coordination of information with VP-HISs
- B.1. Cost for expanding and maintaining the DHIS is acceptable to GOP

5.3 Pilot Test Methodology

5.3.1 Duration of Pilot Test

This Pilot Test will be completed in 6 months from January to June 2006.

5.3.2 Selection of Pilot districts and facilities

Pilot Test will be carried out in all four provinces (Punjab, NWFP, Sindh and Balochistan) in selected districts, which will be agreed by the Steering Committee. At least one district per province will be selected to test the DHIS design. The DHIS design will be implemented in all the facilities of the selected districts to ensure that overall district health performance can be monitored by DHIS.

Pre-requisites for selection of target districts are:
  i.   Transfer of trained staff is suspended during Pilot Test district
  ii.   Authority for coordinating health administration given to EDOH of the target district tentatively during Pilot Test

5.3.3 Establishment of Pilot Test M&E working groups (WG)

- Federal working group member will be from:
  - NHIRC (National Health Information Resource Center) staff
  - Officials of MOH, P&D (Planning & Development)
  - High officials of each PHD
  - JICA Study Team
  - Relevant donors (UNICEF, WHO, USAID, GTZ, DFID etc.)

  The main activities of the Federal WG will be:
  - Coordinate activities of Provincial WG for periodic review of DHIS design and recommend modifications according to provincial context
  - Supervision and monitoring of Pilot Test in coordination with Provincial WGs

- Provincial WG will be constituted by the PHD and its main activities will be:
  - Implement supervision and monitoring for Pilot Test
  - Periodically reviewing DHIS design and considering draft DHIS policy paper
  - Recommend further implementation of NAP after Pilot Test results
  - Review of training programs and curriculum
  - New education and training plans for relevant staffs

- District WG will be constituted by the DHD and its main activities will be:
  - Ensuring human resources/financial support and commitment from higher levels
  - Examine issues related to strengthening DHIS through review meetings
  - Recommend improvement of district performance review meetings

5.3.4   Method of Evaluation

A.1. DHIS design improves availability of quality data/information

The quality of the DHIS information will be assessed through observation checklist by the Study Team and Provincial and District WGs. Quality of DHIS data/information will be evaluated through the following:

- Process indicators for quality of data/information:
  - Knowledge and skill on QA techniques (LQAS and data cross-checking) of the trained staff will be evaluated using a questionnaire and observation checklist
  - How many times LQAS and data cross-checking were carried out by those staff will be reviewed through HMIS cell and facility records.
    - (These records on which facility reports and of which month were selected applying LQAS, which indicators were cross-checked and what the result of the cross-checking was will be maintained by facility in-charge and HMIS coordinator every time they apply QA techniques.)

- Output indicators for quality of data/information: (data for these indicators will be collected through observation checklists. Additionally, for the first two indicators mentioned below review of HMIS cell reports will be also done.)
  - Timeliness and completeness of reporting from the facilities
  - Data accuracy and completeness of filling the reports

Baseline evaluation will be carried out on various M&E indicators of the HMIS/FLCF and compared with mid-test evaluation of DHIS at 3-month and end-test evaluation at 6 month.

Approximately ten percent of the facilities will be randomly selected for monitoring purpose in each Pilot district. In standard case of Pilot district, twelve BHUs (Basic Health Units), one RHC (Rural Health Center), one THQH (Tehsil Headquarter Hospital) and one DHQH (District Headquarter Hospital) will be selected.

A.2. DHIS information contributes to decision-making by the district managers

District managers' practice in terms of (1) in how many meetings DHIS information are referred for performance monitoring, (2) which indicators are reviewed, and (3) decisions taken based on performance monitoring using DHIS information, will be evaluated through review of minutes of the monthly coordination meetings. Such questionnaire and review of meeting minutes will be applied for baseline, mid-test and end-test evaluation.

Questionnaires will be distributed to HMIS coordinators in the beginning of Pilot Test.

They will regularly check/record which DHIS indicators are discussed in the regular meeting. They will also keep record of how often they responded to the request by EDOH, DOH and other managers for data/information from DHIS, as well as keep record of indicators requested but not available from DHIS. The questionnaires will be collected and analyzed every month, and it will be assessed whether frequency of referring to DHIS data/information by district's decision maker after initiation of Pilot Test is increased. At the same time, it will be assessed whether DHIS caters to their information needs.

Qualitative methodology (i.e., key informant interviews) will also be used to know how DHIS data/information helped the district managers for decision making, which indicators were most used and what important decisions were taken using the DHIS information and whether those decisions were implemented.

A.3. DHIS data/information contributes to self-evaluation of performance at facility level

Quantitative methodology will be applied to evaluate the knowledge of the facility in-charge on self-evaluation of their performance through a questionnaire. Their practice in terms of how many times (1) DHIS information is referred for self-evaluation of their performance, (2) which indicators are reviewed, and (3) actions taken based on self-evaluation using DHIS information, will be evaluated through review of meeting minutes. Such questionnaire and review of meeting minutes will be applied for baseline, mid-test and end-test evaluation. Qualitative methodology (i.e., key informant interviews with facility in-charges) will also be used to know how DHIS information helped the facility in-charge for self-evaluation, which indicators were most used and what important actions were taken using the DHIS information.

A.4. DHIS design support sharing/coordination of data/information with VP-HISs

Sharing of data/information will be measured through assessing completeness and accuracy of data relating to VP-HISs in DHIS facility reports on monthly basis. Thus, all the monthly DHIS reports will be examined to check the completeness of reporting of the variables in the DHIS facility report relating to VPs. Of these reports, 10% will be selected for cross-checking for consistency with VP-HIS at district level.

Coordination of data/information among VPs-HISs and DHIS will be measured in terms of data from both DHIS and VPs-HISs reviewed together during monthly coordination meetings chaired by EDOH. Thus, the coordination of data/information among VPs-HISs and DHIS will be assessed through key informant interviews.

Baseline evaluation will be done based on the current HMIS/FLCF; mid-test and end-test evaluations will be carried out based on DHIS.

B.1. Cost for expanding and maintaining the DHIS is acceptable to GOP

The cost of implementing DHIS at FLCF level will be estimated after the Pilot Test and the recurrent cost for maintaining DHIS will be compared with the recurrent cost of implementing HMIS/FLCF,. Key Informant Interviews will be done with stakeholders regarding these cost estimates to understand the acceptability of GOP.

5.4 Implementation plan (interventions)

- Select pilot districts that cater to agreed criteria and commit to the pre-requisites
- For developing new computer application, tendering and contracting procedures will be completed in October-November 2005. A computer program will be developed. The program consists of data entry / online connection system / reporting system. Development of computer program will be sub-contracted to the local computer programming firm. For the selection of sub-contractor, open tendering must be held. Specifications and tender document will be prepared by the Study team.
- Pre-testing of the DHIS instruments will be done in October 2005. Accordingly, required modifications will be made. Necessary guidelines, registers and forms will be prepared in November 2005.
- Federal, provincial and district WGs will be established in November 2005. The members of the WGs will be trained accordingly.
- Baseline evaluation will be done based on the current HMIS/FLCF; mid-test and end-test evaluations will be carried out based on DHIS.
- About 10 facilities will be randomly selected for evaluation purpose. In standard case of Pilot district, twelve BHUs, one RHC, one THQH and one DHQH will be selected.
- At least one staff from all facilities will be selected and trained in filling in register, transcribing into monthly report in December 2005. Similarly, key district managers will be trained on performance improvement procedures and use of information.
- After introducing new DHIS, accuracy, completeness and timeliness of the first monthly report submitted will be evaluated. And based on the results, training manuals, methodologies and registers will be modified according to the results.
- Mid-test evaluation will be carried out after 3 months and end-test evaluation after completion of Pilot Test.

5.5 Implication of the Pilot Test results

- Modifying the indicators sets based on the results of Pilot Test
- Establishment of the QA procedures applicable for the NAP
- Establishment of procedures for continuous use of DHIS information applicable for NAP

6. Commitment by Pakistani side for smooth implementation of the Pilot Test

- Taking necessary actions to Pilot Test: governmental commitment, executive orders, and resources allocation

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- Arrangement of the coordination among VPs and Pilot Test
- Organizing the provincial and district working group meeting for Pilot Test
- Commitment from EDOH for assigning responsibility to district HMIS coordinator/HMIS cell for Pilot Test
- Commitment of discontinuation of existing HMIS/FLCF at Pilot districts/ facilities, and maintaining the DHIS design implementation

7. Activities required for further work on NAP

7.1 Objective

In the context of HIS, there is a great emphasis by the GOP to establish HIS for private sector. However, lot of ambiguities exists in terms of what data/information to be collected from private sector and for what purpose. Also, there is a general understanding that getting data/information from private sector is difficult due to many factors, including lack or weak implementation of legislation and reluctance of private sector to provide data/information to public sector. The feasibility of establishing HIS for private sector that caters to the interest of both public and private sectors and its chances of being sustainable are issues that need to be thoroughly examined. In this context the objective to further activities on NAP is:

"To examine the possibility of inclusion of approaches in the NAP that will lead to establish an information system with the private sector."

7.2 Activities

(1) Consultative meeting with private providers/institutions and associations
- Examine the added benefits to private sector of involving private sector for specific disease and service reporting
- Examine how a feasible HIS with private providers can be established
- Examine how a HIS with private providers can produce quality data/information
- Examine how a HIS can self-evolve and improve.

(2) Consultative meeting with HRA (Health Regulatory Authority)
- Clarify the definition of private providers and Homeopathic and Tibb/ Unani/ other traditional practitioners
- Analyze the cause of weak implementation of legislation to regulate private sector and examine the solution

7.3 Selection of target area

The activities mentioned above will be conducted in NWFP.