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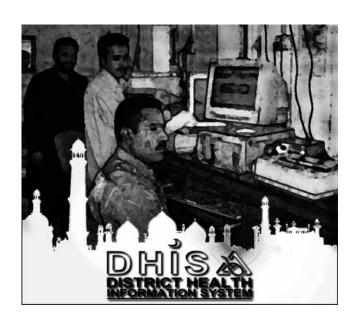MINISTRY OF HEALTH, ISLAMIC REPUBLIC OF PAKISTAN

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

NATIONAL ACTION PLAN

FEBRUARY 2007

NATIONAL HEALTH INFORMATION RESOURCE CENTER
SYSTEM SCIENCE CONSULTANTS INC.

Japan International Cooperation Agency
Ministry of Health, Islamic Republic of Pakistan

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EXECUTIVE SUMMARY

The National Action Plan for the Improvement of Health Information Systems in Pakistan

Executive Summary

The overall purpose of Health Information System (HIS) is to provide continuous information support to decision-making processes at each decision-making levels of the health system. Improving HIS in Pakistan is seen as an important investment towards improving the health care services. The guiding principle for the improvement of HIS in Pakistan is that the HIS should contribute to the continuous performance improvement of the health system in Pakistan with a vision of improving the overall health status of the population. After devolution in 2001, the districts are responsible for decision-making for health resource management and improving health services, particularly preventive, promotive and curative health services provided from primary and secondary level care facilities and outreach. A major objective of the management of the district health system is to improve its performance in order to contribute to the improvement of the health status of the population. Regular monitoring of the performance of health care services and their supporting sub-systems (e.g., logistics, financial, human resource management systems) is the first step in the performance improvement function of the district. No single data source can provide all the information required for planning and monitoring the health services. Nonetheless, information for ongoing health programs/activities is easier and more efficiently obtained through routine data collection, i.e. routine Health Information System (HIS). Therefore, improving routine HIS that caters mostly to the district's management needs as well as related provincial/national information needs for policy, planning and monitoring has emerged as a priority for Pakistan.

In addition to its responsibility to manage the district health system, the government is also responsible for managing the tertiary hospitals in the public sector. Though some of the tertiary hospitals in the public sector are semi-autonomous institutions, yet, Ministry of Health (MOH) or Provincial Health Department (PHD) is responsible for the overall management/financing and quality assurance of these institutions in their jurisdiction and there is a need for a uniform tertiary hospital information system (IS) and regular reporting to the government.

Similarly, as a constitutional responsibility of protecting public interest and preventing harm to the population, government has a duty to oversee and ensure that the private health sector is providing quality care to the population. Information system to support that function of the government is a felt-need in Pakistan.

The National Action Plan (NAP) for the improvement of HIS in Pakistan lays down the roadmap towards addressing the above stated needs. NAP takes into account technical,

organizational and behavioral factors that influence the performance of HIS and addresses the causes of low performance of HIS in terms of production of quality data (measured by the relevance, coverage, completeness, accuracy and timely availability of data) and continuous use of information generated by the HIS. The main causes of low performance of HIS, particularly Health Management Information System for First Care Level Facilities (HMIS-FLCF) in Pakistan were that the HMIS-FLCF design not meeting existing information needs and failed to self-evolve to meet changing needs. There were resources constraints, lack of Data Quality Assurance (DQA) mechanism, low capacity and motivation for HIS tasks and weak institutional mechanism for HIS tasks, including use of information for performance improvement. These resulted from inadequate or absent implementation framework and organizational support for HIS, lack of ownership and accountability of HIS at Provincial/District levels, weak linkages between information and planning, management and health system not being managed in performance-based (output oriented) manner.

Thus, the overall goal of 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 and thereby be able to contribute to achieving the vision of improving the overall health status of the population".

Given that the major thrust of the government is towards enhancement of district health system (providing primary and secondary care) and tertiary care (provided by tertiary hospitals) and protection of public interest through ensuring quality care provided by private health sector, that routine HIS caters to most of the health system's performance monitoring and management information needs, and that the District Health Information System (DHIS) has been designed to that end for the district health system, the scope of NAP is deliberately kept confined to:

1. Implementation and continuous improvement of DHIS
2. Development, implementation and continuous improvement of Public Health Sector Tertiary Hospital Information System
3. Development, implementation and continuous improvement of Private Health Sector Information System

Within the ambit of each of these three scopes, the major areas that the NAP addresses are:

A. Formulation and implementation of strategic / administrative decision on routine HIS and related organizational issues
B. Establishing leadership, coordination and management mechanisms at MOH, Provincial and District levels for routine HIS, including data management, DQA, data processing, analysis, interpretation, feedback and use for evidence-based decisions, and

establishment and improvement of Information and Communication Technology (ICT) support for HIS

   C. Mechanisms for development/continuous improvement and implementation/ expansion of HIS design.

   D. Mechanisms for provision of sustainable financial resources for HIS

   E. Mechanisms for HIS capacity building, including institutionalization of capacity building mechanisms

It may be noted that DHIS was developed based on the existing HISs in Pakistan and as an outcome of a Development Study carried out between 2004-2006 in close coordination with and collaboration of MOH and PHDs by Study Team commissioned Japan International Cooperation Agency (JICA) for the "Study on the Improvement of Management Information Systems in Health Sector in Islamic Republic of Pakistan" under a Scope of Works signed between Government of Pakistan and Government of Japan (GOJ). The design of DHIS takes into account the situation analysis findings and the results of a series of extensive consultative meetings with national, provincial and district stakeholders. It was successfully pilot tested in 2006 in four districts of four provinces of Pakistan. DHIS is designed to ensure ownership and augment continuous use of information at all levels by strengthening of feedback loops within the districts and 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, Vertical Programs (VPs), and HIS sub-systems, viz. logistics, financial, human resource, capital assets HISs for self-regulation and performance monitoring at facility/district/province levels. Improved data quality assurance (QA) procedures at all levels are in-built within the design. Also, there is flexibility in the design to evolve for accommodating future information needs.

The designs of Tertiary Hospital Information System (TH-IS) and Private Health Sector Information System (PvtHS-IS) are still in the making. Nevertheless, there is consensus on the broad conceptual designs of these ISs. The overall objective of TH-IS is to provide information for management and performance improvement of the tertiary hospital and thus contribute to the improvement of quality of patient care services in the hospitals, improvement of planning and management of services and resources, meeting the information needs of public health importance, and improvement of performance monitoring and accountability through feedback. On the other hand, the primary objectives of the PrtHS-IS are to contribute to (1) improving quality of services through health regulation and accreditation, (2) disease surveillance, (3) mapping/ Database of private health providers for purposes of equity, helping private sector in identifying gaps and improving services, and awareness of the community about availability of services, and (4) improving management of Public-Private Partnership.

Key areas of action are summarized into Table S-1

Table S-1　Key areas of action

Key Action Area	Action Item	Actions
1. Strategic/ Administrative Decisions	1. Decisions for introduction of DHIS in all districts 　1) Mandatory for all districts to implement DHIS 　2) DHIS will replace existing HMIS-FLCF 　3) Gradually, other routine HISs (e.g. VP-IS) will become integrated / complementary to DHIS 2. Decisions for DHIS Management 　1) Ownership with districts 　　a. Providing budget and other logistics for DHIS 　　b. District budget to have line-item for DHIS printing & procurement 　　c. Managing data, ensuring data quality, doing analysis, generating feedback reports and using DHIS information 　2) Province providing technical guidance and stewardship 　　a. Organizing trainings 　　b. Compiling districts' data & generating analysis/feedback reports, helping in software maintenance, promoting use of DHIS information 　3) National Health Information Resource Center (NHIRC) providing overall coordination & technical assistance. (Financial/logistic support only in the very beginning of DHIS implementation.) 3. Decisions for improving health system management practices that are directly influenced by DHIS 　1) Regular performance review meeting utilizing DHIS information for performance monitoring and problem solving by: 　　a. Executive District Officer of Health (EDOH), district managers 　　b. Facility in-charges	1. Constituting Provincial Working Group for developing HIS Strategy Paper 2. Broad-based participation and consultation on HIS strategy matters 3. Vetting by MOH, PHD 4. Approval of HIS strategy/administrative decisions by competent authority

Key Action Area	Action Item	Actions

	c. Secretary Health of PHD
	2) Supporting regular holding of these meetings
	  a. Reflection in manager/in-charge's performance evaluation
	  b. Availability of budget to implement decisions
	3) Regular "News Letter" containing analysis of DHIS data, success stories of lessons learned on using DHIS information	

	4. Decision on PHD's role in TH-IS management
	1) Provincial HIS Cell, under Director General Health Services (DGHS), to collect and compile data from tertiary hospitals
	2) HIS and Tertiary Hospital Management (H&THM) Unit in PHD to review TH-IS data
	  a. Organize quarterly performance review meetings
	  b. Assist Budget & Accounts Dept. to review financial management vis-à-vis performance
	  c. Recommend development projects based on performance of tertiary hospitals	

	5. Strategy/Decisons on Private Health Sector Information System 1) Formulation of Legislation or Health Regulation Ordinance that provides legal support for establishing PvtHS-IS.	1. PHDs constitute Working Groups on Private Health Sector Regulation 2. Broad-based participation and consultation on HIS strategic matters 3. Vetting by MOH, PHD 4. Approval of HIS strategy/administrative decisions by competent authority 5. Establish/Strengthen Health Regulation Authorities
2. Coordination & management	1. DHIS organizational structure at districts 1) District HIS unit at EDOH Office 2) Headed by Grade 17/18 Officer 3) Assisted by Statistical Officer/Statistician & Computer	1. Executive/Administrative decisions at Provincial level 2. Develop/approve Provincial "Planning commission form number 1"s (PC-1s)/

Key Action Area	Action Item	Actions
	Operator/Data Entry Staff 4) Equipped with 2 computers – server and work station, & 24 hrs telephone line 5) Responsible for data management, DQA, analysis and feedback reports, staff training, DHIS logistics management	Schedule for New Expenditures (SNEs) 3. Recruit/depute appropriate staff 4. Human resources for DHIS deputed or appointed/recruited under initial PC-1 or through SNE 5. Procurement of equipment 6. Printing of DHIS instruments, manuals 7. Carryout respective unit's functions/ responsibilities
	2. DHIS management at facility 1) At Basic Health Unit (BHU)/Rural Health Center (RHC), DHIS Focal Person assigned 2) At hospitals, Medical Officer (MO) as DHIS Focal person with Statistical Assistant recruited/appointed 3) District Health Management Team /District Health Team already in place, made responsible for using DHIS information for self-assessment & developing and implementing Action Plans for continuous performance improvement 4) Facility in-charge responsible for conducting monthly staff meetings	
	3. Provision of sustainable financial human and logistic resources for DHIS	

	4. HIS management by PHD
	1) Provincial HIS unit under DGHS
	   a. Headed by Director
	   b. HIS Focal Person of BPS 18/19
	   c. Computer experts and data analysts
	2) HIS and Tertiary Hospital Management (H&THM) Unit under Secretary Health/PHD
	   a. Responsible for districts' performance review based on DHIS
	   b. Holding districts' performance review meetings with Secretary Health in chair
	   c. Management of Tertiary hospitals	

Key Action Area	Action Item	Actions
	5. Coordination and technical assistance by NHIRC 6. Management & supervision of NHIRC activities - especially stewardship of DHIS implementation, by Board of Governor (BOG)/Steering Committee 7. Support continuous improvement of DHIS design	1. Notification of HIS Steering Committee by MOH 2. Further strengthening of NHIRC 3. M&E activities and consultations with PHD/Districts for continuous improvement of DHIS
3. Provision of sustainable financial resources for routine HIS	1. Provision of sustainable financial, human and logistic resources for DHIS	1. Initially NHIRC & afterwards PHD provide finances for DHIS implementation 2. Ultimately Districts take responsibility 3. Develop proposal for DHIS expenses in District's health budget 4. Approval by District Assembly 5. Exemption of No-Objection-Certificate from Govt. printing press 6. Drawing Disbursing Officers: DDOs (District Health Officer: Director of Health: DOH, Medical Superintendent: MS) exercise full sanctioning and procurement powers under financial rule for DHIS implementation
4. DHIS Capacity building, institutionalization of capacity building mechanism	1. Strengthening of Provincial Health Development Center (PHDC)/Provincial Health Services Academy (PHSA) as center for HIS training 2. Strengthening of District Health Development Center (DHDC) 3. Training of Master trainers, District Trainers, District staff/managers, and orientation of facility staff	1. Training of master trainers/district trainers from PHDC/DHDC on DHIS, Software application, DQA and use of DHIS information 2. Provision of financial resources to PHDC/DHDC for training 3. Regular holding of training activities for initial launching, refreshers and new/re-training of staff
5. Development and Implementation of TH-IS	1. NHIRC, in collaboration with PHDs/Tertiary Hospitals, will design TH-IS 2. PHD/NHIRC introducing and maintaining the TH-IS	1. Further need assessment 2. Finalization of & consensus building on conceptual design

Key Action Area	Action Item	Actions
		3. Development of generic computer software with provision for customization 4. Gradual introduction of TH-IS in public sector Tertiary Hospitals 5. Establish Provincial HIS Cell, under DGHS, to collect and compile data from tertiary hospitals 6. Establish H&THM Unit in Provincial Health department to review TH-IS data 7. Regular holding of review meetings by PHD
6. Development and Implementation of PvtHS-IS	1. Consensus among government departments on the conceptual design 2. Legislation or Health Regulation Ordinance for establishing any form of PvtHS-IS 3. Gradual incremental implementation of PvtHS-IS	1. Hiring/appointing consultant/expert group on developing PvtHS-IS 2. Promulgating/amending Health Regulation to incorporate clause on information sharing/reporting – PHDs 3. Pilot testing PvtHS-IS 4. Gradual incremental implementation of PvtHS-IS by PHDs in collaboration/ cooperation with private health sector

1.   **Stages of DHIS Implementation**

  (1)   Initial Stage (Year 1 & 2)
    1) DHIS owned by PHD/Districts
    2) Expansion of DHIS in all districts
       ◆ Provincial PC-1s developed & approved   Feb. 07
       ◆ Provincial/District HIS units strengthened:
          staff appointed/ deputed; hardware, software installed   Sep.-Dec. 07
       ◆ Printing of DHIS instruments   Nov. 07 – onwards
       ◆ Training of Master Trainers   Mar. 07
       ◆ Training of Trainers (TOT) and Training of district staffs   Sep.-Nov. 07
       ◆ Use of DHIS instruments   Jan. 08 onwards
       ◆ Use of DHIS Information   Jan. 08 onwards
       ◆ Provision of DHIS cost   Jan. 08 onwards

  (2)   Mid Stage (Year 3 - 5)
    1) DHIS Self-improvement mechanism established
    2) DHIS incorporating logistic, financial & human resource management information developed and implemented

  (3)   Final Stage (Year 6 & on)
    1) Continuous improvement
    2) DHIS integrates VP-ISs

2.   **Stages of TH-IS Development**

  (1)   Initial Stage
    1) Basic data collection method
    2) Mostly paper-based system
    3) Stand-alone computers at a few specific work-stations: Statistical room, Matron's office, Record room

  (2)   Mid Stage
    1) Advanced data collection method
    2) Computers at a few workstations linked via main server: Statistical room, Matron's office, Record room, Central Registration Point (CRP), Diagnostic units, Medical store, Finance department, Complaint cell

(3)   Final Stage

1) Fully computerized data collection

2) Computers in all workstations linked via server: Statistical room, Matron's office, Record room, CRP, Diagnostic units, Out-patient departments (OPDs), Indoor wards, Medical store, Finance dept., Complaints cell, Admin Office.

The National Action Plan for the Improvement of Health Information Systems in Pakistan

Contents

Part 3 Other Health Information Systems (HISs) in Pakistan

Annex

List of Tables and Figures

Tables

ABBREVIATIONS

BHU	Basic Health Unit
BOD	Board of Directors
BOG	Board of Governors
COD	Casualty Out-door
CRP	Central Registration Point
DCO	District Coordination Officer
DDHO	Deputy District Health Officer
DDO	Drawing Disbursing Officer
DG	Director General
DGHS	Director General Health Services
DHD	District Health Department
DHDC	District Health Development Center
DHIS	District Health Information System
DHO	District Health Officer
DHQH	District Headquarter Hospital
DHS	Demographic and Health Surveys
DOH	Director of Health
DOTS	Directly Observed Treatment, Short-course
DQA	Data Quality Assurance
EDOH	Executive District Officer, Health
EPI	Expanded Programme on Immunization
FANA	Federally Administered Northern Areas
FATA	Federally Administered Tribal Areas
FLCF	First Level Care Facility
GOJ	Government of Japan
GOP	Government of Pakistan
H&THM	Health Information System and Tertiary Hospital Management
HIS	Health Information System
HMIS	Health Management Information System
HRA	Health Regulatory Authority
ICT	Information and Communication Technology
IDSPP	Integrated Disease Surveillance Program-Pakistan
IS	Information System
JICA	Japan International Cooperation Agency
LHW	Lady Health Workers
LQAS	Lot Quality Assurance Sampling
MCH	Maternal & Child Health
M&E	Monitoring & Evaluation
NAP	National Action Plan
NCD	Non communicable diseases
NHIRC	National Health Information Resource Centre
NIPS	National Institute of Population Studies
NWFP	North West Frontier Province

MO	Medical Officer
MOH	Ministry of Health
MS	Medical Superintendent
OPD	Out-Patient Department
PC-1	Planning Commission Form Number 1
PHC	Primary Health Care
PHD	Provincial Health Department
PHDC	Provincial Health Development Center
PHSA	Provincial Health Services Academy
PvtHS-IS	Private Health Sector Information System
RHC	Rural Health Center
SNE	Schedule for New Expenditure
TB	Tuberculosis
TH-IS	Tertiary Hospital Information System
THQH	Tehsil/Taluka Headquarter Hospital
TOT	Training of Trainers
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development
VP	Vertical Program
WHO	World Health Organization

Part 1 What is the National Action Plan (NAP)

The National Action Plan for the Improvement of Health Information Systems in Pakistan

PART 1

What is the National Action Plan (NAP)

1.   Background

The overall purpose of Health Information System (HIS) is to provide continuous information support to decision-making processes at each decision-making levels of the health system. HIS is an integral part of the health system itself; and the global experience is that improved management of the health system is linked to improved HISs[1]. In the National Health Policy 2001 of Pakistan, the Government of Pakistan (GOP) emphasized on good governance to achieve quality health care and has targeted enhancing equity, efficiency and effectiveness in the health system in Pakistan[2]. GOP is well aware that the objective of maintaining the performance and quality of existing health care delivery system through increasing accessibility, expanding coverage and identifying areas/facilities/districts in need of government support can only be met through an efficient and workable HIS[3]. In fact, GOP adopted the overall vision of the HIS in Pakistan as the system that aims "to improve the health care services through evidence-based management of service delivery." This in turn will contribute to the improvement of health status of the population[4]. Thus, improving the HIS in Pakistan is seen as an important investment towards improving the health care services[5].

In Pakistan, under the Local Government Ordinance 2001, the responsibility to manage the district health system is now devolved to the districts. They are now responsible for decision-making for health resource management and improving health services, particularly preventive, promotive and curative health services provided from first and secondary level care facilities and outreach. In case of priority national programs (the vertical programs: VPs), technical, financial and administrative support is provided by the federal ministry of health or provincial health department, but still the implementation of those programs is the responsibility of the district health authorities. A major objective of the management of the district health system is to improve its performance in order to contribute to the improvement of the health status of the population. Regular monitoring of the performance of health care services and their supporting sub-systems (e.g., logistics, financial, human resource management systems) is the first step in the performance improvement function of the district. This would then lead to identification of problem areas or best practices, problem analysis and planning and implementation of the

solutions, monitoring the implementation and evaluating the solutions. No single data source can provide all the information required for planning and monitoring the health services. Nonetheless, information for ongoing health programs/activities is easier and more efficiently obtained through routine data collection, i.e. routine HIS. The following table gives the relative strengths of various data collection methods in collecting data for input/process/output data indicators and outcome/health status indicators. [6]

Table 1　Indicators and data collection methods

Data collection method	Input (Health resources)	Process (Health activities)	Output (Health services provided)	Outcome (health status)	
				Morbidity	Mortality/ Fertility
Routine HIS data collection	+++	+++	+++	+	+
Routine community data collection	-	++	++	++	++
Non-routine methods	+	+	+	+++	+++
Civil registration	-	-	-	-	+++

Clearly, the information for the ongoing program monitoring is easier and more efficiently obtained through routine data collection, whereas information for the purpose of an impact evaluation will probably need to be generated through non-routine methods. Thus, most of the data necessary for district health management can be made available through routine HIS.

The existing Health Management Information System for First Level Care Facilities (HMIS-FLCF) was established in 1992, long before devolution, as the mainstream routine HIS in the public health sector. However, the data generated through HMIS-FLCF is not addressing the requirements of good quality in terms of its relevance to the current health system's management function needs at various levels, data accuracy, data completeness, data coverage, and timeliness. Further, the use of information for management decision-making is only discretely practiced, if any.　As a result, less importance is given to data quality. These processes have led to a vicious cycle of low data quality and lack of information use.

Therefore, improving the routine HIS that caters mostly to the district's management needs has emerged as a priority for Pakistan. However, districts forming an integral part of the health sector in Pakistan cannot be seen in isolation. With the federation (MOH) and provinces (Provincial Health Departments: PHDs) having important policy formulation, planning and

M&E (monitoring and evaluation) functions, direct management of tertiary/teaching hospitals and health systems in Federally Administered Tribal Areas (FANA) and Federally Administered Northern Areas (FATA), and also regulation of private health sector, improvement in the HISs to respond to the information needs of the district are a priority, but only as a part of an overall process of the improvement of the HISs that respond to those needs of the health sector as a whole.

The National Action Plan (NAP) for the improvement of HISs in Pakistan lays down the roadmap towards fulfilling those requirements.

## 2.	History of HMIS-FLCF in Pakistan

Until 1992, HIS in Pakistan was considered as inadequate. An overall HIS management never existed. The routine facility based reporting system was poorly functioning: the indicators used did not correspond to information needs for decision making at different management levels; data collection did not take into account the technical skills of the health personnel. The reporting system was fragmented through the addition of VP - information systems (ISs); processing was done mostly manually with several aggregation levels. Use of the information generated was greatly limited by the quality of the data collected, by the fragmented information flows and by virtue a nonexistent feedback mechanisms. At the central planning levels this deficient and low quality routine information was sometimes complemented by conducting costly surveys.

In 1992, MOH, GOP, in agreement with the international agencies (United States Agency for International Development: USAID, United Nations Children's Fund: UNICEF etc) decided to restructure and replace the routine reporting system at the government managed health facilities with National HMIS. Consequently, HMIS-FLCF was developed with the extensive involvement of federal and provincial governments as well as other stakeholders.

In November 1993, a countrywide training of the field staff, in the data collection techniques, was launched to introduce this system on a uniform pattern at the health facilities spread over the country. Approximately 20,000 field staff was trained in data collection techniques throughout the country. After the completion of the district training the system was operationalized in all the 120 districts of the country. The HMIS-FLCF data comes from about 8,000 FLCFs and embodies 18 priority diseases/syndromes, mostly communicable diseases. HMIS-FLCF captures about 14% of visits to the public health facilities [5].

Despite these gains scope of the HMIS-FLCF remained limited to the FLCFs (i.e. Rural Health Centers: RHCs, Basic Health Units: BHUs, Mather and Child Health: MCH Centers) and OPDs (Out-patient departments) of some secondary hospitals only. Efforts to introduce the system in the out-patient departments of secondary hospitals had only limited success. HMIS-FLCF was already a decade old system. After several years of its implementation there was a growing concern amongst the PHDs and the National Program Managers to make it more responsive to the information needs of its multiple stakeholders. Inter-Provincial Workshop on HMIS Design were held in February, 2002 and the analysis of the HMIS-FLCF data in the National Report (2000) revealed many lacunae in its setup. For example, HMIS-FLCF was grossly incomplete and provided only a partial view of the whole situation. It lacked information from the hospitals which absorb more than 70% patient inflow. Similarly, HMIS-FLCF lacked definite system for capturing data on the human and physical resources, private health care or community related activities. Thus, during all these inter-provincial workshops organized by the National HMIS Cell in 2002, it was felt imperative that HMIS-FLCF should be reformed further from to a more comprehensive HIS.

2.1 How HMIS-FLCF was financed

The section below describes in brief the history of financing the implementation and maintenance of HMIS-FLCF with the idea to provide important learning lessons for financial sustainability of any HIS in Pakistan. The Sindh Health Department was the most progressive in their efforts to make the system sustainable, and these are described below as a showcase.

2.1.1 Early Days (1992-93)

Initially, HMIS-FLCF was implemented in all the provinces through the USAID funded Pakistan Child Survival Programme, coordinated by MOH. However, soon the system got setback when suddenly USAID's assistance was withdrawn. By the time, USAID had withdrawn its support implementation of HMIS-FLCF was only partially complete in the provinces. For example, in Sindh, HMIS-FLCF was implemented in 12 (57%) districts out of 21. Thus, implementation in rest of the districts became uncertain.

2.1.2 Re-start (1994-1999)

The Sindh Health Department requested the World Bank to provide assistance through Family Health Project (FHP) for HMIS-FLCF; the bank agreed for full support and hence the implementing HMIS-FLCF in the rest of the districts was made possible: thousands of staff were trained, data collection instruments and computers were made available in all the districts

of the Sindh. As a result, HMIS-FLCF took roots in the province and target of more than 90% reporting compliance was achieved during this period. However, the other provinces could not managed support from the FHP.

2.1.3 Efforts to make HMIS-FLCF sustainable (2000 and onwards)

In order to make HMIS-FLCF sustainable, the Sindh Health Department arranged the availability of instruments through Asian Development Bank funded Women Health Project till 2006. To meet the other requirements of HMIS-FLCF like latest model computers, staff training, supervision and monitoring and publication of reports, the Sindh Health Department arranged funds from various other sources, like UNICEF/Sindh and WHO, and from its own resources through PC-1 (Planning commission form number 1). Currently, there is a component for HMIS-FLCF in the PC-1 of Reproductive Health Project.

The situation in other provinces is quite different. Punjab Health Department initially implemented HMIS-FLCF in its four Divisions through USAID and UNICEF. Later on, in the remaining four divisions the implementation was funded through the Second Family Health Project. In the follow through, the Punjab Government took initiative and two PC-1s for total of three years period were approved for the sustainability of the system, but unfortunately HMIS-FLCF could not be transformed into a regular program. Subsequently, another PC-1 was prepared but this time it could not be materialized. In late nineties, the condition of getting No-Objection-Certificate from Government Printing Press Punjab was waved off for printing of HMIS-FLCF instruments. As a result, districts started printing HMIS-FLCF instruments from their own resources. The training component for HMIS-FLCF was regularly addressed through District Health Development Centers (DHDCs) from the district resources. In this way the system was sustained in the Punjab. However, in other two provinces, viz. North West Frontier Province (NWFP) and Balochistan, there were long intermittent gaps and the implementation remained a major problem as there was no substantial support for HMIS-FLCF during this period.

3. Current situation of technical, organizational and behavioral aspects of routine HISs in Pakistan

In this section, the current situation of routine HISs in Pakistan is considered in the context of technical, organizational and behavioral determinants of the performance of routine HIS (the Prism Framework). The performance of routine HIS is assessed in terms of the quality of data and the continuous use of the information generated by the routine HIS. In 2004, as part of the Study on the Improvement of Management Information System in the Health Sector in the Islamic Republic of Pakistan (the Study), an assessment of the existing routine HISs,

particularly the HMIS-FLCF which was designed and launched as a comprehensive and integrated IS for the FLCF-based primary health care services delivery systems in the country[7], was carried out using the "Prism Framework".

The salient features of the situation analysis are that (1) the data generated through these HISs, particularly the HMIS-FLCF, was not of good quality and (2) the use of information for management decision-making was only discretely practiced, if any. Though reporting timeliness was encouraging, the data accuracy and completeness of reporting were compromised, the system was covering only the out-patients of FLCFs and some secondary hospitals (situation varied from province to province in case of secondary hospitals) and, in the context of the devolved health system, the data/information generated by the HMIS-FLCF was insufficiently relevant to the management needs.

The direct causes of low quality of data/information were found to be (1) 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, (2) constraints of human resources and logistics for HISs, (3) lack of data quality assurance mechanisms, and (4) low level of motivation and limited knowledge/skill to collect and report data; deficient capacity for data analysis and interpretation. These deficiencies, in turn, were the result of weak institutional mechanism for M&E of the HISs, planning and implementing their revision, weak supervisory system for quality control, lack of a well organized system of capacity building of facility/outreach staff on data collection and reporting, and low motivation of managers to monitor the district health system performance.

Similarly, the causes of lack of use of information from the HISs were low accuracy and insufficient relevance due to gaps between the information collected and needed. Also, the district managers as well as the facility staff/managers are less motivated to use HISs information. This resulted from a number of organizational and behavioral factors including deficiency in capacity and practices of self-evaluation and using HIS data for performance improvement, resource allocation not being according to the performance, little feedback being regularly provided from province to districts and from districts to facilities on performance appraisal based on HIS data. In addition, the management of HMIS-FLCF and VP-ISs are centralized.

Further analysis of these issues revealed the root causes of the low quality and limited use of information, which are (1) inadequate strategic framework and organizational support for HISs, (2) weak linkage between information and strategic decisions, planning/management, (3) lack of ownership and accountability of HISs at provincial/district levels and (4) health system is

not managed in performance-based (output oriented) manner.

Lack of HIS strategy in Pakistan is one of the important root causes of low performance of the HISs in Pakistan. It has affected issues of accountability, authority and ownership. The senior management gives less importance to HIS tasks and there is limited support for the availability of budget for forms, tools and instruments, as well as for staff training. There is less clarity on the HIS structure and functions, and coordinating mechanisms between various ISs are lacking. There is no prescribed systematic practice of performance appraisal and continuous performance improvement using evidences from routine HIS. There is overt duplication and contradiction of work and execution of authority between National Health Information Resource Center (NHIRC) and the National VPs.

Another important weakness in all the HISs in Pakistan has been that once the various HISs were developed, they did not have the capacity to evolve and respond to the changing situation and thereby the changing needs of the health sector. For example, the HMIS-FLCF was developed in 1992 with the assistance of USAID. Since then, there has been no revision of the system to adapt itself with the devolution process. Efforts undertaken at federal level for revision remained stalled. As a compromise with having no standardized HIS for secondary hospitals at all, the same FLCF-HMIS was introduced in the outdoor of secondary hospitals. The HIS for Malaria program is based on the age old malaria eradication program that is different from the priorities of the current Roll Back Malaria program. The Expanded Programme on Immunization (EPI)-IS still has data points to capture vaccination given to 12-23 months children whereas the national policy is to provide immunization to under-one year children only. On the other hand, HIS sub-systems like logistic, financial or human resource management ISs are still in their basic stages. These reflect the need to develop intrinsic capacity of the prime users of health information, particularly the district and provincial health departments in case of Pakistan, to initiate and maintain a continuous evolution of the HISs abreast with the evolution of the health system in Pakistan itself.

In addition to its responsibility to manage the district health system, the government is also responsible for managing the tertiary hospitals in the public sector. Though some of the tertiary hospitals in the public sector are autonomous institutions, yet, MOH or PHD is responsible for the overall management/financing and quality assurance of these institutions. Till now, the tertiary hospitals are maintaining their own IS, but standardization of the tertiary hospital IS and regular reporting to the government are lacking.

Similarly, as a stated responsibility of protecting public interest and preventing harm to the population, government has a duty to oversee and ensure that the private health sector is providing quality care to the population. IS to support that function of the government is non-

existent in Pakistan.

Thus, in order to improve routine HISs in Pakistan, the main areas recommended for improvement/strengthening are:

i. Creation of HIS Strategic Framework
ii. Strengthening/improvement of HIS design for districts, tertiary hospitals and private health sector
iii. Strengthening of institutional and staff capacity to perform HIS tasks
iv. Improvement of HIS resources and management

The above stated findings and recommendations of the Situation Analysis on HIS in Pakistan form the basis of NAP.

4. Basic concept of National Action Plan (NAP) for the improvement of HIS in Pakistan

The NAP for the improvement of HIS in Pakistan takes all the above technical, organizational and behavioral factors into account. Given the current devolved setup in Pakistan and the need to have district's ownership of the HIS that should meet the management needs of the district, the District Health Information System (DHIS) forms the core component of NAP. DHIS was developed based on the existing HISs in Pakistan and as an outcome of a Development Study carried out between 2004-2006 in close coordination with and collaboration of MOH and PHDs by the Study Team commissioned by JICA for the "Study on the Improvement of Management Information Systems in Health Sector in Islamic Republic of Pakistan" under a Memorandum of Understanding (MOU) signed between GOP and GOJ. The design of DHIS takes into account the situation analysis findings and the results of a series of extensive consultative meetings with national, provincial and district stakeholders. It was successfully pilot tested in 2006 in four districts of four provinces of Pakistan. DHIS is designed to ensure ownership and augment continuous use of information at all levels by strengthening of feedback loops within the districts and 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 self-regulation and performance monitoring at facility/district/province levels. Improved data quality assurance (QA) procedures at all above levels are in-built within the design. Also, there is flexibility in the design to evolve for accommodating future information needs. DHIS is described in some details in the following section (Section 4.1).

The other two areas that are addressed through NAP are the development/implementation of IS for the tertiary hospitals and IS for the private health sector.

4.1   DHIS specification

Regular monitoring of the performance of the primary and secondary health care services and their supporting sub-systems (i.e. logistics, financial, human resource and capital assets management systems) is the first step in the management and performance improvement function of the districts. This would then lead to identification of problem areas or best practices and actions to improve the situation. DHIS primarily caters to the key routine information needs of the districts' function of monitoring the ongoing health programs/activities and their supporting sub-systems. Furthermore, DHIS is able to supply important routine information to the provincial and federal levels that would meet many of their information needs for carrying out those functions. The objective of DHIS is "to provide information for management and performance improvement of the district health system". More specifically, the DHIS:

(1)   Provides selected key information from FLCF, VPs, secondary hospitals and sub-systems such as logistics, financial, human resource and capital asset management systems for improving the district health system's performance

(2)   Caters to the important routine information needs at the federal and provincial levels for policy formulation, planning and M&E of health programs

4.1.1   DHIS indicators and data elements to be collected

The DHIS provides a number of core indicators required for the overall monitoring of health services at the district level. While DHIS prioritizes the needs of facilities and district managers, provincial and federal requirements for monitoring implementation of national goals have also been addressed. DHIS indicators are not intended to be an exhaustive list of all possible indicators that could be collected, or are required by technical specialists. Instead they provide readily understandable indications of the performance of the health service activities and of the sub-systems that support service delivery. Once performance gaps are identified through DHIS, a problem solving process should be initiated. This process may need more detailed information from other ISs in the health sector such as VP-ISs, or need to use non-routine information sources such as register review or small-scale special studies. The design of DHIS includes 79 indicators which can be categorized as:

1) Overall health facility utilization: 15 indicators
2) Preventive and curative service delivery: 48 indicators – 14 preventive care and 34 curative care
3) Financial management: 3 indicators
4) Logistics: 1 indicator
5) Human resources: 2 indicators
6) Capital assets: 6 indicators
7) Regulation: 1 indicator
8) Information system: 3 indicators

The variables required to calculate most of the indicators are compiled on a monthly basis, even though many are recommended for analysis on a yearly basis. As mentioned earlier, the DHIS indicators serve the purpose of monitoring the performance of the health system, and this includes assessing the performance of the VPs. DHIS provides an instant overview of the progress of all VPs to the managers and, as such, functions as complementary to the existing VPs' own IS. Once any problem area in any VP's is identified, further in-depth investigation can be carried out using the VP's own IS. Thus, important indicators for each of the National VPs and the Population Welfare Program of Ministry of Population Welfare are included in DHIS, as well as maternal and child health and priority disease indicators. For example, the EPI aims at immunizing all children before they reach their first birthday against seven priority diseases (diphtheria, measles, whooping cough, polio, tetanus, tuberculosis and hepatitis B); this performance will be monitored through indicator on fully immunized children.

In case of TB-DOTS (Tuberculoses-Directly Observed Treatment, Short-course), designated facilities manage diagnosis and treatment of TB patients; all facilities participate in case detection and supervised distribution of drugs after a confirmed diagnosis. Therefore, two DHIS indicators suggest how well all facilities are performing their tasks of identifying suspected cases and supervising treatment. The performance of the TB-DOTS program will continue to be monitored through quarterly collection of data on case detection, sputum conversion and cure rates.

Out of the seven malaria indicators, three will be taken together – trends in OPD cases, admitted cases, and case fatality rate – in order to suggest the severity of the cases. One reflects diagnostic acuity (slide positivity), and another one reflects the prevalence of the more virulent parasite (plasmodium falciparum).

DHIS indicators on maternal and neonatal health will provide an assessment of the performance of public health facilities (both indoors and outdoor) in terms of their antenatal,

skilled birth (including Cesarean sections) and postnatal coverage and their comparison with community-based activities of Lady Health Workers (LHWs). DHIS also includes facility-based indicators on maternal complications and maternal and neonatal deaths in the facilities with their causes, low birth weight babies and still births

4.1.2   Components of DHIS

(1)   DHIS instruments

There are 25 DHIS instruments for collection, aggregation and transmission of data from the primary health care facilities (BHU, RHC, MCH Centers) and secondary care facilities (DHQH: District Headquarter Hospital and THQH: Teshil/Taluka Headquarter Hospital). The list of instruments is attached in Annex 1.

In order to ensure proper filling of the DHIS instruments, a Procedures Manual (both in English and Urdu) is available along with Training Manuals for trainers and participants.

(2)   DHIS software and hardware

The main features of the DHIS software are that it is based on open-source Linux system and, therefore, does not require any licensing, it has been developed as a user-friendly system and the data transmission is through web-based dial-up connection; the DHIS software provides ready access to Provincial managers and decision makers (e.g. Secretary Health, Director General Health Services(DGHS)) and district managers and decision makers (e.g. District Nazim or District Coordination Officer (DCO), Executive District Officer of Health (EDOH)) or any other authorized user to analyzed feedback reports as soon as data entry is completed; the ownership is with the district and provincial health departments such that the provincial or district health departments can introduce new forms according to their local changing needs; the software also supports any future extension of the network up to facility level. Any change, however, will be coordinated with PHD/NHIRC; districts will recommend to PHD/NHIRC who will execute the changes in the forms.

The software application will be installed at EDOH Office (District HIS Unit) where data will come from the health facilities/institutions (and VPs) in the pre-defined format (e.g. Monthly Report format) on monthly or yearly basis. District HIS unit will carryout data entry and produce different pre-formatted feedback reports and need-based ad hoc reports. The summarized/consolidated data will be synchronized through communication media with provincial HIS unit. The Provincial HIS Unit will generate provincial reports and

electronically provide provincial data to federal level (NHIRC).

There is provision in DHIS software to be installed at facility level as well. Facility can enter relevant data and generate required reports. In this case, data will be stored directly in facility local database and will be synchronized with the district database. Similarly, DHIS software can be installed at Tehsil/Taluka level. If installed, Tahsil/Taluka will be able to enter facility data and generate relevant reports and upload/synchronize consolidated data with the district database.

The DHIS hardware is composed of the Server and the Clients that are connected with telephone line. The Server is installed at Provincial HIS unit and the Clients are installed at Provincial and District HIS units. The DHIS software and its database are based on an open-source system, and the Server and Clients are able to operate both the Windows and the Linux operating systems. Therefore, the capacity of hardware requires that Linux/other open-source system can be operated. Required features of DHIS hardware are;

- CPU : Pentium 4 (more than 3.0 GHz)
- Main memory : more than 1GB
- CD-drive : Combo Drive
- Modem : Linux ready modem
- UPS/AVR : required

(3) Use of DHIS information model

The overall goal of the model is to use DHIS information for continuous improvement of health system performance. Problem solving is the first principle applied in developing this model. It helps in stating problem as performance gap, understanding causes and developing solution for those causes, action plan and monitoring solution for the desired impact. Thus, the problem solving process is translated into a cycle of use of information for continuous improvement of health system performance. Continuous improvement also means that there are performance target, which provide a reality check of achievement status. It also implies that when proficiency in the task or a target is achieved the standards or target are raised. Self-regulation is another principle for promoting DHIS information use. Thus, DHIS will be contributing to improving evidence based decision-making, transparency and accountability, in other words, strengthening culture of information.

This model will be implemented both at health facility level and at district level. At the health facility level, the facility in-charge will organize monthly staff meetings to review the

monthly facility report and compare the performance with targets and previous months' reports and take decisions for the improvement of the facility's performance. During these meetings all the concerned facility staff and other outreach staff attached to the facility will participate in the meeting. In hospitals, the in-charges of various units or departments will have monthly meetings with the Medical Superintendent (MS) of the hospital and use DHIS data for review of their performance and apply the model of use of DHIS information mentioned above.

At the district level, the District HIS Unit will prepare the analysis reports and review the DHIS data to identify areas that need attention. The unit will be submit the analysis reports to EDOH and circulate them to concerned district/facility managers for their review. EDOH will be responsible for calling monthly meetings of the district managers (District Health management Team or District Health Team) and facility in-charges and review the DHIS information and take decisions and develop action plans for implementing solutions. The subsequent meetings will review the progress in solving the issue and the progress in the performance and may identify new areas for problem solving. In this way continuous improvement of the district's health system's performance will be propagated. Summary reports prepared by the District HIS Unit will also be sent to district's political and administrative heads (Nazim and DCO) for their necessary attention and action. The District HIS Unit will also prepare monthly "News Letters" using the DHIS information and widely disseminate them to the health facilities and political and administrative organizations within the district.

PHD will support the use of DHIS information by organizing periodic (e.g. quarterly) performance review meetings with all the districts in the province and provide necessary guidance and technical support for improving the districts' performance. Such meetings at provincial level chaired by Secretary Health will have a ripple effect and will encourage the districts and health facilities to make use of DHIS information part of the organizational management culture. The Provincial HIS Unit will also be responsible for publishing quarterly "News Letters" using the DHIS information from all the districts of the province and disseminate them widely in the districts and within the provincial departments, ministries and national/international development partners.

(4)   DHIS Data Quality Assurance Mechanism

Apart from the Use of DHIS information model which in turn will influence improvement of data quality, a number of data quality assurance mechanisms based on Lot Quality Assurance Sampling (LQAS) technique have been made the intrinsic part of DHIS. These

are:

    i. LQAS at facility level, whereby the facility in-charge will carryout monthly cross-checking of recorded data and assess the level of data quality, discuss it with the facility staff and take necessary measures to improve the data quality

   ii. LQAS at District level. The district HIS Cell will cross-check the recorded data at randomly selected health facilities, make an assessment of the overall quality of DHIS data and provide necessary feedback to the facility in-charges. He will also monitor the practice of LQAS at the facilities.

  iii. Computer program for identifying blanks cells in monthly reports and late submissions

  iv. LQAS Job-Aide and training guidelines are also available

   v. Supervisory checklist to check the availability of the stock of DHIS instruments in the facility, review the facility meeting minutes for data QA activities carried out by the facility in-charge and assess the level of use of DHIS information.

(6) DHIS Procedure Manual

This manual describes in details about DHIS indicators, instruments for data collection and reporting, data flow mechanism and roles and responsibilities of the staff involved, DHIS feedback reports, data analysis methods and Data Quality Assurance (DQA) mechanism.

(7) DHIS Training Module

DHIS Training Module consists of three separate modules:

    i. Training Module on DHIS instruments and DQA Tools
   ii. Training Module on use of DHIS Information, and
  iii. Training Module on DHIS software

These training modules describe the training methodology, transparency/presentation slides, model schedule, and budget estimation. Each module consists of a Trainer's manual and a Participant's manual. The training will be based on adult learning principles and techniques, building on existing experiences, emphasizing dialogue, relevance of information, immediate results, respect, recognition and appreciation, and using feeling, thinking and actions for learning. They include discussion, questions and answers, individual and group activities, role plays etc.

5.   Goal and objectives of NAP

The guiding principle for the improvement of HISs in Pakistan is that the HISs should contribute to the continuous performance improvement of the health system in Pakistan with a vision of improving the overall health status of the population.

As mentioned in Section 4.1 above, since routine HIS consisting of health and disease records, service records and administrative/resource records best serves the purpose of monitoring health system's performance, outcomes and resource management, DHIS is considered as the primary focus of NAP. Nevertheless, other routine HISs relating to tertiary hospitals and private sector are also considered.

DHIS is not to be considered as an isolated/independent IS. It is an integral part and supporting system of the health system itself. The design of DHIS addresses the issues of quality of data (in terms of its relevance, accuracy, completeness, coverage and timeliness) and use of information, but for itself to be viable and sustainable, DHIS needs an enabling environment within the health system. The enabling environment for the HISs, in general, is constituted by:

(1)   The design of HISs, which is dependent on the minimum set of national, provincial and district level indicators and their data sources and which, in turn, depends on the health information needs of each level.

(2)   The data management structure/mechanisms. This includes structure/mechanisms for data collection, transmission, storage, analysis, dissemination, use, and data quality assurance

(3)   HIS Resources:
   A.   Information strategic framework, legislation, regulations
   B.   Financial resources for data collection, storage, analysis, dissemination, use and implementation of decisions
   C.   Human resource:
        i.   Provincial and National technical expertise
        ii.   District and Provincial expertise to manage HISs and to ensure data quality standards and use
   D.   HIS training and capacity building
   E.   Communication infrastructure: Information and communication technology (ICT)
   F.   Coordination and supervision

DHIS provides the minimum set of indicators that cater primarily to the district's health information needs as well as the national and provincial routine health information needs. Other sources of information for provincial and national levels are the tertiary hospital IS and IS for private sector. DHIS also specifies the data management structure from facility level up to the district and provincial levels. However, in order to implement that, there is a need to have the necessary HIS resources mentioned above. An analysis of the existing situation of HIS resources in Pakistan, especially for routine HIS, will throw light on the possible future course of actions necessary for the implementation and sustainability of DHIS and other HIS in Pakistan.

ISs for tertiary hospitals and private health sector are still in the making. Nevertheless, a lot of work has already been done in this respect and consensus on the basic issues of these two ISs has been achieved. Designing, testing and implementing the standardized ISs for public health sector tertiary hospitals and private health sector are pending. The consensus is that the primary purpose of IS for tertiary hospitals is the improvement of the performance/quality of health care services in these hospitals through contributing to the improvement of internal management of the hospital. On the other hand, the important objectives of private health sector IS could be to contribute to (1) improving quality of services through health regulation and accreditation, (2) disease surveillance, (3) mapping of private health providers for purposes of equity, helping private sector in identifying gaps, improving services, and awareness of the community about availability of services, and (4) improving management of Public-Private Partnerships. The initial focus could be on various private health providers practicing modern medicine, e.g., hospitals, clinics, specialists, general practitioners, nursing homes, blood banks, and diagnostic centers. The preferred mechanism of flow of information could be self-reporting by the private health providers to concerned EDOH and validation of the reports by the health department through surveys.

As discussed in section 2, the availability of financial resources for HIS in Pakistan has been inconsistent during the past decade. This has severely compromised the achievement of the overall aim of HIS. Rather, getting HMIS-FLCF implementation get going became the end during the past years. Similarly, there is absent strategic framework for HISs in Pakistan, and the coordination and technical assistance roles expected from the national and provincial levels are also inadequate and fragmented. There is inadequate institutional mechanism for the continuous improvement of routine HIS to meet the changing needs of health systems' management.

Availability of human resources and capacity building efforts for performing HIS tasks have also been inconsistent and mainly carried out on ad-hoc basis. There is inadequate institutional

approach to systematically build capacity of the managers and staff involved in executing various HIS tasks. Refresher training activities on HMIS-FLCF could only be started after a very long gap, and even that was done when the government has already taken an initiative to reform and improve the existing HIS. The Provincial Government in Sindh has established a Provincial HMIS Unit and also has designated full-time staff (epidemiologist) at the district level responsible for managing the HIS in the district. Such initiatives are not matched in other provinces, and the result is lack of ownership of the IS within the health departments.

There is tremendous interest at national level and within the provincial health departments to bring HIS within the fold of ICT. There have been some efforts towards that end. The DHIS software provides a platform for extending the ICT at district level and, in the future, up to facility level. As far as logistical support is concerned for extending ICT in health sector, there is huge opportunity available with the ICT departments of the provincial governments. These departments are ready to support the specific initiatives by other government departments to expand the use of ICT.

Thus, in the context of the situation of the HISs in Pakistan as described in the sections above, the goal of NAP for the improvement in the HISs is to contribute to continuous performance improvement of the health system in Pakistan with a vision of improving overall health status of the population.

Focusing on the quality of data and use of information generated by the HISs and their in-built capacity to evolve and improve, the overall objective of this National Action Plan is:

"To reform and create an enabling environment[8] for the HISs in Pakistan to continuously evolve and improve to respond to the information needs of the health sector in Pakistan and thereby be able to contribute to achieving the vision of improving the overall health status of the population."

6. Broad areas of NAP

The NAP provides a broad-based, well coordinated (among MOH and PHDs) plan for the improvement of HISs in Pakistan. It addresses both strategies and actions, and promotes ownership of the districts, provinces and MOH. Build through consensus among the stakeholders, this NAP is an expression of the commitment of the MOH and PHDs to the implementation and continuous improvement of the routine HISs and the enabling environment of which it is an integral part. Through this NAP, GOP is development the "Project" approach, rather augmenting the "Systems" approach whereby routine HIS will be integrated as an

essential component of the whole health system. Thus, implementation of NAP will not only result in improvement of data collection and reporting, but also will influence the management practices of the health system, especially the public health sector and ultimately the private health sector as well. In fact, the global experience is that improved management of the health system is linked to improved HISs.

The NAP, therefore, embraces wide-angled strategy of addressing not only the technical issues of a routine HIS (i.e., design of routine HIS, management of routine HIS itself, etc.), but also the organizational and behavioral issues, and the implementation of NAP may become the harbinger of improvement in the management/performance of the health system itself.

Given that the major thrust of the government is towards enhancement of district health system (providing primary and secondary care) and tertiary care (provided by tertiary hospitals) and protection of public interest through ensuring quality care provided by private health sector, that routine HIS caters to most of the health system's performance monitoring and management information needs, and that DHIS has been designed to that end for the district health system, the scope of NAP is deliberately kept confined to:

(1) Implementation and continuous improvement of DHIS
(2) Development, implementation and continuous improvement of Public Health Sector Tertiary Hospital IS (TH-IS)
(3) Development, implementation and continuous improvement of Private Health Sector IS (PvtHS-IS)

Within the ambit of each of these three scopes, the major areas that the NAP addresses are:

a. Formulation and implementation of policies / administrative decision on routine HIS and related organizational issues
b. Establishing supervision/monitoring, coordination and management mechanisms at NHIRC, Provincial and District levels for HIS, including data management, DQA, data processing, analysis, interpretation, feedback and use for evidence-based decisions, and establishment and improvement of ICT support for HIS
c. Mechanisms for development/continuous improvement and implementation/ expansion of HIS design, especially DHIS, TH-IS and PvtHS-IS.
d. Mechanisms for provision of sustainable financial resources for the HIS
e. Mechanisms for HIS capacity building, including institutionalization of capacity building mechanisms

7.   Duration of NAP

The implementation of NAP will take place in three stages over a period of 10 years. The pace of implementation of its major three components, viz. DHIS, TH-IS and PvtHS-IS vary according to the level of development of and the level of sophistication required for each component at the onset of NAP. The duration of the Initial, Mid and Final stages of NAP are 2 years, 3 years and 5 years respectively. Table 2, below gives an image of the status of development/implementation of each component during each stage of NAP.

Table 2   Status at each stage of NAP

NAP Component	Pre-NAP Status (Development Study – 2006)	Status at each stage of NAP		
		Initial stage (Year 1 & 2)	**Mid stage (Year 3-5)**	**Final stage (Year 6-10)**
DHIS	1. DHIS Designed and Pilot Tested 2. DHIS Software developed	1. Capacity of PHD/Districts to conduct DHIS training developed 2. DHIS owned by PHD/Districts, both having full-fledged & efficiently functioning HIS units 3. DHIS implemented in all districts 4. NHIRC/PHD collaborating & assisting districts to implement DHIS	1. PHD, in collaboration with NHIRC, establishing and implementing DHIS improvement mechanism 2. M&E of DHIS conducted 3. 2nd version of DHIS (that incorporates ISs for logistics, financial and human resource management) developed by NHIRC in collaboration with PHD/Districts and implemented by PHD/Districts	1. Continuous improvement of DHIS taking place 2. 3rd version of DHIS (that integrates VP-ISs) developed by NHIRC in collaboration with PHD/Districts and implemented by PHD/Districts

NAP Component	Pre-NAP Status (Development Study – 2006)	Status at each stage of NAP		
		Initial stage (Year 1 & 2)	Mid stage (Year 3-5)	Final stage (Year 6-10)
TH-IS	Design of core component of TH-IS conceptualized & computer application developed	1. Design of core component of TH-IS & computer application pilot tested 2. Core component of TH-IS gradually introduced in Public Sector Tertiary Hospitals 3. Work on design of fully computerized TH-IS initiated	1. Design of fully computerized TH-IS & computer application developed and pilot tested 2. Gradual introduction of fully computerized TH-IS in public sector tertiary hospitals – CRP, OPD, diagnostic units, admin units, Matron's Office, Record Room & Statistical Room all linked through main server, & computer application facilitating hospital management	1. Fully computerized TH-IS implemented in all public sector tertiary hospitals – indoor wards also linked to main server, computer application also used for facilitating patient management in addition to hospital management.
PvtHS-IS	Consensus on broad concept of the design of PvtHS-IS achieved	1. Design of PvtHS-IS developed 2. Legislation for implementing PvtHS-IS promulgated 3. HRA (Health Regulatory Authorities) made fully functional in all provinces	1. PvtHS-IS pilot tested 2. Mapping/database of private health facilities implemented & maintained 3. PvtHS-IS gradually introduced in private sector hospitals and large clinics 4. PvtHS-IS implemented in facilities under public-private partnerships	1. Mapping/database of private health facilities and practitioners implemented & maintained 2. PvtHS-IS maintained in private sector hospitals and large clinics

PART 2   DESCRIPTION OF NAP IMPLEMENTATION

PART 2

Descriptions of NAP implementation

1. Implementation of DHIS

1.1 Basic approaches for DHIS implementation

The design of DHIS was the outcome of a successful Study on the Improvement of Management Information Systems in the Health Sector in Pakistan. This Study was commissioned because of the growing felt-need in the country to improve the HISs in Pakistan. An important outcome of this Study was the development of design of DHIS involving assessment of the existing situation followed by a series of consultative meetings and consensus building with Federal, Provincial and District stakeholders and experts. The design was pilot tested and finalized based on the results of the Pilot Test. Evaluation of the Pilot Test of DHIS also revealed levels high level of interest about and acceptance at national, provincial and district of DHIS as an improved routine HIS for public health sector in Pakistan. This NAP provides the roadmap for the country-wide implementation of DHIS. A methodical implementation of DHIS in all the districts of Pakistan requires a multi-faceted approach that involves the MOH, PHD, District Governments. Commitment, diligent management of resources and proper coordination of activities among all the stakeholders is essential for introducing the system through-out the country. As mentioned in the preceding section, introduction of DHIS and its continued implementation would require policy support and administrative backup, financial and human resources, regular supply of necessary logistics, and an institutional approach for the management of the resources and the relevant activities. The section below provides a detail of these requirements.

1.2 DHIS related strategic/administrative decisions

Like any other reform program, improvement of the existing HIS through the implementation of DHIS requires political commitment and strategic or administrative decisions. These can be categorized as:

(1) Decisions for the introduction of DHIS in all the districts

(2) Decisions for the management of DHIS

(3) Decisions for improving health system management practices that are directly influenced by DHIS

1.2.1 Decisions for the introduction of DHIS in all the districts

The first and foremost strategic decision required is to take a national level executive decision that DHIS will become the mainstream routine HIS for the government health facilities in the districts and for that DHIS will be introduced in all the districts of Pakistan. The strategy for implementing this decision would be that:

a. DHIS will become part of the health system management Standard of Practice, and it will be mandatory for all the district managers and related public health facilities to implement DHIS

b. DHIS will replace the existing HMIS-FLCF; due to practical reasons this has to be done in a phased manner, i.e., as soon as the staff are trained and the necessary logistics are provided, all the public health facilities in the district will start to implement DHIS and cease using HMIS-FLCF.

c. Over time, other routine HISs, especially the VP-ISs will become integrated or complementary to DHIS; and DHIS will expand its scope to include more detailed information on health resource management.

1.2.2 Decisions for the management of DHIS

Ownership (or lack of it) is an important determinant of good performance (in terms of producing good quality data and the information being used for decision-making) of the HIS. The current practice of managing the HISs from the federal level is one of the important root causes of compromised quality of the routine HISs in Pakistan, especially that of HMIS-FLCF. Unless there is ownership at the data collection level and at the level of the primary users/beneficiary of the IS (i.e., districts), better management of the HIS cannot be expected. With health devolved to the districts, it is empirical that the ownership should lie with the districts. Nevertheless, provinces are an important player in the management of the health system by providing technical guidance and stewardship to the districts. The ownership of the public health system is, therefore, shared between the districts and the provincial government; and likewise for the DHIS. Thus, the target of the strategic decision on the management of DHIS is that ultimately the ownership will be with the districts and provinces. The strategy to implement this decision would be to clearly define the respective roles of the Districts, PHDs

and NHIRC/MOH and build their capacity to execute those roles.

Districts will be responsible for providing the necessary finances and logistics for the implementation of DHIS, and will be responsible for data collection, aggregation, transmission, compilation at district levels, computer entry, analysis, generation of feedback reports, interpretation and use for management decisions and data quality assurance. The District HIS Unit will publish monthly "News Letters" using DHIS information and circulate them widely within the district.

PHDs will play the role of coordination among the districts, their technical supervision and providing them necessary financial and technical support like organizing trainings, compiling districts' data at provincial level, generating and disseminating analysis reports, publishing quarterly "News Letters", trouble shooting software and hardware problems, and promoting use of DHIS information through regular inter-district performance review meetings at provincial level. In the provinces there will be two distinct entities for the management of DHIS and its use. At the level of Directorate, there will be full-fledged HIS Unit for aggregation and compilation of DHIS reports from all the districts in the province, and to generate analysis reports. These reports will be sent to the HIS and Tertiary Hospital Management (H&THM) Unit at the PHD level. In addition to having role in Tertiary Hospital's management (as described later), this Unit will coordinate with the district for reviewing their performance based on DHIS data and to hold regular inter-districts performance review meetings at the provincial level under the chairmanship of the Secretary Health of the respective Provincial Government. This H&THM Unit will recommend financial proposals and development project based on district's performance.

In order to guarantee that the districts and PHDs can play their role effectively, the government needs to establish or strengthen HIS Units at each level headed by a senior level officer and appropriately staffed by technically related persons. Thus, at PHD there should be a Director (Grade 19/20) to head the Provincial HIS Unit and under him there will be a full-time Deputy Director (Grade 18/19) working as HIS Focal Person. The unit should also be staffed with computer experts and data analysts. The Provincial HIS Unit will also have provision to engage/hire Information Technology (IT) expert for the maintenance of DHIS software. Similarly, at district level there should be a full-time Grade17/18 Officer to head the District HIS Unit as Focal Person with one assistant and a computer operator. These staff should have appropriate academic background and be trained for their respective job. The H&THM Unit will be reporting to the Secretary Health and headed by Grade 19/20 grade Director belonging to the Provincial Health Cadre.

At federal level, NHIRC will be primarily responsible for overall coordination and technical assistance for the HIS in the country. It will coordinate the implementation of DHIS and other routine HIS with the provinces and with international agencies for financial/technical support. NHIRC will also be responsible for carrying out evaluation of the HISs and undertaking interventions for the improvement of those HISs. NHIRC will also coordinate with other VPs to integrate/complement the VP-ISs with DHIS. It will also be responsible for setting minimum standards for various HISs, conduct operations research activities, develop curricula for training and coordinate training activities for master trainers in the country. NHIRC will compile data from DHIS and other sources to generate national level aggregations and comparisons, and will disseminate them to the provinces, other ministries and international agencies. Initially NHIRC will coordinate and assist the provinces to facilitate arranging funds for implementation of DHIS till provinces/districts have their own regular arrangements for implementing DHIS.

Another important decision required to ensure ownership by the districts is to have district budget line-item for DHIS printing and procurement. This will ensure that budget is also allocated exclusively for DHIS, and in this way, continuity of DHIS supplies can be ensured. Currently, HIS gets the least importance and are frequently slashed out from the budget proposal. This has hindered the smooth implementation of HIS in the districts.

NHIRC also needs to be further strengthened to become fully staffed and functional and to show its full potentials as envisaged. Also, with the new development of DHIS, the role of NHIRC and its capacity building need to be enhanced by removing the bottlenecks for NHIRC to carryout its expected role and responsibilities.

1.2.3 Decisions for improving health system management practices that are directly influenced by DHIS

DHIS has been designed to meet the management needs at the district and provincial levels. Its vision to contribute to the improvement of the health services can only be realized if DHIS information is used for performance monitoring and management decision-making for continuous improvement of the health system's performance. For that, DHIS model incorporates regular performance review meetings at facility and district levels. The District Governments need to formalize/institutionalize this mechanism by providing clear decision and guidelines on how to conduct these meetings and how the District Government will facilitate and support the regular holding of these meetings and the implementation of the decisions made during such meetings.

PHDs can also institutionalize holding of regular inter-district meetings using DHIS information at the provincial level. This will enhance the interest and responsiveness of the districts towards using DHIS information, and the Provincial Government will benefit by being able to coordinate with and assist the districts to achieve national and provincial performance targets.

1.2.4   Steps for developing HIS Strategic Framework

The first step towards taking policy decisions for HIS in Pakistan would be to constitute provincial Working Group for developing a HIS Strategy Paper. This working group will promote broad-based participation and consultations with all concerned within and outside MOH or PHDs, including community representative. The drafted HIS Strategy Paper is drafted, it will be sent to MOH and PHD for vetting and after that it should be approved by the government.

Some of the issues discussed above would require administrative decisions. NHIRC, in collaboration with PHDs, will facilitate such decision making by the Provincial/District Governments.

1.3   Supervision/monitoring, coordination and management mechanisms at NHIRC/MOH, Provincial and District levels for DHIS

1.3.1   DHIS management at Districts

The primary ownership of DHIS lies with the districts. In this section, the organizational structure and tasks for DHIS management at district level are described as below.

The tasks related to DHIS management at the district include:

a) Filling-out of DHIS data collection instruments
b) Data compilation at the facility and timely submission of the Monthly Report to the district EDOH Office
c) Computer data entry using DHIS software at District HIS Unit
d) Generation of feedback reports and district report, and timely dissemination of the reports to appropriate persons/offices
e) Self-assessment and supervision to ensure production of high quality data
f) Ensuring availability of DHIS supplies
g) Ensuring allocation/availability of budget for DHIS related activities

h)   Ensuring availability of staff at District HIS Unit and assigning specific DHIS responsibilities to staff at facility level

i)   DHIS training/orientation and on-the-job training of staff

j)   Use of DHIS information

1.3.2   DHIS organizational structure at Districts

(1)   District HIS Unit

In the EDOH Office of every district there will be a District HIS Unit. This Unit will be well equipped and furnished, and will have two computers – one as the districts DHIS server and the other as the client computer for data entry. The Unit will have 24 hours telephone connection for receiving and transmitting DHIS data. As mentioned earlier, this unit will be under EDOH and headed by a Grade 17/18 Officer who will be assisted by a Statistical Officer and a Computer Operator/Data Entry Person.

The main responsibilities of this unit are:

- Collection, data entry and compilation of Monthly Facility Reports and other reports from primary and secondary level health facilities, e.g. BHU, RHC, THQH and DHQH
- Check / ensure quality of computer data entry
- Conduct DQA visits to the facilities and assist them in improving data quality
- Generating feedback analysis reports using the computer software
- Disseminate feedback reports to EDOH/ Director of Health (DOH) and Facility In-Charges
- Coordinate with DOH/EDOH to ensure adequate supply/stock of DHIS logistics
- On-job-training and institutional training of staff on DHIS

(2)   Facility-level DHIS focal person

At every primary care level health facility (BHU, RHC), the Facility In-charge will designate or assign one staff as the focal person for DHIS in that facility. In case of THQH and DHQH, a Medical Officer (MO) from the hospital will be nominated as the DHIS focal person. A Statistical Assistant will also be recruited/appointed to assist the DHIS focal person for that institution. The main functions of that DHIS focal person will be:

- Collection of compiled data from each department/staff

- Aggregation of the data and preparation of Monthly Facility Report
- In case of Hospitals with DHIS Software, he will be responsible for data entry
- Submission of the monthly reports to EDOH Office through the facility In-charge
- Arranging/conducting self-assessment of data quality within the facility
- Maintaining stock of DHIS supplies and arranging for replenishment from EDOH Office.

(3) District Health Management Team/District Health Team

Managers and staff at every level will be responsible for using DHIS data for self-assessment of their/facility's performance and apply problem-solving approach for continuous performance improvement. This can be done anytime when deemed necessary. However, to facilitate institutionalized participatory approach, the EDOH will constitute District Health Management Team/District Health Team in his district. Fortunately, in most of the districts in Pakistan, such entities already exist. In addition to the already define roles and responsibilities, these Teams will also be responsible for monthly review of DHIS information, identify problem areas and their root causes, prioritize solutions and develop Action Plans with tasks assigned to specific persons. Subsequently, the Teams will monitor the progress in the implementation of the Action Plan and improvement in performance indicators and take necessary decision accordingly.

(4) Facility monthly meetings

At the facility level, the Facility In-charge will conduct monthly staff meetings. At primary health care level facilities (like BHU, RHC), all the staff will participate in the meeting; and in hospitals, MS, DHIS Focal Person, all departmental in-charges will participate in the meeting. Performance review and decisions for problem solving will be made during these meetings. Data quality will also be in the agenda for discussion.

1.3.3 DHIS management at Provincial and Federal level

This has been described in section 1.2.2 above.

1.4 Provision of sustainable financial, human and logistic resources for DHIS

As repeatedly emphasized, the ownership of DHIS lies primarily with the districts. MOH/NHIRC and PHD will help the districts to implement DHIS by providing the necessary stewardship. Thus, initially NHIRC/PHD will provide necessary financial backup to the

districts to initiate the implementation of DHIS, but ultimately the districts will take over the responsibility to ensure allocation of budget for DHIS related activities. Thus, EDOH will be responsible for ensuring that sufficient allocation of budget for printing and supply of DHIS instruments is reflected in the annual health budget of the district. At the time of budget preparation, EDOH will advice the DOH or District Health Officer (DHO) and the facility in-charges to develop their respective budget demand that will include proposal for printing DHIS instruments for their respective facilities. The consolidated annual health budget (including proposal for DHIS expenses) will be sent to the District Assembly through District Nazim/DCO and EDO (Finance) for approval. Once the budget is approved, it will be the responsibility of EDOH, DHO/DOH and MS to ensure timely and proper utilization of the budget for DHIS.

In order to ensure timely and proper utilization of budget for DHIS, the districts will be given exemption from obtaining No-Objection-Certificate from government printing press. This exemption can be provided by the Provincial Government or the District Assembly. The Drawing Disbursing Officer (DDO), e.g. EDOH, DOH/DHO, MS will exercise full powers (sanctioning and procurement powers) under the financial rules of Provincial/District Governments. In this way, the districts will be able to print their own DHIS stationeries and ensure their timely supply to the health facilities. The focal person in the health facilities will maintain records of stock of DHIS instruments and regularly check the availability of adequate stock at the facility. Once the stock level reaches a minimum level, he will initiate necessary paperwork for their replenishment. In case, the allocated budget is exhausted and additional DHIS supplies are necessary, EDOH, DHO/DOH or MS will request for re-appropriation of the budget and take necessary measures to ensure supply of printed materials for DHIS.

For the provision of human resources, particularly for the District HIS Unit and Provincial HIS Unit, EDOH or DG of PHD will initiate Schedule for New Expenditure (SNE) for the creation of new posts for the respective HIS Unit. The SNEs will be approved by the competent authorities and recruitment will be done accordingly. Later on, these posts will become part of the regular budget.

1.5 DHIS capacity building, including institutionalization of capacity building mechanisms

Capacity building of the district and provincial managers and staff to perform DHIS tasks in an important activity for implementing and maintaining DHIS. Hitherto, all the training activities carried out for HMIS-FLCF have been done on ad-hoc basis without any proper institutionalization of the training activity. The result was that after the initial training of the

staff, there was a long gap before refresher trainings or training for newly appointed/recruited staff could be organized. Therefore, it is imperative that provinces and districts should have sufficient technical and logistic capacity to conduct initial and continuous training activities for DHIS. In this regard, Provincial Health Development Centers (PHDC) or Provincial Health Services Academy (PHSA) and District Health Development Centers (DHDC) will be made centers for DHIS training. In districts where there is no DHDC existing, a training cell will be established in EDOH Office having all the necessary training equipments and facilities required at the district level. Master Trainers from among the faculty members of these institutions will be selected and trained for imparting further training to provincial and district level trainers. These institutions will organize regular training activities from their regular budget. However, for the initial start-up training for the introduction of DHIS in the districts, NHIRC/PHD will provide the necessary budget. The subsequent refresher trainings and training of new staff will be conducted as a regular activity of these institutions. DHDC will be mainly responsible for conducting staff trainings in the respective district.

The same methodology for training implemented during the JICA assisted Development Study will be adhered to. That is, first master trainers from each province will be trained by NHIRC. These master trainers who are mostly from PHDC or PHSA, but can be from other government health institutions, will provide Training of Trainers (TOT) to district trainers, e.g. faculty of DHDCs. The district trainers will train facility staff, particularly the facility in-charge and DHIS focal person at district level. It will then be the responsibility of the trained facility staff to orient/train other staff of their facility accordingly.

For refresher training or training of newly appointed staff, the facility in-charge through EDOH/DOH will send nominations to DHDC/PHDC for inclusion of these staff in the regular DHIS training schedule. District will bear the travel and related costs, while DHDC will bear the cost for arranging the training out of their regular budget.

Three types of training activities will be carried out for the implementation of DHIS. These are:

1) Training on DHIS Instruments and DQA
   • District managers and facility staff are the target group for this training
2) Training on Use of DHIS Information
   • Provincial and district managers, DHIS Focal Persons and facility in-charge are the target of this training. They will receive hands-on training at their own district using real-time data from DHIS and developing the action plans that they will implement.
3) Training on DHIS Software
   • Provincial and district DHIS focal persons, Statistical Officers and computer

operators will be trained on full application, maintenance and trouble shooting of DHIS software.

Provincial and district managers will be oriented on how to access aggregate reports and feedback reports and to generate advance analysis reports using DHIS software.

1.6   Phases of expansion of DHIS (activities and timeline)

Introduction of DHIS throughout the country in one go would require enormous effort from all concerned. Therefore, the implementation of DHIS will take place in a phased manner, but carried out simultaneously in all the four provinces. The major activities for the implementation of DHIS throughout the country are:

1) Develop Provincial PC-1s for all four provinces each of 3 years duration. Alternately, PHDs can allocate funds from their regular budget. (Punjab and NWFP Health Departments will implement DHIS from their regular budgets.) In the light of NAP, these PC-1s or regular budget proposals will detail out all the activities and budget for the expansion/introduction of DHIS in the respective province. These activities include those given below.
2) Allocating budget for DHIS implementation
3) Establishing /strengthening the Provincial HIS Units and District HIS Units. This involves appointment/recruitment of appropriate staff through SNEs. However, till such time the SNEs are approved and staff recruited, government will depute staff for the interim period to immediately start the implementation process.
4) Printing and supply of DHIS instruments
5) Procurement of computer hardware for Provincial and District HIS Units
6) Installing the DHIS hardware and software in Provincial and District HIS Units
7) Training on DHIS. This is a step-wise process and involves sequentially:

- Training of Master Trainers
- Training of Trainers (TOT)
- Training of facility in-charges and other selected staff
- Orientation of all the facility staff

8) Use of DHIS instruments for data collection, aggregation and transmission, and use of DHIS information by the concerned government offices/managers for management decisions, e.g. procurement and distribution of medicines and supplies, and placement/redistribution of staff according to the workload. Audit personnel will also

use DHIS data for auditing.

All these activities can start simultaneously. Nonetheless, as a priority, the budget for DHIS implementation, strengthening of Provincial and District HIS Units and training of Master Trainers must be completed as a priority. Printing and procurement procedures will also start as soon as the HIS Units are established/strengthened and they can initiate necessary official procedures for printing and procurement. As the staff in the districts are trained, HIS Units will ensure that DHIS instruments and hardware are supplied to the districts such that when the staff training is complete, the districts can immediately start and uninterruptedly continue DHIS implementation.

In order to ensure proper management and stewardship of DHIS implementation by PHD, training and supply of instruments and installation of DHIS hardware/software will be done initially in 10 districts in each province during the first 3 months. After that, depending on the preparedness and capacity of PHD and concerned districts to handle the introductory activities, another 10 districts will be brought under DHIS in the next 3 months. In the following months, DHIS will be introduced in all the remaining districts. In this way, the introduction/expansion of DHIS to all the districts will be completed within 9 months.

NHRIC will provide the technical and financial/logistics support to the PHDs for smooth and uninterrupted expansion/implementation of DHIS in all the districts during the initial period. NHIRC will particularly assist in conducting training of provincial master trainers, installation of available software developed by SSC and initial printing of DHIS instruments.

For continuation of DHIS implementation after the completion of 3 years of initial developmental phase under PC-1, districts will take the responsibility of DHIS supplies, staff and maintenance of equipment/hardware. For that districts will incorporate all these activities into their regular budget. Thus, DHIS will consequentially transform from a developmental project of PHD to a regular scheme of the districts/provinces.

The Table 3 below shows the major activities, timeline and responsibility for the expansion/implementation of DHIS.

Table 3 DHIS expansion/implementation activities and timeline

	Activities	Timeline	Responsibility
1.	Develop and submit Provincial PC-1 to Provincial Government	Jan 2007	DGHS (Head of the attached department)
2.	Approval of PC-1	Jan/Feb 2007	Competent authority
3.	Allocation and Budget release	July 2007	Provincial Government
4.	Depute/assign staff for Provincial HIS Unit for interim period (till regular appointments are completed)	Feb 2007	PHD
5.	Appointment/recruitment of staff for Provincial HIS Unit observing all codal formalities	July-Sep 2007	Provincial HIS Unit will initiate the process. Competent authority will select and appoint the staff
6.	Depute/assign staff for District HIS Unit for interim period (till regular appointments are completed)	Feb 2007	EDOH
7.	Appointment/recruitment of staff for Provincial HIS Unit observing all codal formalities	July-Sep 2007	EDOH will initiate the process through District Government. Competent authority will select and appoint the staff
8.	Rate contracts for printing of DHIS instruments	July-Sep 2007	Provincial HIS unit will initiate the process. DGHS will award the rate contract for the entire province observing the codal formalities
9.	Printing order to the printing press	Oct-Nov 2007 and onwards (according to the need)	Drawing Disbursing Officers (DDOs): EDOH, DOH/DHO, MS)
10.	Distribution of DHIS instruments to the facilities	Dec 2007 onwards	Concerned DDOs
11.	Training of District Trainers	April-August 2007	NHIRC/PHD through PHDC/PHSA
12.	Purchase of DHIS Hardware (One time at the beginning of DHIS Implementation) for the districts of the respective province	July-Sep 2007, onwards	Provincial HIS unit will initiate the process. DGHS will procure the hardware supplies for the entire province observing the codal formalities
13.	Distribution of DHIS hardware to the districts	Dec 2007 onwards	Provincial HIS Unit
14.	Installation of hardware and software at districts	Dec 2007 onwards	Provincial HIS unit
15.	Maintenance and purchase of accessories and disposables for DHIS	Jan 2008 onwards	District EDOH, DHO/DOH, MS
16.	Training of Provincial Master Trainers	March 2007	NHIRC
17.	Training of District staff	Sep-Nov 2007	EDOH, through DHDC
18.	Orientation of facility staff	Sep-Nov 2007	Facility In-charge through staff trained at the district.

	Activities	Timeline	Responsibility
19.	Use of DHIS Information	Jan 2008 onwards	EDOH, other District managers, accounts/audit staff
20.	Provision of recurring cost for DHIS	Jan 2008 onwards	Respective Provincial/ District Government

The estimated cost for expansion of DHIS in all districts in the country is given in Annex 5.

1.7   Mechanism of DHIS revision and upgrade

DHIS is designed to meet the information needs for performance monitoring of the district health system. Its goal is to contribute to the improvement of the health services delivery. With the changing situation of the public health system in Pakistan, the information need, particularly the routine information needs may also change. There can be changes in health priorities. For example, Dengue and other hemorrhagic fever are attaining public health importance in Pakistan; maternal health issues are being brought to forefront and donors are helping the government to take large scale initiatives for the improvement of maternal health services; rehabilitation of those injured during the devastating earthquake of 2005 is still a lingering issue for the quake affected districts in NWFP; there is existence of a potential threat of wide-spread emergence of drug-resistant malaria and tuberculosis in Pakistan. There can be changes in management functions of the district health system or changes in their management practices. With gradually adopting the culture of evidence-based decision making, the managers may find need for other indicators to improve management efficiency and the use of some of the indicators in the current design of DHIS may become less important. In this situation, it is necessary that DHIS remains abreast with the changing information needs for the management of health system. Similarly, issues relating to data quality and information use, or issues relating to data entry, aggregation or report generation using DHIS software may arise. Thus, there is a need for continuous monitoring / review of DHIS and upgrading it according to the need of the time. The areas relating to DHIS that may require revision and upgrading are:

1) The design of DHIS – indicators and data elements, data collection and aggregation instruments, analysis reports
2) Data quality assurance mechanism and use of DHIS information mechanism
3) DHIS software and support systems
4) DHIS related knowledge, skills and motivation and DHIS Training methodology
5) DHIS support services, e.g., finances, supervision, training activities
6) Organizational commitment for DHIS implementation/continuation.

NHIRC will be primarily responsible for carrying out periodic monitoring and evaluation of DHIS to identify needs for improvement in any of the above stated areas relating to DHIS. NHIRC will establish a monitoring cell with appropriate staff and technical expertise to conduct such monitoring, analyze data and formulate necessary interventions for the improvement of DHIS. For this, NHIRC will also hire short-term consultants to assist them in carrying out the activity. NHIRC will coordinate with PHDs and the districts for regular implementation of this activity.

On the other hand, PHD and the districts will also communicate to PHD/NHIRC issues or requirement that may arise over time. NHIRC's monitoring cell will take necessary actions to address those issues or requirements. The HIS Unit of PHD will also conduct a yearly assessment of DHIS performance and identify strengths and weaknesses in the various components of DHIS. These findings will be shared with the concerned authority in PHD and districts and also communicated to NHIRC. PHD can then take necessary actions for the improvement of DHIS according to their need. If required, PHD will initiate a new scheme (if the cost is less than Rs 1.5 million) or develop a supplementary PC-1 (if cost is more than Rs. 1.5 million) for the implementation of the DHIS reform activities. However, in order to maintain uniformity, gross changes in the design of DHIS (indicators, data elements, data collection and reporting instruments, analysis reports, and software application) will be done through NHIRC only. This will ensure proper coordination among the provinces and adherence to basic minimum standards of DHIS. Issues like data quality and use of information, supervision, financing, and organizational commitment will be mostly handled by Provincial or District Governments. Provinces and districts, on their own, can add new reporting requirements according to their specific needs but without changing the original design of DHIS.

All the activities and decisions for the reform of DHIS will be carried out on broad-based consensus basis. Thus, NHIRC will ensure proper coordination and consultation with all the provinces and other stakeholders. Similarly, PHDs will have proper consultations with NHIRC and other provincial stakeholders for the reform of DHIS with their scope defined above.

Since the initial implementation of DHIS will be done through Provincial PC-1s, at the completion of the implementation of those PC-1s, the respective provincial government will form Planning & Development (P&D) Board for the final evaluation of the project. This Board will conduct their independent evaluation and on the basis of its results, DHIS may become a regular feature reflected in the budget or formulation of an extension PC-1 may be recommended for further development of DHIS.

1.8 HIS forums

For NAP implementation, particularly DHIS expansion throughout the country, NHIRC has a vital role to play. NHIRC has to provide high quality technical support and financial support to the provinces for the start-up activities and play a leadership and coordination role to see the implementation of NAP through. Therefore, it is crucial that NHIRC also gets the necessary support and guidance for efficiently executing its responsibilities.

Initially NHIRC was though to be an autonomous body and the management and supervision of its activities/performance was to be governed by a Board of Governors (BOG) to be enacted through an act of Parliament. It was, however, realized later that an autonomous body could not perform NHIRC's designated functions. Hence, the idea was dropped and NHIRC continued as a Government Department to be funded initially through Development Budget and subsequently out of normal/regular budget.

In this situation, a HIS Forum will be formed to support and guide NHIRC for the implementation of NAP. The composition of this proposed forum is similar to that of the BOG initially conceptualized for NHIRC, and is given as following:

- Secretary Health   Chairman
- DG Health/MOH   Deputy Chairman
- Executive Director NHIRC   Member Secretary
- Executive Director National Institute of Health (NIH)   Member
- All DGs /PHD   Member
- National Program Managers   Member
- Representative, Ministry of (M/O) Planning & Development   Member
- Representative, M/O Finance   Member
- Representative, Statistical Division   Member
- Representative, Partner Agencies   Member

For the purpose of NAP, the composition and role of this forum has been expanded to include Secretary Health of all the Provincial Governments and representatives from the interested development partners/international donors. This forum will meet regularly to review the progress made. This forum will provide the platform for coordination, collaboration and consensus building among Federal, Provincial and District Governments, and will help in avoiding duplication/overlapping of efforts and inputs by various stakeholders in improving HIS in Pakistan. Detailed role of the HIS Forum is described below.

The initial tenure of this forum will be for the first two years of NAP. After that, the necessity

and rationale of the forum will be revisited and decision for its continuation will be taken. Similarly, a provincial level, PHD will constitute a Provincial HIS Forum for overseeing the implementation of NAP in the province and providing a single platform for discussions coordination among the districts and with international agencies active in the province on matters related to HIS. Secretary Health of the respective province will be its chairperson, DG Health as Deputy Chairperson and Provincial HIS Unit head will be the Member-Secretary. Other members will be from Provincial Program Coordinators of National Programs, Representatives of Planning and Development (P&D) unit, EDOHs of the Districts.

1.8.1 Role of HIS forum

One of the most immediate tasks of the HIS forum will be to bring MOH, PHDs and the donors together for coordinating and monitoring the implementation of DHIS throughout the country, including the final fine tuning of the DHIS software and its installation in all the districts where DHIS is introduced.

The HIS forum should ensure uniform and proper implementation of all the components of DHIS throughout the country; this includes implementation of DHIS instruments for both Primacy Health Care Facilities and Secondary Hospitals, DHIS software, data quality assurance mechanism and use of DHIS mechanism.

The HIS forum will also provide necessary policy guidance for the development of TH-IS and PvtHS-IS.

The HIS forum will monitor the changing information needs of the health system. Any future modification of the HIS design will be discussed in the Forum and changes in the HIS will be carried out only through national consensus. Provincial government can make some modifications in the HIS design base on their needs, but these should be duly communicated to NHIRC and the HIS Forum. Similarly, districts may suggest some modifications to suit their needs; however, districts must consult PHD before making any modification.

Similarly, modifications in the software will also be agreed upon by the Forum.

The HIS Forum will maintain liaison with Health Metrics Network and work towards the improvement of HIS in Pakistan. One of the pending areas for HIS improvement is the integration of various VP-ISs. This can be achieved in various ways. One option is to upgrade the DHIS software so that it can accommodate entry/integration of data from VP-ISs at district

level. Such an initiative will require national consensus and coordination/collaboration. The HIS Forum will provide the necessary platform for such consensus building.

The HIS forum will assist the Government in taking important HIS policy decisions; it will also promote organizational changes toward use of information for evidence-based decision making for the management of health system. The Forum will provide the platform for discussion on provision of HIS resources through donor coordination.

2. Tertiary Hospital Information System (TH-IS) in Pakistan

2.1 Tertiary Hospitals in Public Health Sector

In the public health sector in Pakistan, tertiary hospitals are autonomous institutions responsible for their own management. They, however, receive financial allocations from the federal or provincial governments and are, thus, reportable to the respective federal or provincial government.

Most of the tertiary hospitals are affiliated with or part of teaching institutes. These hospitals are large complex institutions with complex administrative arrangement. There are separate departments for various specialties. Classically, each department is headed by the departmental head to whom junior doctors are reportable. In many tertiary hospitals, there are two or more units under each department. These units are under the unit heads who in-turn are under the departmental head. The nursing cadre is managed by the Matron or Chief Nurse. She is responsible for preparing nurses' duty rosters, collection, compilation of daily bed statement from the wards and forwarding it to the MS of the hospital, and overall supervision of the nurses. The Matron reports to the MS. The MS is responsible for the overall management of the hospital. However, in teaching hospitals, there is Board of Directors/Governors (BOD/BOG) and the Principal of the Medical Institute is the institutional head. In that case, the departmental heads and the MS report to the Principal, and the MS manages the capital assets, logistics, finances and human resources up to the level of MO.

The Federal/Provincial Government does not interfere with the internal management of the tertiary hospital. The BOD/BOG is the apex authority to supervise and resolve issues of the hospital. Nevertheless, the hospital must report its overall performance and financial expenditure and place budget request for the next fiscal year to the respective government.

2.2   TH-IS – current situation

Traditionally, the tertiary hospitals have their own patient-oriented paper-based IS. These vary to some extent from hospital to hospital, but have fairly served the purpose of patient and ward management. In more modern and specialized tertiary hospitals, they have introduced computerized ISs on their own initiative.

However, IS in many public sector tertiary hospitals is deficient in terms of providing relevant information for internal management of human resources, finance, equipment and other logistics. Similarly, the system of data collection, aggregation and transmission/reporting for disease surveillance is also weak. DQA mechanisms and use of information practices are lacking and the feedback mechanism is deficient.

2.3   Conceptual design of the improved TH-IS

The tertiary hospitals are complex institutions and have complex management systems. Though they are similar in many ways, but they also vary in terms of their specialization, staffing, logistic requirements, and management structure and practices. Thus, the information needs may also vary and, therefore, each tertiary hospital will require IS that is customized to its situation. Nevertheless, the basic/core principle of the IS for tertiary hospital is applicable for all the tertiary hospitals. While each tertiary hospital has the autonomy to develop or maintain its own IS according to its own situation, efforts to improve the IS of the public sector tertiary hospitals must address the core issues for the sake of achieving/establishing a uniform core IS that meets the minimum/basic information needs.

Thus, the overall objective of the TH-IS will remain as "to provide information for management and performance improvement of the tertiary hospital". More specifically, the TH-IS will provide the necessary information that will contribute to:

- Improvement of quality of patient care services in the hospitals
- Improvement of planning and management of
  - Services, such as preventive, curative and rehabilitative
  - Resources
  - Teaching activities
- Meeting the information needs of public health importance.
- Improvement of performance monitoring and accountability through feedback

2.3.1 TH-IS core indicators and data elements

The core indicators for meeting the information needs to fulfill the above stated objectives can be categorized as (1) those meeting hospital management needs, and (2) those meeting individual patient care needs. In the table below, the core indicators meeting the hospital management information needs are listed. This table also provides the rationale for collecting the information and their data source.

Table 4 TH-IS information needs, data requirements and data source

	Information needs /Indicators	Rationale	Required Data Elements	Data Source
1.	OPD Patient Attendance	▪ Assess OPD performance ▪ Know workload on providers ▪ Arrange logistics ▪ Plan further development	– Total OPD attendance by each OPD – Working days	◆ Individual OPDs or ◆ Central Registration Point (CPR)
2.	OPD disease pattern (notifiable diseases)	▪ To know the types of cases coming for outdoor services. This will help in planning for logistics/ human resources accordingly ▪ Know the increasing / decreasing trend of important diseases or occurrence of new/re-emerging diseases in the catchment population	– Number of patient with notifiable /listed diseases attending OPD	◆ Individual OPDs
3.	Casualty Out-door (COD) /Emergency Department Patient Attendance	▪ Assess COD performance ▪ know workload on COD ▪ Arrange logistics ▪ Human resource development planning ▪ Notification of unusual cases ▪ Plan further development	– Total COD attendance – Types of cases attended – Deaths at COD – Medico Legal cases (MLCs) – Staff at COD – Stock of emergency drugs at COD – Equipment at COD	◆ COD / Emergency Department ◆ Same as # 11 ◆ Same as # 12 ◆ Same as # 13
4.	Bed-occupancy Rate (BOR) and Indoor Average Length of Stay (ALS)	▪ Assess performance of individual ward ▪ Reduce unnecessary stays / early discharges (i.e. promote rational management of patients)	– Daily/Total admissions – Daily/Total discharges/deaths/ LAMA – Total beds	◆ Hospital wards through Chief Nurse or Matron's Office ◆ Statistician

	Information needs /Indicators	Rationale	Required Data Elements	Data Source
		▪ Plan for indoor bed requirements		
5.	Indoor deaths	▪ Assess quality of indoor services ▪ Report on unusual occurrences of indoor deaths	– Total deaths in the wards	◆ Hospital wards through Chief Nurse/Matron's Office
6.	LAMA (Left Against Medical Advice) cases	▪ Assess quality of indoor services	– Total LAMA cases	◆ Hospital wards through Chief Nurse/Matron's Office
7.	Indoor disease pattern	▪ Management of logistics and human resources ▪ Disease surveillance / reporting to PHD/MOH	– Number of Indoor cases by diagnosis, age, sex – Indoor deaths by diagnosis, age, sex	◆ Hospital wards through record room
8.	Surgeries performed	▪ Assess the load on surgical ward/Operation theater (OT) ▪ Plan and manage logistics, human resources, infrastructure	– Number of surgeries performed, by type of surgery	◆ OT
9.	Deaths in wards audited	▪ Monitor internal efforts to improve quality of services ▪ Promote accountability	– Number of indoor deaths – Number of indoor deaths audited	◆ Departmental/ Unit Head
10.	Number of investigations performed	▪ Assess the quality and performance of diagnostic services ▪ Promote accountability ▪ Logistic management	– Number of investigations done by type	◆ Laboratory, Radiology (Diagnostic) Departments ◆ CPR
11.	Human Resources	▪ Assess the human resource requirements to meet the workload ▪ Planning human resource development	– Staff sanctioned by each category – Filled and vacant posts by each category	◆ Medical Superintendent (MS) Office / Human resource unit
12.	Medicine stock status	▪ Management of medicine stock / prevention of stock-outs ▪ Promote accountability	– Medicine in-stock – Out of stock – Total consumption	◆ Medical store
13.	Equipment status (Functional / non-functional)	▪ Planning and maintenance	– Number of functional /non-functional equipment	◆ Inventory /Survey (MS Office)
14.	Service cost/Finance	▪ Feedback to patients ▪ Feedback to Government ▪ Financial planning	– Cost of services (esp. medicine and investigations) to individual patient	◆ MS Office / Finance unit

	Information needs /Indicators	Rationale	Required Data Elements	Data Source
			– Per-capita cost of treatment at indoors – Financial statement	
15.	User satisfaction	▪ Improve patient-hospital interface.	– Number of monthly complaints	◆ Complaint center

2.3.2 Components of TH-IS

(1)   TH-IS instruments

Tertiary hospitals are large and advanced-level institutions with complex management requirements and sophisticated patient care. Improvement in the design of TH-IS should be seen as coming in stages. This would also effect the design of TH-IS instruments. Thus, in the initial stages of improvement, focus is primarily on the TH-IS instruments that are related to capturing the core/minimum set of data required for hospital management (as given in the Table 3 above). In the subsequent stages, improvement in the system for capturing data for individual patient care is also addressed.

In the initial stage of TH-IS improvement, the design of TH-IS takes the advantage of existing data collection tools at tertiary hospitals. Practically, no new data collection tool is introduce, only necessary modifications are done to accommodate or ensure that the required data is captured by the respective instrument. The design of TH-IS also takes the advantage of the ICT and reduces paper-work by introducing computer programs for data entry at relevant points. This will help in producing regular reports as well as need-based special reports utilizing the data entered in the computer.

In the later stages, more sophisticated computer application/software is introduced that gradually interlinks various units/departments. With the help of this computerized system, a patient coming to the hospital gets a unique Identification (ID) Number and at every service delivery or contact point and on every subsequent visit, his/her data is entered in the computer using that same ID Number. This will help in preserving the patient's profile for current and future use, and thereby contribute to quality of patient's care, including continuity of care.

Thus, there will be a gradual shift from paper-based system to a computerized system and, therefore, there the design of data collection instruments will also change. TH-IS instruments that will be applied at initial and later stages for capturing the minimum basic (core) data as listed above are as given in the following table:

Table 5   TH-IS data collection and compilation instruments and tools

	Information needs /Indicators	Early (Initial Stage) version of TH-IS		Mid Stage version	Final Stage version
		Data Collection Instrument	Data compilation Program	Advanced data collection method	Fully computerized data collection
		Mostly Paper-Based	*Stand-alone computers at a few specific points*	*Computers at a few specific points linked with main server*	*Computers at every data collection and use point linked with main server*
1.	OPD Patient Attendance	▪ OPD Registers	▪ Computer program at Statistical Room	▪ Computer program at Central Registration Point (CRP)	▪ Computer program at CRP linked with main server
2.	OPD disease pattern (notifiable diseases)	▪ OPD Tally sheet at each OPD consultation room (Abstract Form)	▪ Computer program at Statistical Room	▪ Computer program at Statistical Room	▪ Computer in each OPD consultation room
3.	COD/Emergency Department Patient Attendance	▪ COD Register ▪ COD Report (Abstract Form)	▪ Computer program at Statistical Room		▪ Computer at COD linked with main server
4.	Bed-occupancy Rate (BOR) and Indoor Average Length of Stay (ALS)	▪ Daily Bed Statement Register	▪ Computer program at Matron's Office	▪ Computer program at Matron's Office linked with main server	▪ Computer program at each ward linked with Matron's Office through main server
5.	Indoor deaths	▪ Daily Bed Statement Register/Report	▪ Computer program at Record Room	▪ Computer program at Record Room	▪ Computer program at each ward linked with Record Room through main server
6.	LAMA (Left Against Medical Advice) cases	▪ Daily Bed Statement Register/Report	▪ Computer program at Matron's Office	▪ Computer program at Matron's Office linked with main server	▪ Computer program at each ward linked with Matron's Office through main server
7.	Indoor disease pattern	▪ Discharge certificate, or ▪ Medical Records ▪ Indoor Register	▪ Computer program at Record Room	▪ Computer program at Record Room linked to main server	▪ Computer program at each ward linked with Record Room through main server.
8.	Surgeries performed	▪ OT Register	▪ Computer program at statistical Room	▪ Computer program at statistical Room	▪ Computer program at OT Nurse room linked with main server

		Early (Initial Stage) version of TH-IS		Mid Stage version	Final Stage version
		Data Collection Instrument	Data compilation Program	Advanced data collection method	Fully computerized data collection
9.	Deaths in wards audited	▪ Departmental Head's Register for recording indoor deaths audit reports	▪ Computer program at Record Room	▪ Computer program at Record Room linked to main server	▪ Computer program at each ward linked with Record Room through main server.
10.	Number of investigations performed	▪ Laboratory / Radiology Registers	▪ Computer program at Statistical Room	▪ Computer program at CRP	▪ Computer program at CRP linked with lab/radiology unit through main server
11.	Human Resources	▪ Register at Human resource Unit	▪ Computer program at Statistical Room	▪ Computer program at Statistical Room	▪ Computer program at Human resource Unit linked with main server
12.	Medicine stock status	▪ Medicine Stock Register ▪ Medicine stock report	▪ Computer program at Statistical Room	▪ Computer program at Medical store linked with main server	▪ Computer program at Pharmacy linked with Medical store through main server
13.	Equipment status (Functional / non-functional)	▪ Equipment register /	▪ Computer program at Statistical Room	▪ Computer program at Statistical Room	▪ Computer program at Procurement linked with main server
14.	Service cost/finance	▪ Fee receipt register/books ▪ Expenditure record register		▪ Computer program at finance unit feeding in reports from diagnostic units and medicine store and finance department	▪ Computer program at accountant room linked with main server
15.	User satisfaction	▪ Complaint Center Register ▪ Complaint Center Report	▪ Computer program at Statistical Room	▪ Computer program at Complaint Center	▪ Computer program at Complaint Center
16.	Report for MS, Feedback to PHD/MOH	▪ TH-IS Monthly Report ▪ TH-IS yearly Report	▪ Computer program at Statistical Room	▪ Computer program at Statistical Room linked with main server	▪ Computer program at Statistical Room linked with main server

(2)   TH-IS Computer programs

As indicated in Table 5, TH-IS computer program will depend on the stage of TH-IS improvement. In the initial stages, there will be only a few specific points where data will be entered using computer program. These points are:

1)   The Matron's Office, where the data from daily bed statements of each ward will be entered and a compiled report will be generated for the MS, OPDs and unit/departmental heads

2)   The Record Room, where data from patient charts of discharged/dead patients will be entered

3)   Statistical Room, where data from OPD Registers and tally sheets and COD Report will be entered. The Statistical Room staff will also be responsible for entry of data collected from other units, particularly on investigations performed, human resources, medicines and equipment, and complaints .The Statistical room /HIS unit will be responsible to collect and compile data from all these points and will be responsible to prepare report for MS, PHD, etc.

The second stage of TH-IS improvement is the advanced stage of the transition to fully computerized system. In this stage, an advanced computer software of TH-IS will be developed that will provide Local Area Network (LAN) linkages with the main server. Computer stations for data entry and use will be expanded to a few more points. The basic principle of establishing linkage would be to issue a unique ID Number to every patient coming to the hospital for any service. The same ID Number will be used for data entry at any service delivery point for the current or future visits to the hospital. In addition to the above three computer stations (viz. Matron's Office, Record Room and Statistical Room), the Central Registration Point (CRP) will be brought under the computerized program. Here data on OPD attendance and fee receipts will be entered. Initial data on investigations advised and fee collection for that will also be entered here. Also, the Medical Store will have computerized system for data entry and use. The Table 6 below provides a list of data that will be captured at various computer stations and the type of reports that can be generated from them.

Table 6   TH-IS computer stations during Mid stage

	Computer station	Purpose

a)	Central Registration Point (CRP)	1. Capture data on OPD patients
		    ♦ Name, Age, Sex, Address
		    ♦ Sent to which OPD (Medicine, Surgery, Obstetrics /Gynecology, Pediatric, Orthopedic, etc.)
		    ♦ Fee collected for OPD
		    ♦ Fee collected for investigation
		    ♦ Type of investigation advised by Medical Officer (MO)/Specialist
		
		 2. Generate reports on:
		    ♦ Total OPD attendance by type of OPD
		    ♦ OPD fee collection
		    ♦ Number of Investigations by type
		    ♦ Fee collection for investigations
		
		3. Additional analysis possible:
		    ♦Distribution of OPD patients by locality

b)	Statistical Room	1. Capture data on Human Resources
		    ♦ Posts sanctioned (by category)
		    ♦ Posts filled
		    ♦ Name and academic qualification/specialization of staff filling the post
		    ♦ Vacant posts
		    ♦ Additional contractual recruitments
		
		2. Capture data on equipment
		    ♦ Functional/non-functional
		    ♦ Distributed to which units
		
		3. Capture data from OPD/COD
		    ♦ Disease /cases
		
		4. Generate reports on:
		    ♦ Sanctioned, filled and vacant posts
		    ♦ Staff availability by specialization/training
		    ♦ Equipment/medicines/complaints
		    ♦ Disease profile, trends

c)	Matron's Office	1. Capture data on indoors (by each ward)
		    ♦ Daily admissions
		    ♦ Daily discharges / LAMA / Deaths
		    ♦ Beds Occupied /Vacant
		
		2. Generate reports (daily/monthly/yearly)on
		    ♦ Total admissions
		    ♦ Total deaths
		    ♦ Total LAMA
		    ♦ Beds vacant for each day's admission
		    ♦ Bed-Occupancy Rate (BOR)
		    ♦ Average Length of Stay (ALS)

	Computer station	**Purpose**

d)	Record Room	1. Capture data on indoors (from patient charts of discharged/dead patients)
		  ◆ Name, age, sex, address
		  ◆ Date of admission
		  ◆ Ward and bed number
		  ◆ Diagnosis
		  ◆ Discharge/LAMA/Death status
		  ◆ Date of discharge/LAMA /Death
		
		2. Generate reports on:
		  ◆ Indoor disease profile (overall and by ward)
		  ◆ Total admissions, discharges, LAMA and deaths
		  ◆ ALS

e)	Medical Store	1. Capture data on medicines and other supplies
		  ◆ Stock position
		  ◆ Cost
		
		2. Generate reports on
		  ◆ Medicine consumption
		  ◆ Stock-outs
		  ◆ Forecasting
		  ◆ Cost of medicine

In the Final stage of improvement, all the units will be brought under the computerized program and will be interlinked through the main server. Thus, there will be additional computer stations at:

- All OPDs
- All wards
- OT
- Lab and Radiology Departments
- Medical Store and Pharmacy
- Equipment store
- Finance department
- Administration Office, etc.

The specification of the computer program applicable at all the above points will depend of the specific requirements of the individual tertiary hospital. Therefore, the designing of the computer system at this Final stage will take into account the common requirements and the specific requirements of tertiary hospitals.

(3)   TH-IS DQA Mechanism

DQA mechanisms will be in-build in TH-IS, particularly in the computer programs. Cross-checking data between Matron's Office and Record Room will help to tally the data on admissions, discharges and deaths. Similarly, cross-checking data on total OPD and fee collected at CRP, cross-checking CRP data on investigations and records at diagnostic centers will help in assessing the level of data quality. LQAS technique will also be applied in cross-checking indoor data.

(4)   TH-IS Use of Information Model

The overall goal of this model is continuous performance improvement. The principles of problem solving, continuous improvement and self-regulation are applied in model.

2.4   TH-IS management mechanism

2.4.1   Data collection and reporting

The mechanism of data collection and reporting is developed upon the existing practices in the tertiary hospitals. The section below, only the changes /improvement in the TH-IS management as they occur in the three stages are described.

(1)   OPD

In the initial stages, when OPDs are not within the computerized network, OPDs will maintain a tally sheet for capturing data on the number of cases of notifiable/listed diseases attending the OPD. At the end of the month, these tally sheets will be sent to Statistical Room for data entry and reporting.

In the later stages, each OPD will have a computer station manned by a junior doctor or a computer assistant. After each consultation, relevant data from the OPD ticket will be transferred to the computer software using the ID number assigned to the patient at CRP. The data will be used for generating reports on OPD attendance and disease profile. It will also be used for future reference in case the patient comes for revisit for the same disease or any other disease or if the patient is admitted in the ward or sent to laboratory/radiology for investigations.

(2)   Central registration point (CRP)

In the initial stages of TH-IS development, the CRP will only maintain a Register for recording the receipt of "Purchee" fee. Later on, in the 2nd stage of development, CRP will be linked with other units through the computer program. The CRP staff will directly enter the patient's data into the computer and print-out the OPD ticket. The computer program will assign a unique ID Number to the patient. The patient will take the OPD ticket to the concerned OPD. There the MO/Specialist will provide consultation and, if required, will write the necessary investigations on the OPD ticket. The patient will come back to the CRP and show the OPD ticket and pay the fee for investigations. This time CRP staff will access the patient's data using the unique ID Number and make all the additional entries regarding investigations. He will print out the fee receipts for each investigation and hand it over to the patient. The patient will then take the receipt to the diagnostic department who will access the patient's record using the ID number and do the required data entry.

Patients coming for next visit should bring the OPD ticket for future references and easy access to previous computer entry at CRP.

At the end of each month and yearly, the Statistical Room will access the OPD/COD data through the LAN and print out computer-generated reports on OPD attendance, fee collection and investigations, and submit it to the MS Office.

(3)   Casualty Out-door (COD)

Initially, at COD the staff will maintain a register to enter the details of patients coming to the COD. They will use this register to compile reports on total patients, case profile and deaths at COD. This report will be submitted to Medical Superintendent (MS) Office.

In the later stages, COD will also have a computer station for entering data of patients attended at COD. They will also assign a unique ID number to the patients coming to the hospital for the first time. Report on COD Statistics will be generated by the Statistical Room by accessing the server through LAN.

(4)   Matrons' office

At the end of each day (mid-night) the night shift nurse will fill up the Daily Bed Statement Register and submit the report to the Matron Office. At the beginning of each day, in the morning, staff at Matron's Office will enter data from all the Daily Bed Statements received

from the wards. He will print-out a report on the bed-status of each ward, especially the status of vacant beds. This report will be submitted to the MS Office in the morning who will communicate the number of vacant beds at each ward to the respective OPD for them to know how many new patients can be admitted on that day. At the end of each month/year, report of Bed-occupancy Rate (BOR) and Length of Stay (ALS) and deaths will also be generated and submitted to MS and BOD/BOG.

(5)   Indoor wards

In the initial stages of TH-IS development, the wards will maintain only paper-based records. However, with subsequent development of software, the wards will also be linked to the server. Details of patients admitted in the ward will be entered by the duty nurse or junior doctor in the ward.

The data will be used by the Statistical Room and individual wards/departments to generate daily bed statements and monthly indoor reports on total admissions, discharges, deaths, and Left Against Medical Advice (LAMA), BOR, ALS, and disease profile. Individual patient data will be used by the attending physician/surgeon for deciding/planning the treatment.

(6)   Record room

When a patient is admitted in a ward, a Patient Chart is created that contains details of patient's examination findings, investigations, diagnosis, treatment and day-to-day follow-up. On discharge or death, the chart is closed and sent to the record room for filing. On receipt of the patients' charts, the record room staff will enter the relevant data in the computer before filing the charts. At the end of each month/year, the staff will generate reports on disease profile, admissions, discharges, LAMA and deaths in each ward and submit to the MS and BOD/BOG.

(7)   Store

At the medicine store the storekeeper will maintain stock register for the medicines. He will use this register to calculate the stock situation and out-of-stock status of the medicines and report to MS for necessary actions.

(8)   Statistical room

The Statistical Room will be assisting the Medical superintendent's (MS) Office for compilation of reports and their onward transmission. Thus, in addition to receiving the various

reports generated by the sub-ordinate units and compiling them for onward transmission to BOD/BOG and PHD, the MS Office will also maintain the records of each staff in the hospital. Each staff will have a Personal File and the main features from the Personal File will be entered in the computer. This computer entered data will be used to generate reports on the status of filled and vacant posts and also on the specialization/training status of the staff. This report will be used for requesting the required staff and for arranging necessary training for the staff.

2.4.2   Data quality assurance

MS Office will be mainly responsible for carrying out data quality checks. A designated staff will be made responsible for ensuring that data quality checks are applied at the respective unit and reported to the MS.

2.4.3   Use of TH-IS information

There are four levels at which the data generated by TH-IS will be used. One is at ward/department level, where each ward/unit in-charge will use the data for self-regulation and performance improvement. Second and third levels are MS Office and BOD/BOG who will use the data for monitoring the overall performance or functioning of the hospital and make necessary decisions according to their authority/responsibility for problem solving and continuous improvement. The fourth level of use of TH-IS information is PHD/MOH level for making administrative/policy decisions and for future planning.

Thus, Ward/Departmental heads will have monthly performance review meetings at their respective wards. MS will have a monthly review meeting with his administrative staff and BOD/BOG will also meet monthly and yearly to review the overall performance of the hospital and report to the government. PHD/MOH will organize quarterly/yearly meetings with BOD/BOG for review of hospital's performance and future planning.

2.4.4   TH-IS training

The Principal of the Teaching Institute with the assistance of MS will arrange regular training of the staff on TH-IS instruments and computer program.

2.4.5   Allocation of budget for TH-IS

The MS Office will prepare annual budget for TH-IS supplies, computer program maintenance

and related activities. He will submit it to the Principal for approval. The Principal with the assistance of Director of Finance will allocate necessary budget for TH-IS.

Once budget is approved, MS will arrange for procurement and distribution of TH-IS supplies and implementation of related activities, e.g. training.

2.5   Provincial level management and coordination mechanism

Tertiary hospitals are semi-autonomous institutions. However, they are financed by either the PHD or the MOH and, therefore, the tertiary hospitals in the public health sector are answerable to the respective funding organization of the government. In order to improve the management and answerability of the public sector tertiary hospitals, a Provincial HIS and Tertiary Hospital Management (H&THM) Unit will be established in the PHD. This unit will be headed by the Director (HIS and Tertiary Hospital Management) from the Provincial Health Cadre. He/she will be reporting to the Secretary Health of the Provincial Government. This unit will be responsible for performance monitoring of tertiary hospitals under PHD. It will assist the Budget and Accounts/Audit Department of PHD to review financial management of the hospitals and recommend and process financial proposal or other development projects based on the performance of the tertiary hospitals. For human resources for tertiary hospitals, this unit will coordinate with the Establishment Wing of PHD. The other responsibilities of this unit relate to HIS and have been described in section under DHIS.

This unit will hold quarterly performance review meetings under the chairmanship of Secretary Health of the Provincial Government. The tertiary hospitals will present their performance and issues/problems during these meetings. Decisions will be taken by the competent authority based on the problem analysis and performance review.

The Provincial HIS Cell under the DG Health will coordinate and collaborate with this Provincial H&THM Unit under the Secretariat for collection, compilation and analysis of reports from tertiary hospitals.

2.6   Role of MOH and NHIRC

The role of MOH with regard to those tertiary hospitals that are under MOH is same as that of PHDs managing the tertiary hospitals under them. MOH has recently appointed an Inspector General (Hospital) for monitoring tertiary hospitals' performance and recommending actions for the improvement of their management and services. However, there should be a full-fledged unit at MOH for the management of tertiary hospital who will receive reports from the

tertiary hospitals, carrying out supervisory visits and hold quarterly performance review meetings to recommend to the competent authority actions for the improvement of the tertiary hospitals' performance and quality of services.

In the context of TH-IS, the role of NHIRC is to coordinate development activities, e.g., development of a computerized TH-IS, collect and aggregate disease data from tertiary hospitals and produce analysis reports.

2.7   Time framework of the implementation of TH-IS

As indicated above, the implementation of TH-IS will be in three stages (see "Table 2 Status of each stage of NAP", p. I-19).

3.   Private Health Sector Information System (PvtHS-IS) in Pakistan

3.1   Private health sector in Pakistan

In Pakistan, private health sector is widely spread all over the country and is seen as an important health care provider. Private health sector is globally recognized as a heterogeneous entity[9]. However, for simplicity sake, the private health sector in Pakistan can be defined simply as all those health care providers or institutions that fall outside the direct control of the government. These private health care providers may be individual practitioners, groups of practitioners, or institutions (clinics, hospitals, etc.), and include both for-profit and not-for-profit providers and organization. With regard to recognized schools of health care the private sector belongs to, there are allopathic (modern medicine), homeopathic, herbal and traditional medicine practitioners or institutions. On the other hand, quacks also constitute a formidable portion of the private health sector. Even if only the private sector belonging to allopathic/modern medicine is considered, the classification of private health sector is not clear and simple. For example, there are government physicians who are part-time private practitioner in there own clinics or private drug stores; there are private health facilities where government physicians work on part-time basis. Currently, with Punjab Rural Support Program and other public/private collaborations, there are government health facilities where doctors employed by non-governmental organization are providing health care services.

Given the complexity and wide diversity within the private health sector and taking into consideration the capacity of the public health sector itself to reach out to the multiplicity of private health sector providers, efforts to bring the private health sector within the fold of HIS

can be realistically carried out only in an incremental manner. Within this pretext, the medium to large formal private health institutions providing modern medical/health (allopathic) care are considered as the primary focus for establishing HIS within the realm of private sector.

Currently, in Pakistan, various forms of Public-Private Partnership have emerged. Some selected private institutions are collaborating with the public health sector for surveillance of Acute Flaccid Paralysis (AFP) cases. There are other private organizations who receive vaccines or family planning commodities from public sector and provide these services from their health facilities. Organizations like National Rural Support Program (NRSP) are assisting the public sector in managing and running basic health facilities in rural areas. Such types of partnership also require information support. Thus, there is potential for developing IS that can contribute to improving the management of Public-Private Partnerships. On the other hand, private sector is actively involved and contributing a large share in the management of cases of public health interest, e.g. tuberculoses (TB) patients, malaria patients, maternal health and delivery cases. Information on such cases attended at private health facilities would help the government institutions to plan and implement interventions by themselves or through engaging private sector in public-private partnerships.

Nonetheless, in order to establish any form of IS for Private health sector, promulgation and strict implementation of Health Regulatory Ordinance is an essential pre-requisite. Without that, trying to establish the IS for private health sector would be futile exercise. Examples abound in Pakistan where efforts to bring private health sector under the umbrella of a routine HIS through personal contacts and motivation has yielded only limited success.

3.2   Conceptual design of PvtHS-IS

3.2.1   Objectives of PvtHS-IS

The primary objectives of the PrtHS-IS are to contribute to:

(1)   Improving quality of services through health regulation & accreditation
(2)   Disease Surveillance
(3)   Mapping/ Database of private health providers for purposes of equity, helping private sector in identifying gaps and improving services, and awareness of the community about availability of services
(4)   Improving management of Public-Private Partnership

3.2.2 PvtHS-IS core indicators and data elements

Commensurate with the objectives of PvtHS-IS, the core indicators and the required data element are in the following table. This table also provides the rationale for collection the information and its data source.

Table 7   Pvt-IS Information needs, data requirements and data source

	Information needs /Indicators	Rationale	Required Data Elements	Data Source
1.	Distribution of private health facilities by locality	▪ Know the number of Private Health Facilities in a locality ▪ Form the basis of private health facilities' registration and regulation ▪ Community awareness on location of and services provided from private health facilities ▪ HRA to facilitate/guide private providers to areas that are underserved and have less number of health facilities registered.	– Location of private health facility – Types of services (clinical and diagnostics) provided from the facility – Number of indoor beds in the facility	◆ HRA /PHD database on private health facilities registering with HRA
2.	Proportion of private health facilities registered with Health Regulatory Authorities (HRA) or PHD/MOH	▪ Know the extent of private health facilities brought under regulation ▪ Plan strategy for achieving full coverage by regulatory authority	– Number of private health facilities in a locality – Number of private health facilities registered with HRA / PHD	◆ HRA /PHD database ◆ Survey by PHD and/or District Government

3.	Private health facilities meeting or not meeting health regulation standards	▪ Ensure quality of care
		▪ Know if private providers are meeting the minimum standards for infrastructure/ resources and treatment Standard of Practices .
		▪ De-register facilities not meeting regulation standards
			– Data on infrastructures and resources:
			  ◆ Type of human resource and qualification
			  ◆ Building
			  ◆ Net and gross space to bed ratios
			  ◆ Operation Theaters
			  ◆ Diagnostic Facilities
			  ◆ Equipment
				◆ Private Health Facility's Report
				◆ HRA database

	Information needs /Indicators	Rationale	Required Data Elements	Data Source

			– Data on treatment practices
			– Information on outcomes of services, e.g.
			  ◆ Average length of stay
			  ◆ Death Rate
			  ◆ Cesarean (C)- Section Rate
			  ◆ Infection Rate
			– Names of private health facilities meeting or not meeting regulation standards	

4.	Cases of public health importance attended at Private Health Facility	▪ Disease surveillance	– Profile of cases notifiable and/or of public health importance, e.g., AFP, Dengue/VHF, Obstetric complications	◆ Private Health Facility's Report ◆ PHD Database
5.	Performance of health facilities managed through public-private partnerships	▪ Performance monitoring for continuous performance improvement	– Performance data according to the services provided through the public-private partnerships.	◆ DHIS like IS maintained by the health facility

3.2.3 PvtHS-IS components - instruments and computer program

The PvtHS-IS instruments are designed according to data to be collected for meeting the objectives of the IS. Thus, these include instruments for:

    i.   Collection of data for private health facilities database/mapping
    ii.   Regulatory data collection, and
    iii.   Disease reporting
    iv.   Performance reporting

Instruments to serve the above purposes are:

    1) For collection of data for private health facilities database/mapping

- Private health facility basic data form
- Private health facility data computer entry and mapping program
- Private health facility report/map

2) For regulatory data collection
   - Private health facility infrastructure form
   - Private health facility human resource form
   - Private health facility infrastructure and human resource monitoring checklist
   - Private health facility report on deaths, C (Cesarean) -Sections, Hospital Infections, Average length of stay (ALS)
   - Private health facility standard of practices monitoring checklist
   - PvtHS-IS computer program

3) For disease reporting
   - Private health facility disease/services report
   - LQAS Job-Aide (for cross-checking quality of disease reporting)
   - Private health facility disease/services profile computer program

4) For performance reporting
   - Relevant DHIS data collection instruments depending on the type of service delivered and/or DHIS software application
   - Relevant section of DHIS report, depending on the type of service delivered under the Public-Private Partnership arrangement

3.3   PvtHS-IS management mechanism

3.3.1   Private health facilities database/mapping

The overall management of data collection, compilation, and computer data entry and report/map generation will be the responsibility of Health Regulatory Authorities (HRA) or concerned unit of PHD. Essentially, the primary source of data for this database/mapping will be from the private health facilities themselves. At the time of registration, the private institutions will submit the Basic data form, Health facility infrastructure form and Human resource form. Data from these forms will be entered in the computer using a Private health facility data computer entry and mapping program to generate maps showing the distribution and details of private health facilities.

As a secondary or alternate source of data for health facilities mapping, HRA/PHD can arrange

data collection through EDOH/DCO/Nazim (District Governor). EDOH will assign staff at BHU, RHC etc. for collecting data on Private Health Facilities in their respective catchment area. The BHU/RHC staff, in collaboration of Union Council Nazim will carryout the data collection every year using the Private health facility basic data form. Private health facilities can also volunteer to submit reports to EDOH Office using the same form. Filled-up forms will be sent from EDOH Office to HRA Office or PHD for data entry and generation of Private health facility report and map.

3.3.2   Private health facility registration and regulation

HRA will advertise for voluntary registration of private health facilities. At the same time HRA can communicate directly with private health facilities enlisted in Private health facility database/map. The private health facility will be responsible to submit the Private health facility infrastructure report and Human resource report at the time of registration and annually at the time of renewal of registration.

HRA, through EDOH, will be responsible for validating the data submitted by the private health facility by using Private health facility infrastructure and human resource monitoring checklist.

All the data collected through the above mentioned reports and monitoring checklists will be entered by HRA using the PvtHS-IS Computer Program. Using the computer program HRA will generate necessary reports for further planning and actions.

The private health facilities will be responsible on monthly basis to submit to HRA the Private Health Facility Report on Deaths, C-Sections, Hospital Infections, and ALS. HRA will also be responsible to carryout monitoring of the quality of care at private health facility using the Private health facility Standard of Practice monitoring checklist applying the LQAS technique. Using the computer program HRA will do data entry and generate necessary reports for further planning and actions.

3.3.3   Private health facility reporting of disease/services of public health importance

The private health facilities will be responsible on monthly basis to submit to HRA the Private health facility disease/services report. HRA will do the data entry and data validation using LQAS Job-Aide. The compiled report on disease profile will be sent to PHD for disease surveillance.

3.3.4 Private health facility performance reporting

In case of private health facilities or institutions that are engaged in formal public-private partnerships, the private health facility/institution will utilize the relevant DHIS instruments for reporting their performance. This arrangement will be made part of the agreement between the two parties.

3.3.5 Responsibility for implementing PvtHS-IS – Role of various Governmental organizations

The primary for implementing and maintaining the PvtHS-IS is with the Provincial Government. As noted earlier, the pre-requisite for establishing any form of IS for private sector would require the legal backup in the form of legislation or ordinance. Provincial Governments are responsible for doing so. For example, Provincial Governments in NWFP and Balochistan have already enacted Health Regulation Ordinances. Similarly, PHD, preferably through HRA will manage the PvtHS-IS, ensure data collection (or data submission by private health facilities), compilation, analysis and use of the information. PHD/HRA will also provide feedback to the private institutions that are regularly reporting to PHD/HRA.

In case of providing private health facility's basic, infrastructural and human resource's data, the concerned private health institution will be bound by the Health Regulatory Ordinance to do so at their own expense and as a requisite of registration and its renewal with HRA. For disease surveillance, PHD will provide certain incentives to the private health facility for collaborating in disease surveillance. In this case, not every private health facility needs to participate; rather only those private health facilities with good reputation and proven quality of services will be engaged.

For maintaining an IS by the private institutions under public-private partnership, the responsibility will be on the private institution on the basis of the mutual agreement between the two parties. The HIS unit of PHD will be the primary liaison with the private institution for collecting reports, data entry, analysis and dissemination to the concerned authorities. The relevant department of PHD will be responsible for providing feedback to the private institution on its performance based on the review of the data submitted by the private institution.

The role of MOH/NHIRC is case of PvtHS-IS is limited. NHIRC will collect disease surveillance data from PHD/HRA for national level compilation and dissemination to relevant government departments and international agencies. NHIRC will also assist and coordinate

with the PHD/HRA in the design of the PvtHS-IS to ensure uniformity of the design of PvtHS-IS yet addressing the specific requirements of each PHD/HRA.

3.4   Time framework of the implementation of PvtHS-IS

As indicated in Table 2 "Status of each stage of NAP" (p. I-19), the implementation of PvtHS-IS will be in three stages.

PART 3 OTHER HEALTH INFORMATION SYSTEMS (HISs) IN PAKISTAN

The National Action Plan for the Improvement of Health Information Systems in Pakistan

PART 3

Other Health Information Systems (HISs) in Pakistan

1.   Introduction

As mentioned earlier, by and large the major goal of the health system in Pakistan is to improve the health status of the population through improvement of the health service delivery. In case of public health sector, government has a direct role of providing health services to the population; and in case of private health sector, the government has an indirect/ regulatory role of protecting the interest and well-being of the population.

Keeping in view these goals and roles, the health information needs are broadly categorized as:

• Information on Health Status	Fertility, mortality, morbidity, disability, well being
• Information on Health Determinants	Risk factors, socio economic factors, environmental factors, demographic factors
• Information on Health systems	
a. Input:	Policy, finance, human resource, organization
b. Output:	Availability, quality
c. Outcome:	Coverage and utilization
• Information on individual patient	Diagnosis, investigations, treatment, outcome

Matching the data item or indicator that meets the above information needs with the most appropriate and cost effective tool to generate it is an essential function of the HIS[10]. In general, the data source for these various information needs can be classified as:

Population-based data source

(1) Surveys	For coverage / utilization, risk factors and health status data
(2) Surveillance	For data on diseases, outbreaks and risk factors
(3) Vital events registration	For fertility & mortality data
(4) Census	For health status, socio-economic and demographic data

Health services/facility based data source

(5) Routine HIS	For:
(Health and disease records, services records, administrative records)	- Performance (output) monitoring data - Outcome monitoring data - Resource data - Data on regulation of quality of services
(6) Patient/clinical records	For patient management

2.   Population based HISs in Pakistan

(1)   Surveys

In many developing countries, population-based surveys are the single most important source of population health information. Seventeen of the 23 health-related Millennium Development Goal (MDG) indicators are generated through house-hold surveys, such as Demographic and Health Surveys (DHS) and Multiple Indicator Cluster Surveys (MICS). In Pakistan, DHS is conducted by National Institute of Population Studies (NIPS) and MISC was carried out by UNICEF in collaboration with the government. Many other large/small scale surveys are conducted by different organizations/institutions, e.g. Pakistan Institute of Development Economics. However, for national surveys to become major national planning and evaluation instruments, it is essential to lay down an integrated plan of surveys for the next decade and identify and strengthened the institution/institutions responsible for carrying out those surveys. One such institution is NIPS. NIPS was established in 1986 as an autonomous organization in Islamabad, through a resolution of the GOP to undertake population and development research and to provide feedback to the Government departments and agencies for planning, policy formulation in the sphere of population and development, programmatic implementation and effective monitoring of Reproductive Health /Family Planning Program. Even though, top begin with NIPS's focus is basically population studies, it has gradually moved to cover health issues as well. Currently NIPS is conducting Maternal Mortality and Demographic Health Survey. Secretary Health is the co-chairman of the Steering Committee of the Survey. One hundred thousand households will be surveyed with the cost of Rs. 86 million. Maternal Mortality rate will be established by using verbal autopsy tool. Thus, in the absence of any institution exclusively looking after health surveys at national level, NIPS has a potential to become a "Center of Excellence" for conducting national health and population surveys; and as such NIPS can be renamed as "National Institute for Health and Population Studies (NIHPS).

Briefly, to make use of surveys as a meaningful and efficient instrument for population-based data collection on health and nutrition, use of services, knowledge and practices relating to

health care, determinants and risk factors of health/disease, there is a need to have:

a. a government policy on surveys
b. a 10-year plan for specified surveys with well defined methodologies and the plan is revised every 5 years
c. specific institutions at national/provincial levels to conduct and manage surveys and survey data
d. Federal institution (e.g. NHIRC) or Cell within MOH responsible for coordination among provincial institutions and with donors
e. Funds (and coordination/collaboration with donors) for conducting the surveys.

(2)   Surveillance

In Pakistan, there is a very well established AFP Surveillance for polio eradication and is active in all the districts of the country. The National (Acquired Immune Deficiency Syndrome) AIDS Control Program in collaboration with international partners has carried out 1st generation Human Immunodeficiency Virus (HIV)/AIDS Surveillance and is now implementing the 2nd generation HIV/AIDS Surveillance. In addition to these, National Tuberculosis Control Program and National Malaria Control Program have surveillance component. MOH/NHIRC in collaboration with Centers for Disease Control and Prevention (CDC), USA and the World Bank carried out a country-wide assessment of the situation and developed a National Action Plan for the implementation of an Integrated Disease Surveillance Program-Pakistan (IDSPP). However, implementation of this Action Plan is pending its approval and the development of long term project proposal and pilot testing[11]. The key recommendations of the assessment study that cover Communicable Disease Surveillance, Non-Communicable Disease Surveillance and Vital Statistics are shown in Table 8.

In the National Strategic Framework document on IDSPP[11], it is envisage that IDSPP and RHIS will be made as two tracks of IS. However, government should revisit the arenas where these two systems have commonalities and take care to avoid duplications and over-burdening the health staff. Surveillance draws upon an ever broadening set of data sources for the purpose of ongoing monitoring of health status and sustained vigilance for conditions that need to precipitate an urgent public health response and these include data sources like methods for monitoring of vital events, surveys and RHIS. Thus, proper assessment of IDSPP data sources and strengthening/utilization of available data sources should become an integrated part of the development of IDSP in Pakistan.

(3)   Vital Events Registration

Recommendations on vital events registration formulated as part of the National Strategic Framework for Disease Surveillance are shown in Table 8.

(4)   Census

In Pakistan, census has been carried out in regular intervals of 10 years since 1951, except between 1981 and 1998. The next census is due in 2008. There is a federal organization (Population Census Organization) that is responsible for conducting the census. Pakistan Institute of Development Economics has carried a thorough analysis of the 1998 census and have made several recommendations for the improvement of the census [12]. These recommendations can be further reviewed and addressed accordingly.

Table 8   Key recommendations of the assessment study

Communicable Diseases	Non Communicable	Vital Statistic
• Establish discrete surveillance units at federal. Provincial and district levels that are responsible for coordinating all surveillance activities including disease detection and response.	• Implement the National Action Plan for Non communicable diseases (NCD) as planned.	• Elaborate a long-term plan (10 year) to develop a complete vital registration and statistics system.
• Develop a legal framework that mandates notification of priority diseases by all health sectors and clearly defines responsibilities of the administrative levels of transition of surveillance system into the health system's mainstream or disease prevention and control.	• Clearly delineate roles and responsibilities across public/private partners and across the levels (federal. provincial, district) to implement and sustain the NCD National Plan of Action.	• Work with Vital Registration/National Database and registration Authority (NADRA) and union councils to assure the success of plans to expand the Lahore pilot for birth and death registration to other districts ensure required health data is collected and standardize birth and death certificates using WHO IUN recommendations.
• Surveillance and response activities must be functionally integrated across programs.	• Strengthen capacity for public health surveillance, research intervention, and evaluation skills through the development and implementation of a comprehensive training package.	• In the short-and medium-term strengthen coverage of birth and death reporting through MCH programs (LHW, HMIS, Hospitals, private sector). Birth and death reporting ongoing via the LHW-IS should be strengthened to increase coverage and studies carried out to validate the extent of coverage of births and maternal. infant and child deaths.
• Build health workers' capacity for improved surveillance, disease and outbreak response. A comprehensive analysis and plan of the competencies and resulting training requirements for a communicable disease surveillance and response work force is needed in the areas of applied epidemiology, surveillance, outbreak investigation and response, case investigation and management, the century public health laboratory in disease monitoring and outbreak response, public health informatics (including computer training), communications, and management and policy development	• Consider establishing prevention research centers to carry out applied public health based research and interventions and training.	• Hospital data on births and deaths should be incorporated in the district reporting system. The private sector should be slowly involved in the reporting process.
	• Replicate the cancer registry protocol in other sites and link registries to a national system.	• In the medium term implement a SAW (Sample Vital registration and Verbal autopsy) system that provides at a minimum annual national and provincial level estimates for cause-specific mortality rates and risk factors.
	• Involve the use of sentinel sites to enhance chronic disease prevention and control activities.	• Develop and finance an effective MCH organizational structure at all administrative levels.
• Develop a public health laboratory network (PHLN) linked with other components of surveillance.	• Improve hospital data collection and use.	• Consolidate MCH information from various sources at the district level. Include hospital information to permit a systems approach to analysis of the MCH situation.

Communicable Diseases	Non Communicable	Vital Statistic
• Elaborate a long-term plan to modernize the public health surveillance information and data transmission systems • Assure the use of surveillance information for public health interventions.		• Strengthen and expand the system of verbal autopsies to provide better information for decision-making by LHW program. • Utilize evidence from ISs for timely action and policy-making. • Build capacity (aggregation, analysis, utilization)

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ANNEX 1

DHIS INDICATORS LIST

Table DHIS indicators data source

Indicators	Data collection frequency	Data element source (Register/Form)	BHU	RHC	THQH	DHQH	District
I. Overall health facility utilization *15 indicators*							
I.A. Outpatient *8 indicators*							
1. Daily OPD attendance	Monthly	OPD Register OPD Register at Emergency Deptt. (+ Human Resource Data Transfer Form) (+ Population Chart)	X	X	X	X	
2. Age and gender wise utilization of OPD	Monthly		X	X	X	X	
3. Referred case proportion	Monthly		X	X	X	X	
4. Follow-up case proportion	Monthly		X	X	X	X	
5. Emergency service utilization	Monthly			X	X	X	
6. Daily OPD staff load	Monthly		X	X	X	X	
7. Per capita OPD attendance	Monthly		X	X	X	X	
8. Medico-legal cases	Monthly	MLC register		X	X	X	
I.B. Investigation services *2 indicators*							
9. Lab service utilization	Monthly	Lab. Registers		X	X	X	
10. X-ray service utilization	Monthly	Radiology Register		X	X	X	
I.C. Inpatient *5 indicators*							
11. Bed occupancy rate	Monthly	Daily Bed Statement (+ Population Chart)		X	X	X	
12. Average length of stay	Monthly			X	X	X	
13. Hospital death rate	Monthly			X	X	X	
14. Left against medical advice rate	Monthly			X	X	X	
15. Annual per capita hospital admissions	Monthly			X	X	X	
II. Preventive and curative service delivery *48 indicators*							
II.A. Preventive Care *14 indicators*							
II.A.1. EPI *3 indicators*							
16. Full immunization coverage	Monthly	Permanent EPI Register	X	X	X	X	
17. Measles coverage	Monthly	EPI Register	X	X	X	X	
18. Neonatal tetanus coverage (TT2 in pregnant women)	Monthly	EPI register (Mother Health Register)	X	X	X	X	
II.A.2. Reproductive Health *11 indicators*							
II.A.2.a. Family Planning *3 indicators*							
19. New acceptors	Monthly	FP register	X	X	X	X	
20. Couple years of protection delivered	Monthly		X	X	X	X	
21. Contraceptive prevalence rate	Yearly	LHW-IS *	X	X	X	X	
II.A.2.b. Antenatal Care, Delivery, and Postnatal Care *8 indicators*							
22. Antenatal care (ANC) coverage	Monthly	Mother Health register	X	X	X	X	
23. Average number of ANC attendances	Monthly		X	X	X	X	
24. Prevalence of anemia among first ANC attendance	Monthly		X	X	X	X	
25. Postnatal coverage	Monthly		X	X	X	X	
26. Delivery coverage at facility	Monthly	Obstetric Register	(X)	X	X	X	
27. LHW pregnancy registration	Monthly	LHW-IS >> Data Transfer Form	X	X			
28. Delivery coverage by skilled attendants	Yearly						
29. Facility antenatal coverage compared to LHW pregnancy registration	Monthly	Indicator 22 / Indicator 27	X	X			
II.B. Curative Care *34 indicators*							
II.B.1. All Diseases – OPD *2 indicators*							
30. Annual OPD case load profile	Monthly	OPD Register >> Abstract	X	X	X	X	
31. Annual top 5 communicable and top 5 non-communicable diseases at OPD	Monthly		X	X	X	X	
II.B.2. All Diseases - IPD *2 indicators*							
32. Annual IPD case load profile	Monthly	Indoor Register >> Abstract		X	X	X	
33. Annual top 5 communicable and top 5 non-communicable diseases at IPD	Monthly			X	X	X	

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Indicators	Data collection frequency	Data element source (Register/Form)	Level of data collection				
			BHU	RHC	THQH	DHQH	District
II.B.3. Priority Diseases *19 indicators*							
II.B.3.a. Diarrhoeal diseases under 5 years *2 indicators*							
34. OPD diarrhoeal cases	Monthly	OPD Register	X	X	X	X	
35. Diarrhoeal case fatality rate	Monthly	Indoor Register		X	X	X	
II.B.3.b. Pneumonia under 5 years *2 indicators*							
36. OPD pneumonia cases	Monthly	OPD Register	X	X	X	X	
37. Pneumonia case fatality rate	Monthly	Indoor Register		X	X	X	
II.B.3.c. Malaria *5 indicators*							
38. OPD malaria cases	Monthly	OPD Register >> Abstract	X	X	X	X	
39. Malaria case admissions	Monthly	Indoor Register >> Abstract		X	X	X	
40. Malaria case fatality rate	Monthly			X	X	X	
41. Slide Positivity Rate	Monthly	Lab. register	(X)	X	X	X	
42. P. falciparum rate	Monthly		(X)	X	X	X	
II.B.3.d. TB *5 indicators*							
43. TB case detection rate	Quarterly	Quarterly TB-DOTS Report					X
44. TB treatment success rate	Quarterly						X
45. TB sputum conversion rate	Quarterly						X
46. TB suspect identification rate	Monthly	OPD Register >> Abstract	X	X	X	X	
47. Proportion of TB-DOTS intensive-phase patients Missing	Monthly	TB Cards (TB 01)	X	X	X	X	
II.B.3.e. EPI preventable diseases *3 indicators*							
48. OPD measles cases under 5 years	Monthly	OPD Register	X	X	X	X	
49. OPD diphtheria cases under 5 years	Monthly		X	X	X	X	
50. Neonatal tetanus rate	Monthly	Indoor Register		X	X	X	
II.B.3.f. Nutrition *2 indicators*							
51. *OPD Undernourished children***	Monthly	OPD Register	X	X	X	X	
52. Low birth weight rate (facility-based)	Monthly	Obstetric Register	X	X	X	X	
II.B.4. Obstetric / Neonatal Care *6 indicators*							
53. Expected obstetric complications attended	Monthly	Obstetric Register		X	X	X	
54. Expected Caesarean sections performed	Monthly				X	X	
55. Obstetric case fatality rate	Monthly				X	X	
56. Maternal deaths investigated	Monthly				X	X	
57. Newborn case fatality rate	Monthly			X	X	X	
58. Stillbirth proportion	Monthly			X	X	X	
II.B.5. Sexually transmitted infections (STI) *3 indicators*							
59. STI/RTI cases: women	Monthly	OPD Register >> Abstract	X	X	X	X	
60. STI cases: men	Monthly		X	X	X	X	
61. Number of HIV+ cases detected	Not decided	Lab Register					X
II.B.6. Hepatitis *2 indicators*							
62. Hepatitis B Virus + proportion	Monthly	Lab. Register			X	X	
63. Hepatitis C Virus + proportion	Monthly				X	X	
III. Financial Management *3 indicators*							
64. Budget release	Monthly	Monthly Financial-IS Report		X	X	X	X
65. Unspent budget	Monthly			X	X	X	X
66. Per capita non-salary budget allocation	Yearly	Yearly Financial-IS Report		X	X	X	X
IV. Logistics *1 indicator*							
67. Stock out of tracer drugs / supplies***	Monthly	Medicine Stock Register	X	X	X	X	X
V. Human Resources *2 indicators*							
68. Proportion of staff positions filled	Quarterly	Human Resource Data Transfer Form	X	X	X	X	X

A - 2

Indicators	Data collection frequency	Data element source (Register/Form)	Level of data collection				
			BHU	RHC	THQH	DHQH	District
69. Training	Yearly	Yearly HID	X	X	X	X	X
VI. Capital Assets *6 indicators*							
70. Facility equipment need	Yearly	Equipment Stock Register/ Yearly Inventory	X	X	X	X	
71. Facility repair need	Yearly	Yearly HID[1]	X	X	X	X	
72. Functional patient toilets	Yearly		X	X	X	X	
73. Facility waste disposal	Yearly		X	X	X	X	
74. Emergency Obstetric Care	Yearly						X
75. Blood bank screening facilities	Yearly						X
VII. Regulation *1 indicator*							
76. Private facility registration	Yearly	Yearly HID					X
VIII. Information system *3 indicator*							
77. Reporting timeliness	Monthly	HMIS Cell Logbook/ Computer application					X
78. Reporting completeness	Monthly						X
79. Reporting accuracy	Monthly						X

*Can be done yearly at all levels if LHW records are used as a proxy. Otherwise, a survey is needed.

**Changed from Underweight proportion: under 3 years weighed (facility-based)

***Logistic reporting – Ideally stock outs should not occur. By the time a drug stock level has reached a critical low level, the store manager should initiate the process to get replenishment. Thus, the occurrence of out-of-stock of any drug would indicate that the entire logistic management process is not taking place properly.

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[1] The Study team has already worked with provinces to begin improvements to the Health Institution Database (HID).

Core indicators for self evaluation by facility level

Indicators		Self Evaluation Level			
		BHU	RHC	THQH	DHQH
Monthly Analysis for Self Evaluation					
14.	Full immunization coverage.	O	O	O	O
16.	Neonatal tetanus coverage	O	O	O	O
17.	New acceptors	O	O	O	O
20.	Antenatal care coverage	O	O	O	O
21.	Average number of antenatal care attendances	O	O	O	O
25.	Delivery coverage at facility	(O)	O	O	O
34.	OPD diarrhoeal disease cases amongst under 5 years	O	O	O	O
36.	OPD pneumonia cases amongst under 5 years	O	O	O	O
38.	OPD malaria cases	O	O	O	O
47.	Proportion of TB-DOTS patients missing	O	O	O	O
1.	Daily OPD attendance	O	O	O	O
67.	Stock out of tracer drugs and supplies	O	O	O	O
68.	Proportion of staff positions filled	O	O	O	O
35.	Diarrhoeal disease case fatality rate amongst under 5 years.		O	O	O
37.	Pneumonia case fatality rate amongst under 5 years		O	O	O
39.	Malaria case admissions		O	O	O
64.	Budget release		O	O	O
65.	Unspent budget		O	O	O
	Sub-total	**13**	**18**	**18**	**18**
Yearly Analysis for Self Evaluation					
22.	LHW pregnancy registration	O	O		
24.	Prevalence of anemia among pregnant women at time of first antenatal attendance	O	O	O	O
27.	Postnatal coverage	O	O	O	O
29.	Annual top 5 communicable and top 5 non-communicable diseases seen at OPD	O	O	O	O
51.	Low birth weight rate (facility-based)	(O)	O	O	O
52.	Underweight proportion amongst under 3 years weighed (facility-based)	O	O	O	O
59.	STI/RTI cases amongst women over 15	O	O	O	O
60.	STI cases amongst men over 15	O	O	O	O
5.	Referred case proportion	O	O	O	O
6.	Follow-up case proportion	O	O	O	O
30.	Annual IPD case load profile		O	O	O
32.	Hospital death rate		O	O	O
33.	Left Against Medical Advice rate		O	O	O
53.	Expected obstetric complications attended		O	O	O
57.	Newborn case fatality rate		O	O	O
58.	Still birth proportion		O	O	O
7.	Lab service utilization		O	O	O
8.	X-ray service utilization		O	O	O
9.	Emergency service utilization		O	O	O
11.	Bed occupancy rate		O	O	O
54.	Expected Caesarean sections performed			O	O
55.	Obstetric case fatality rate			O	O
56.	Maternal deaths investigated			O	O
62.	Hepatitis B Virus + proportion			O	O
63.	Hepatitis C Virus + proportion			O	O
	Sub-total	**10**	**20**	**24**	**24**
	Ground Total	**23**	**38**	**42**	**42**

Remarks: The numbers refer to Table 6

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ANNEX 2

DHIS INDICATOR DEFINITIONS

District Health Information System (DHIS)

Definition of DHIS Indicators[1]

1.   Daily OPD attendance

Definition
This indicator measures the average daily patient load of the facility's outpatient department (OPD) daily and, therefore, of the overall performance of the outpatient services.
This indicator is calculated as:

$$\frac{\text{Total OPD attendance for the month}}{\text{Total working days of the month}}$$

Data Source
1. OPD Registers

Use
This indicator is useful in understanding facility work load /utilization and to compare which facilities are well performing which are not. A benchmark may be used for comparison; or comparison among facilities or between monthly performances of same facility can be done.

A sudden increase in the daily average can be harbinger of an epidemic or simply indicate seasonal variation.

Related indicators
-   Staff productivity (daily OPD staff load), i.e., average OPD patients per facility staff/service providers: to understand whether good/ bad performance is due to good/ bad productivity of staff.
-   Per capita OPD attendance: to understand coverage, and community satisfaction

2.   Age and gender wise utilization of OPD

Definition
This indicator shows the age-wise and sex-wise percentage distribution of OPD patients attending the health facility.
This indicator is calculated as:

$$\frac{\text{Age or sex specific OPD attendance for the month}}{\text{Total OPD attendance for the month}} \times 100$$

Data Source
1. OPD Registers

Use
The indicator can be used to understand whether the health facility is catering to specific age groups, e.g., children under 5 years or elderly patients, and to gender equity.

3.   Referred case proportion

Definition
This indicator is the measure of referred cases attending the facility's OPD as proportion of total OPD attendance.
It is calculated as:

$$\frac{\text{Total referred cases attended at facility's OPD for the month.}}{\text{Total OPD attendance for the month}} \times 100$$

Data Source
1. OPD Registers

Use
One of the functions of the district health system is establish and improve referral linkages among the various tiers of service delivery. This indicator is a reflection of the integrity of referral system in the sense that patients are being referred by the lower tiers of health service delivery, they travel to the facility for services and that the facility is providing good services and catering to the referred cases. If the percentage is low, it can indicates problem in any one or more of the above three phenomena. If referral is very high, investigation of which cases are most referred and from where can help in establishing specific management facilities at those areas.

Comparison among facilities/ areas can indicate overall performance of the facility or tehsil/district health services.

4.   Follow-up case proportion

Definition
This indicator is the measure of follow-up cases attending the facility's OPD as proportion of total OPD attendance.
It is calculated as:

$$\frac{\text{Total follow-up cases attended at facility's OPD for the month.}}{\text{Total OPD attendance for the month}} \times 100$$

Data Source
1. OPD Registers

Use
Severely ill patients but on ambulatory treatment or patients with chronic illnesses require follow-up. At the time of initial consultation, such patients should be counseled for coming back to the health facility for follow-up. However, factors such as staff attitude, provision of medicines from the facility, good case management and client satisfaction and confidence on the provider will influence patient's coming back for follow-up visit. This indicator is, therefore, a measure of the quality of care provided from the facility or by the district health system as a whole.

5.   Emergency service utilization

Definition
This indicator is the measure of the workload of the emergency/casualty department of the facility.
It is calculated as:

$$\frac{\text{Total number of cases attended at the emergency department of the facility in a month}}{\text{Total days of the reporting month}}$$

Data Source
1. OPD Register at Emergency Department

Use

This indicator reflects the workload on the emergency department and suggests focusing resources for managing emergencies; it also reflects availability of emergency services at the facility.

Related Indicator
Case profile of patients attending emergency department

6. Daily OPD staff load

Definition
This indicator is the measure of the workload or productivity of the care-giving staff at OPD of the facility.
It is calculated as:

$$\frac{\text{Total OPD attendance for the month}}{\text{Number of care-giving staff} \quad x \quad \text{Avg. work-days expected of care-giving staff}}$$

Data Source
1. OPD Registers

Use
Together with daily OPD attendance, this indicator will help in understanding the resource needs of the health facility.

Related Indicators
Daily OPD Attendance

7. Per capita OPD attendance

Definition
This indicator is the measure of the utilization of the facility by the population of the catchment area.
It is calculated as:

$$\frac{\text{Total OPD attendance for the year}}{\text{Population of catchment area}}$$

Data Source
1. OPD Registers
2. Catchment Area Population Chart

Use
This indicator can be used to understand the public health service coverage of the catchment population, and may also indicate community satisfaction with the public health facility/services.

Related Indicators
Daily OPD Attendance

8. Medico-legal cases

Definition
This indicator is the measure of the workload on the facility due to medico-legal cases.
It is calculated as:

Total medico-legal cases attended at the facility in the month/year
Data Source
1. OPD Registers
2. Medico-legal case Register

Use

The indicator can be used to understand the burden on the facility for attending medico-legal cases. High case load can divert much of the Medical Officers' time in managing and attending to the legal procedures associated with medico-legal cases. This may deem allocating appropriate resources for managing such cases necessary.

9.   Lab service utilization

Definition

This indicator indicates utilization of laboratory services at the facility and also gives a measure of the proportion of OPD patients receiving diagnostic services from the laboratory of the health facility.
It is calculated as:

$$\frac{\text{Total OPD patients provided lab services from the facility during the month}}{\text{Total OPD attendance for the month}}$$

Data Source

1. Laboratory Register
2. OPD Register

Use

This indicator reflects the quality of care in terms of utilization of diagnostic services. It will also help to understand the need for resource allocation for laboratory services based on the utilization rate.

Related indicators

X-ray service utilization

10.   X-ray service utilization

Definition

This indicator indicates utilization of diagnostic services at the facility and also gives a measure of the proportion of OPD patients receiving radiology services from the health facility.
It is calculated as:

$$\frac{\text{Total OPD patients provided X-ray services from the facility during the month}}{\text{Total OPD attendance for the month}}$$

Data Source

1. Radiology Register
2. OPD Register

Use

This indicator reflects quality of care in terms of utilization of diagnostic services. It will also help to understand the need for resource allocation for radiology services based on the utilization rate.

Related indicators

Lab service utilization

11. Bed occupancy rate

Definition
The Bed Occupancy Rate (BOR) is the percent of occupancy obtained by dividing the average daily census by the number of available beds.[2]
It can be calculated as:

Total admitted patient-days in the ward(s) during the year	x 100
Total number of available beds in the ward(s)	x 365

> **Total admitted patient-days** is calculated by adding up the daily census of admitted patients at mid-night.

Data Source
1. Daily Bed Statement Register

Use
BOR indicates utilization of hospital indoor services. It may also indicate quality of care.
Annual BOR are used to evaluate or compare how hospitals or individual specialties are using their resources. However, the hospital with a high average occupancy rate may not necessarily be running more effectively than the hospital with a low average. High occupancy rates can be due to longer lengths of stay rather than greater numbers of patients being treated. Furthermore since these averages are generally calculated based on an average number of available staffed beds for a year they frequently conceal bed borrowing by other specialties, and temporary ward closures. Midnight bed counts can fail to identify patients who do not remain overnight.[3]

Bed occupancy is likely to vary according to:
- Specialty-mix of a hospital's beds. (e.g., orthopedic patients may stay longer; more patients are admitted in pediatric and obstetric wards, etc.)
- Case-mix within specialties (e.g., acute diarrhea and chronic renal failure cases will have different lengths of hospital stay; medicine ward might be receiving large number of malaria cases.)
- Different management practices and their application in different specialties
- Rate of hospital-acquired infections
- Social and demographic characteristics in the populations. (For examples older patients are likely to have longer lengths of stay and patients from socio-economically deprived backgrounds may be more ill and require more care.)

BOR can be used to calculate bed requirement as following:

$$\text{Beds required} = \frac{\text{Total admitted patient-days in the ward(s) during the year}}{365 \times \text{BOR}}$$

Related Indicators
The bed turnover rate (defined as average number of patients treated per bed per year).
Average Length of Stay (ALOS)

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[2] Wennberg J, Gittelsohn A and Shapiro N: Health Care Delivery in Maine III: Evaluating the Level of Hospital Performance

[3] Baillie H & et al. Public Health Research Unit, Department of Public Health, University of Glasgow: Bed Occupancy and Bed Management. October 1997

12.   Average length of stay (ALOS)

Definition
This indicator is the measure of the average duration of hospital stay of admitted patients.
It is calculated as:

$$\frac{\text{Total admitted patients-days in the wards during the month or year}}{\text{Number of patients discharged, LAMA \& died during the month/year}}$$

Data Source
1. Daily Bed Statement Register

Use
This indicator reflects on the intensity of care delivered to hospitalized patients and the probable burden on hospital resources. Like BOR, it is also influenced by factors like patient management practices, quality of care, case-mix and specialty-mix.

Related Indicators
BOR
Bed turn-over rate
Cost per case

13.   Hospital death rate

Definition
This indicator is the measure of the proportion of hospital deaths among admitted patients.
It is calculated as:

$$\frac{\text{Total deaths among admitted patients}}{\text{Total admitted patients}} \times 100$$

Data Source
1. Daily Bed Statement Register

Use
This indicator is indicative of quality of care at the hospital indoors.

14.   Left against medical advice (LAMA) rate

Definition
This indicator is the measure of the proportion of admitted patients leaving the hospital against medical advice.
It is calculated as:

$$\frac{\text{Total LAMA cases}}{\text{Total admitted patients}} \times 100$$

Data Source
1. Daily Bed Statement Register

Use
This indicator is indicative of quality of care at the hospital indoors.

15. Annual per capita hospital admissions

Definition
It is measured as number of hospital admission per 1000 population of the catchment area.
It is calculated as:

$$\frac{\text{Number of hospital admission in a year}}{\text{Total catchment area population}} \times 1000$$

Data Source
1. Daily Bed Statement Register
2. Catchment Area Population Chart

Use
This indicator gives a reflection on the extent of the utilization of the hospital's indoor services by the catchment population.

16. Full immunization coverage

Definition
This indicator is the measure of the percentage of under-one-year-olds who have received all the doses of BCG vaccine, three doses of polio and DPT vaccines and measles vaccine in a given year.
It is calculated as:

$$\frac{\text{Number of under 1 year old children who have been fully immunized}}{\text{Target number of under 1 year old children in the catchment population}} \times 100$$

Data Source
1. EPI Permanent Register
2. Catchment Area Population Chart

Use
Immunization coverage estimates are used to monitor immunization services, to guide disease eradication and elimination efforts, and are a good indicator of health system performance.

Related Indicators
DPT3 coverage
Measles Coverage

17. Measles coverage

Definition
This indicator is the measure of the percentage of under-one-year-olds who have received one dose of measles containing vaccine in a given year.
It is calculated as:

$$\frac{\text{Number of <1 year old children immunized with measles vaccine}}{\text{Target number of <1 year old children in the catchment population}} \times 100$$

Data Source
1. EPI Permanent Register
2. Catchment Area Population Chart

Use

Immunization coverage estimates are used to monitor immunization services, to guide disease eradication and elimination efforts, and are a good indicator of health system performance.

Related Indicators

DPT3 coverage
Full immunization coverage

18.   Neonatal tetanus coverage

Definition

This indicator is a measure of the percentage of pregnant women protected against tetanus/neonatal tetanus. It is calculated as:

$$\frac{\text{Number of pregnant women who have received TT2}}{\text{(or TT3, TT4 or TT5 according to protocol)}} \text{ X } 100$$
$$\frac{}{\text{Number of expected pregnancies}}$$

Data Source

1. EPI Permanent Register
2. Catchment Area Population Chart

Use

This indicator reflects the performance of the health system in achieving TT immunization coverage. Comparison with district/tehsil/taluka /union council target will give indication of achievement against the target for that district/tehsil/taluka /union council.

20.   Couple years of protection (CYP) delivered

Definition

CYP is the estimated contraceptive protection from pregnancy provided by family planning services during a one-year period, based upon the volume of all contraceptives sold or distributed free of charge to clients during that period.
It is calculated as:

> The CYP is calculated by multiplying the quantity of each method distributed to clients by a conversion factor, which yields an estimate of the duration of contraceptive protection provided per unit of that method. The CYP for each method is then summed over all methods to obtain a total CYP figure

The following **conversion factors** are currently in use in Pakistan.
- Condoms 144 condoms per CYP
- Oral Contraceptives 15 cycles per CYP
- DMPA 4 "doses" (1 ml) per CYP
- Net-En 6 "doses" per CYP
- IUD 3.5 CYP per IUD
- Norplant implant 5 CYP per device
- Surgical Contraception 12.5 CYP per procedure

Data Source

1. FP register

Use

CYP serves as a lower-level proxy indicator to track progress when CPR is not available.

Related Indicators
19.   New acceptors
21.   Contraceptive prevalence rate

22.   Antenatal care (ANC) coverage

Definition
Antenatal care coverage is an indicator of access and utilization of health care services during pregnancy. It is a measure of the percent of pregnant women who utilize antenatal care services provided at the public health facility at least once during their current pregnancy.
This indicator is calculated as:

$$\frac{\text{Number of pregnant women receiving first ANC service from the facility}}{\text{Number of expected pregnancies in Catchment Population}} \times 100$$

> **Antenatal care** includes recording medical history, assessment of individual needs, advice and guidance on pregnancy and delivery, screening tests, education on self-care during pregnancy, identification of conditions detrimental to health during pregnancy, first-line management and referral if necessary.

Data Source
1. Mother Health Register
2. Catchment Area Population Chart

Use
This indicator indicates how many of the pregnant women in the catchment area are covered through the facility for antenatal care services. In other words, it reflects the market share of the facility in providing antenatal services. When compared against previous performance or target, it will provide information on the current performance of the facility or facilities in the tehsil/district in catering to the antenatal care needs of the target population of pregnant women. It can reflect the integrity of referral linkages between LHW and the facility-based health care providers, the extent of mobilization of pregnant women or their families to utilize maternal health services from the public health facilities and/or the trust of the community on the public health facilities/providers.

Related Indicators
Average number of ANC attendances

23.   Average number of ANC attendances

Definition
This indicator measures the average number of times pregnant women have come to the facility for antenatal services during the pregnancy.
This indicator is calculated as:

$$\frac{\text{Total number of all antenatal care visits at the facility}}{\text{Total number of first antenatal care visits at the facility}}$$

Data Source
1. Mother Health Register

Use
This indicator indicates how much the facility and outreach staff have been able to motivate pregnant women to re-visit the facility for antenatal care. It can reflect the performance of the facility and outreach in achieving

more than one antenatal care visit to facility by pregnant women. When compared against previous performance of the facility or the tehsil/district, it will provide information on changes (improvement/deterioration) in the current performance and indicate the integrity of referral linkages between LHW and the facility-based health care providers, the extent of mobilization of pregnant women or their families to utilize maternal health services from the public health facilities and/or the trust of the community on the public health facilities/providers.

24. Prevalence of anemia among first ANC attendance

Definition
Percent of pregnant women screened for hemoglobin levels at their first antenatal care visit to the facility with hemoglobin levels less than 10g/dl.
This indicator is calculated as:

$$\frac{\text{Number of pregnant women receiving first antenatal service (ANC1) at the facility with Hb level} <10g}{\text{Total number of pregnant women receiving first antenatal service (ANC1) at the facility}}$$

Data Source
1. Mother Health Register

Use

Pregnant women coming to the facility for antenatal care serve as a sample of women from the catchment population. The nutritional status among this sample of pregnant women is suggestive of the nutritional status of women in the catchment population.

25. Postnatal coverage

Definition
Postnatal coverage is an indicator of utilization of health care services after pregnancy. It is a measure of the percent of mothers who utilize postnatal care services provided at the public health facility at least once at the end of their recent pregnancy.
This indicator is calculated as:

$$\frac{\text{Number of women receiving first postnatal care at the health facility within 42 weeks of delivery}}{\text{Expected number of deliveries in the catchment population}} \times 100$$

Data Source
1. Mother Health Register
2. Catchment Area Population Chart

Use
This indicator provides an estimate of how much of the pregnant women population in the catchment area are covered through the facility for post-natal care services and reflects the market share of the facility in providing postnatal care services. When compared against previous performance or target, it will provide information on the current performance of the facility or facilities in the tehsil/district in catering to the postnatal care needs of the target population of pregnant women. It is an indirect evidence of how many mothers were counseled on breast feeding, immunization and nutrition after delivery.

26.   Delivery coverage at facility

Definition
Delivery coverage at facility is an indicator of utilization of delivery services provided at public health facilities. It is a measure of the percent of mothers who are delivered at the public health facility.
This indicator is calculated as:

$$\frac{\text{Number of deliveries attended/ conducted at the facility}}{\text{Number of expected deliveries in the catchment population}} \times 100$$

Data Source
1. Obstetric Register
2. Catchment Area Population Chart

Use
This indicator is a proxy for deliveries by skilled health personnel. It indicates how much of the pregnant women population in the catchment area are covered through the public health facility for delivery services and, thus, reflects the market share of the facility in providing delivery services.

27.   LHW pregnancy registration

Definition
This indicator measures the proportion of pregnancies registered by the LHWs in the catchment area.
This indicator is calculated as:

$$\frac{\text{Total number of pregnancies newly registered by LHWs during the month}}{\text{Expected number of pregnancies in the catchment area}} \times 100$$

Data Source
1. LHW Register
2. Catchment Area Population Chart

Use
This indicator reflects the performance of LHWs and the extent to which pregnant women in the catchment area have come in contact with the public health system.

Related indicator
Facility antenatal coverage compared to LHW pregnancy registration

28.   Delivery coverage by skilled attendants

Definition
This indicator measures percentage of deliveries attended by skilled health personnel in a given period of time.
This indicator is calculated as:

$$\frac{\text{Number of deliveries by skilled health personnel}}{\text{Number of expected deliveries in the catchment population}}$$

Skilled birth attendant is an accredited health professional – such as a midwife, doctor or nurse – who has been educated and trained to proficiency in the skills needed to manage normal (uncomplicated) pregnancies, childbirth and the immediate postnatal period, and in the identification, management and referral of complications in women and newborns. Traditional birth attendants, trained or not, are excluded from the category of skilled attendant at delivery. Birth can take place in

a range of appropriate places, from home to tertiary referral centre, depending on availability and need. Home delivery may be appropriate for a normal delivery, provided that the person attending the delivery is suitably trained and equipped and that referral to a higher level of care is an option.

Data Source
1. LHW Register
2. Catchment Area Population Chart

Use
All women should have access to skilled care during pregnancy and at delivery to ensure detection and management of complications. The proportion of births attended by skilled health personnel can serve as a proxy for monitoring progress towards increase in skilled birth attendance coverage and reduction in maternal mortality.

29.   Facility antenatal coverage compared to LHW pregnancy registration

Definition
This indicator is a measure of the ratio of pregnancies registered by LHWs receiving antenatal care services at the facility.
This indicator is calculated as:

$$\frac{\text{Total number of pregnancies receiving first antenatal care services from the facility during the month}}{\text{Total number of pregnancies newly registered by LHWs during the month}} \times 100$$

Data Source
1. LHW report
2. Mother Health Register

Use
The indicator reflects on the linkages between LHWs and the facility in providing maternal health services.

30.   Annual OPD case load profile

Definition
This indicator is a measure of the annual number of cases according to broad disease classification attending the OPD.

Data Source
1. OPD Abstract Register

Use
This indicator will help in understanding which diseases/cases were attended at the facility, at all health facilities in a tehsil/taluka or district, the changes in diseases trend over years or months of the same year and the difference among union councils, tehsil/taluka or districts. The indicator can trigger a response in terms of additional resource allocation or redistribution according to the disease pattern, or initiating/strengthening specific preventive, promotive and/or curative services at specific area/catchment population.

Related Indicator
Annual IPD case load profile
Annual top 5 communicable and top 5 non-communicable diseases at OPD

31.   Annual top 5 communicable and top 5 non-communicable diseases at OPD

Definition
This indicator is a listing of the five most common cases of both communicable and non-communicable diseases attending OPD.

Data Source
1. OPD Abstract Register

Use
It will indicate what type of patients mostly are attending the OPD so that appropriate measures/ resources can be focused, e.g., training of staff, equipments, medicines, lab facilities etc. Also, it will suggest focus area for disease control and prevention.

32.   Annual IPD case load profile

Definition
This indicator is a measure of the annual number of cases according to broad disease classification attending the hospital indoors (In-patient departments).

Data Source
1. Indoor Abstract Forms

Use
This indicator will help in understanding which diseases/cases were attended at the facility, at all health facilities in a tehsil/taluka or district, the changes in diseases trend over years or months of the same year and the difference among union councils, tehsil/taluka or districts. The indicator can trigger a response in terms of additional resource allocation or redistribution according to the disease pattern, or initiating/strengthening specific preventive, promotive and/or curative services at specific area/catchment population.

Related Indicator
Annual OPD case load profile
Annual top 5 communicable and top 5 non-communicable diseases at IPD

33.   Annual top 5 communicable and top 5 non-communicable diseases at IPD

Definition
This indicator is a listing of the five most common cases of both communicable and non-communicable diseases attending IPD (In-patient departments).

Data Source
1. Indoor Abstract Forms

Use
It will indicate what type of patients mostly are admitted in the hospital indoors so that appropriate measures/ resources can be focused, e.g., training of staff, equipments, medicines, lab facilities etc. Also, it will suggest focus area for disease control and prevention.

34.   OPD diarrhoeal cases

Definition
This indicator estimates the proportion of under-5 years aged children in the catchment area attending OPD with diarrhea.
This indicator is calculated as:

$$\frac{\text{Number of under-5 years children with diarrhea attending the OPD}}{\text{Total number of under-5 years children in catchment area}} \times 100$$

Data Source
1. OPD Abstract Register
2. Catchment Area Population Chart

Use
This indicator is a rough estimation of the extent of diarrheal diseases among under-5 children population in the catchment area. This facility-based calculation only provides the tip of the ice-burg picture. Nevertheless, an increasing number of OPD attendances of children with diarrhea should alert the health authority and may deem further investigation of the situation.

35.   Diarrhoeal case fatality rate

This **Definition**
This indicator measure the proportion of deaths among patients admitted with diarrhea in hospital indoors.
This indicator is calculated as:

$$\frac{\text{Number of deaths due to diarrhea in patients admitted in the facility}}{\text{Total number of patients admitted in the facility with diarrhea}} \times 100$$

Data Source
1. Indoor Abstract Form
2. Indoor Register

Use
This indicator may suggest severity of diarrhea in the community and can indicate epidemic. It also reflects on the quality of management practices at hospital and the level of early detection and management at community. Occurrence of hospital deaths of diarrhea patients, especially adult patients should alert concerned authorities (EDOH, DOH, PHD), trigger an epidemiological investigation and monitoring of the situation, e.g. through daily reporting on the situation.

36.   OPD pneumonia cases

Definition
This indicator estimates the proportion of under-5 years aged children in the catchment area attending OPD with pneumonia.
This indicator is calculated as:

$$\frac{\text{Number of under 5 years old children with pneumonia (of any severity) attending the OPD}}{\text{Total number of under-5 years aged children in catchment area}} \times 100$$

WHO Classification of pneumonia in under-5 children:
Pneumonia: Presence of fast breathing in children under 5 years of age.

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Fast breathing: Respiratory rate more than 60 in young infants aged less than 2 months, more than 50 in children 2-11 months and more than 40 in children 1-4 years.
Severe pneumonia: Presence of fast breathing and chest in-drawing in under 5-children.

Data Source
1. OPD Abstract Register
2. Catchment Area Population

Use
A sudden significant increase in case load of pneumonia can be indicative of outbreak. This indicator is more useful than calculating ARI which includes "No pneumonia" as well. Calculation of OPD pneumonia cases will help in providing a more tangible understanding of the gravity of the situation in the community. It may also be indicative of a possible measles epidemic in the catchment area. This indicator can help the health authority to decide on initiating preparedness for increase in pneumonia case load in terms of:
- Additional resource (esp. antibiotics and emergency medicines) mobilization
- Training of staff on proper management
- Health education activities
- Coordination with hospitals for preparedness to receive severe pneumonia patients
- Strengthening referral of Under-5 pneumonia cases
- Collaboration with social sector organizations for improved child-feeding activities
- If measles epidemic is there, initiating measles epidemic control measures

37.   Pneumonia case fatality rate

Definition
This indicator measure the proportion of deaths among patients admitted with diarrhea in hospital indoors. This indicator is calculated as:

$$\frac{\text{Number of deaths due to pneumonia in under-5 years aged patients admitted in the facility}}{\text{Total number of under-5 years aged children admitted in the facility with pneumonia}} \times 100$$

Data Source
1. Indoor Abstract Form
2. Indoor Register

Use

This indicator is suggestive of the severity of pneumonia in the community and the level of early detection and management at community/first care levels. It may also indicate quality of care for pneumonia patients at the facility.

38.   OPD malaria cases

Definition
This indicator estimates the proportion of malaria cases (suspected or confirmed) attending OPD.
This indicator is calculated as:

$$\frac{\text{Number of suspected or confirmed cases of malaria at OPD}}{\text{Total population in the catchment area}} \times 1000$$

Data Source
1. OPD Abstract Register
2. Catchment Area Population Chart

Use

This indicator is a rough estimation of the extent of malaria in the catchment population. This facility-based calculation only provides a partial picture. Nevertheless, an increasing number of OPD attendances of malaria cases should alert the health authority and may deem further investigation of the situation.

39. Malaria case admissions

Definition

This indicator estimates the proportion of malaria cases (suspected or confirmed) attending OPD.
This indicator is calculated as:

$$\frac{\text{Number of complicated malaria (suspected or confirmed) cases admitted in the facility}}{\text{Catchment area population}} \times 1000$$

Data Source

1. OPD Abstract Register
2. Catchment Area Population Chart

Use

Assuming that only complicated cases of malaria are hospitalized, this indicator may indicate severity of malaria and level of early detection and management at community/first care levels. It may also indicate resistance to first line drugs used at first level.

40. Malaria case fatality rate

Definition

This indicator measure the proportion of deaths among patients admitted with malaria in hospital indoors.
This indicator is calculated as:

$$\frac{\text{Number of deaths of admitted patients with malaria}}{\text{Number of patients admitted with malaria}} \times 100$$

Data Source

1. Indoor Abstract Form
2. Indoor Register

Use

It suggests severity of malaria and level of early detection and management at community/first care levels. It may also indicate resistance to first line of drugs used at first care level. This indicator may also point to the quality of malaria care at facility indoors.

41. Slide Positivity Rate

Definition

This indicator measure the proportion of blood slides tested positive for malaria.
This indicator is calculated as:

$$\frac{\text{Number of blood slides with malaria parasite positive result}}{\text{Total number of blood slides examined for malaria parasite}} \times 100$$

Data Source

1. Laboratory Register

42.   P. falciparum rate

Definition
This indicator measure the proportion of plasmodium falciparum among blood slides tested positive for malaria.
This indicator is calculated as:

$$\frac{\text{Number of blood slides showing plasmodium falciparum}}{\text{Number of blood slides with malaria parasite positive result}} \times 100$$

Data Source
1. Laboratory Register

Use

This indicator is useful for monitoring increase in proportion of falciparum infection. The national target is to keep the proportion at less that 40%.

National TB Control Program / TB-DOTS Indicators
The following three are the indicator calculated and used by National TB Control / TB-DOTS Program. Details of these indicators are provided in the program guidelines.
43.   TB case detection rate
44.   TB treatment success rate
45.   TB sputum conversion rate

46.   TB suspect identification rate

Definition
This indicator estimates the proportion of suspected tuberculosis (TB) cases attending OPD.
This indicator is calculated as:

$$\frac{\text{Suspected TB cases (cases with cough more than 3 weeks) at OPD}}{\text{Total population}} \times 100$$

Data Source
1. OPD Abstract Register
2. Catchment Area Population

47.   Proportion of TB-DOTS intensive-phase patients missing

Definition
Proportion of plasmodium falciparum among blood slides tested positive for malaria.
This indicator is calculated as:

$$\frac{\text{Number of intensive phase TB-DOTS patients missing treatment for >1 week in the month}}{\text{Number of intensive phase TB-DOTS patients during that month}} \times 100$$

Data Source
1. TB Patient Card (TB-01)

Use
This indicator is suggestive of the performance of the TB-DOTS treatment center and the associated treatment supporters.

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Under TB-DOTS, "if a patient misses his/her treatment for more than 2 consecutive days during the initial intensive phase, he must be traced by the health worker or by the treatment supporter." And, in the continuation phase of treatment "if patient fails to collect his drugs within one week of drug collection day he must be traced by health worker". Also, in case of initial intensive phase treatment cases, if the length of treatment interruption is less that 2 weeks, there is no change in the treatment regimen. But, if interruption is more than 2 weeks, the approach is different according to the situation. Thus, in order to capture the situation of occurrences of treatment interruptions in the initial phase of DOTS, a middle period between 2days to 2 weeks has been chosen in the DHIS report, i.e., 1 week. If the system is working well, we can expect that the health system would have responded to the missing patient situation by 1 week of treatment interruption. This data on number of intensive phase patients missing treatment >1 week would let the managers know how much extra effort is being put by the health system to bring back missing TB patients, and can serve as a early warning of extent of missing patients and thereby let managers take necessary measures to reduce the occurrences of treatment interruptions. This information is not captured in the quarterly TB report where number of "Default" cases is reported. (By definition, "A patient whose treatment was interrupted for consecutive two months or more" is considered as a defaulter.)

48.   OPD measles cases under-5 years

Definition
This indicator is an estimate of the proportion of measles cases attending OPD.
This indicator is calculated as:

$$\frac{\text{Number of under-5 measles cases attending OPD}}{\text{Total under-5 population in catchment area}} \times 100$$

Data Source
1. OPD Abstract Register
2. Catchment Area Population Chart

Use
This indicator provides only a rough facility-based estimate of the overall situation. A trend analysis may yield information on possible measles outbreak.

49.   OPD diphtheria cases under-5 years

Definition
This indicator is an estimate of the proportion of measles cases attending OPD.
This indicator is calculated as:

$$\frac{\text{Number of under-5 diphtheria cases attending OPD}}{\text{Total under-5 population in catchment area}} \times 100$$

Data Source
1. OPD Abstract Register
2. Catchment Area Population Chart

Use
This indicator provides only a rough facility-based estimate of the overall situation. A trend analysis may yield information on possible diphtheria outbreak.

50.   Neonatal tetanus rate

Definition
This indicator is the percent of live births admitted with neonatal tetanus in the hospital.
This indicator is calculated as:

$$\frac{\text{Number of neonatal tetanus admission}}{\text{Expected live births in the catchment area}} \times 100$$

Data Source
1. Indoor Abstract Register
2. Catchment Area Population Chart

Use
This facility-based calculation of the neonatal tetanus rate only depicts the tip of the iceberg of the overall neonatal tetanus situation in the community. In spite of that, this indicator serves to tell the program managers that neonatal tetanus cases are occurring in the community; and an increasing trend can mean evolution of an alarming situation in the community, thus reflecting on the immunization program and safe motherhood activities.

51.   OPD Undernourished children

Definition
This indicator is the ratio of undernourished children among total OPD patients.
This indicator is calculated as:

$$\frac{\text{Undernourished children attending OPD}}{\text{Total OPD attendance}} \times 100$$

OPD Undernourished children are those children coming to OPD for the treatment of obvious wasting, kwashiorkor or marusmus.

Data Source
1. OPD Abstract Register
2. OPD Register

Use
This indicator will give an idea about increasing or decreasing trend of occurrence of obvious under-nutrition among the children in the community. This indicator can serve as a warning signal of the deteriorating nutritional status of the children in the community and, thus, help to alert the managers for taking appropriate program or action to improve the situation. Other factors may also influence increase in OPD attendance of undernourished children, e.g. community-based awareness program on child nutrition, improvement in the quality of health facility's services.

52.   Low birth weight (LBW) rate (facility-based)

Definition
This indicator measures the proportion of live births with low birth weight (live born infants with birth weight less than 2,500 g) among births in health facility in a given time period.
It is calculated as:

$$\frac{\text{Number of live births in the facility with LBW (<2.5 kg)}}{\text{Total live births in the facility}}$$

Birth weight is the first weight of the newborn obtained after birth. For live births, birth weight should ideally be measured within the first hour of life before significant postnatal weight loss has occurred and actual weight should be recorded to the degree of accuracy to which it is measured.

Low birth weight is defined as less than 2500 g (up to and including 2499 g).

Data Source
1. Obstetric Register

Use
LBW rate is a good indicator of a public health problem that includes long-term maternal malnutrition, ill health and poor health care. On an individual basis, low birth weight is an important predictor of newborn health and survival. The facility-based statistics can provide a good estimate of LBW rate in the population. Monitoring changes in facility-based LBW rate can help in understanding changes in the population.

53.   Expected obstetric complications attended

Definition
This indicator is a measure of the proportion of women estimated to have obstetric complications who are treated in the public health facilities
This indicator is calculated as:

$$\frac{\text{Number of obstetric (pregnancy or delivery) complications treated at the facility}}{\text{Number of obstetric complications expected in the catchment population}} \times 100$$

Data Source
1. Obstetric Register
2. Catchment Area Population Chart

Use
As a rule, about 15% of the pregnant women are thought to need emergency obstetric care at hospitals for obstetric complications. This indicator will suggest how much of the expected complicated pregnancies are catered by the public health facility. Indirectly it also reflects the quality of services at the facility, the quality and coverage of antenatal care services in the catchment area and the strength of the referral system

54.   Expected Caesarean sections performed

Definition
This indicator is a measure of Caesarian Sections as a percentage of all births in the population.
This indicator is calculated as:

$$\frac{\text{Number of C-sections carried out in the facility}}{\text{Number of expected births in the population}} \times 100$$

Data Source
1. Obstetric Register
2. Catchment Area Population Chart

Use
It is estimated that 15% of pregnancies develop life-threatening complications; of them one-third (i.e., 5% of pregnancies) require C-sections. Thus, Caesarian sections should account for not less that 5% and not more that 15% of all births. This indicator will give an estimate of what proportion of C-sections are taking place in public health facilities. On the other hand, high proportion may indicate over-indulgence in C-sections.

55.   Obstetric case fatality rate

Definition
This indicator is a measure of deaths among women with obstetric complications admitted in the public health facility.
This indicator is calculated as:

$$\frac{\text{Number of death among obstetric patients in the facility}}{\text{Number of cases with obstetric complications admitted in the facility}} \times 100$$

Data Source
1. Obstetric Register

Use
This is a quality of emergency obstetric care indicator. As a rule of thumb, case fatality rate among women with obstetric complications in the health facilities should be less than 1%. A higher fatality rate indicates poor care. On the other hand, it also reflects quality of early detection and referral from community/first level care facilities for obstetric complications or point towards delays in care seeking for obstetric complications which indirectly suggest the quality/coverage of antenatal care consultations.

Related Indicator
Maternal deaths investigated
Cause-specific obstetric case fatality

56.   Maternal deaths investigated

Definition
It indicates the proportion of maternal deaths in the facility investigated.
This indicator is calculated as:

$$\frac{\text{Number of maternal deaths in the facility investigated}}{\text{Total number of maternal deaths in the facility}} \times 100$$

Data Source
1. Obstetric ward / Medical Superintendent's records

Use
This indicator reflects the management's interest in improving services to reduce maternal mortality and indicates presence of accountability or negligence in case of maternal deaths occurring in the facility

57.   Newborn case fatality rate

Definition
This indicator refers to the proportion of early neonatal deaths (deaths within the first seven completed days of life) in the facility among live births occurring in the facility.
This indicator is calculated as:

$$\frac{\text{Number of newborn (early neonatal) deaths in the facility}}{\text{Total live births in the facility}} \times 100$$

Data Source
1. Obstetric Register

Use

This indicator is suggestive of the quality of newborn care, especially the immediate newborn care and obstetric care in the facility. It may also reflect poor nutritional status of mothers and poor health care seeking behavior in the community

Related indicator

Cause-specific facility-based neonatal fatality

58.   Stillbirth proportion

Definition

This indicator refers to the proportion of still births (babies born dead after 22 weeks gestation) in the facility among all the births occurring in the facility.

This indicator is calculated as:

$$\frac{\text{Number of still births in the facility}}{\text{Total births in the facility}} \times 100$$

Data Source

1. Obstetric Register

Use

Along with newborn case fatality rate, this indicator provides a measure of facility-based perinatal mortality rate. Perinatal mortality rate reflects the overall quality of maternal and neonatal care. It depends of the socio-economic status of the community, access to health care and the quality of that health care.

59.   STI/RTI cases: women

Definition

This indicator is a facility-based estimation of the proportion of female (15-49 age group) patients with STI/RTI attending OPD.

This indicator is calculated as:

$$\frac{\text{Number of female (15-49 age) patients with STI/RTI attending OPD}}{\text{Total female (15-49 age) OPD patients}} \times 100$$

Data Source

1. OPD Abstract Register
2. OPD Register

Use

This indicator is suggestive of the awareness and/or health seeking behavior of 15-49 age group female population for RTI/STI in women.

60.   STI cases: men

Definition

This indicator is a facility-based estimation of the proportion of male (15+ age group) patients with STI/RTI attending OPD.

This indicator is calculated as:

$$\frac{\text{Number of male (15+ age group) patients with STI/RTI attending OPD}}{\text{Total female (15-49 age) OPD patients}} \times 100$$

Data Source
1. OPD Abstract Register
2. OPD Register

Use
This indicator is suggestive of the awareness and/or health seeking behavior of male population for STI in men.

62.   Hepatitis B Virus + proportion

Definition
This indicator is an estimation of the percent of cases screened positive for Hepatitis B infection.
This indicator is calculated as:

$$\frac{\text{Number of blood samples tested positive for HBV}}{\text{Number of blood samples tested for HBV}} \times 100$$

Data Source
1. Laboratory Register

Use
This indicator can provide a rough picture of the overall situation of Hepatitis B infection in the general population.

63.   Hepatitis C Virus + proportion

Definition
This indicator is an estimation of the percent of cases screened positive for Hepatitis C infection.
This indicator is calculated as:

$$\frac{\text{Number of blood samples tested positive for HCV}}{\text{Number of blood samples tested for HCV}} \times 100$$

Data Source
1. Laboratory Register

Use
This indicator can provide a rough picture of the overall situation of Hepatitis C infection in the general population.

64.   Budget release

Definition
It is the percent of allocated budget released
This indicator is calculated as:

$$\frac{\text{Amount of allocated budget released}}{\text{Total budget allocation}} \times 100$$

Data Source
1. Financial records

Use
This indicator reflects the amount of budget released, total or for specific budget heads, e.g., M&R, ADP, medicine etc. When viewed against time, it will indicate the amount of budget made available in time. Review of this indicator may lead to call for action like liaison with finance department for timely and adequate release of budget or to put up case with DCO in case of difficulty.

65.   Unspent budget

Definition
It is the percent of allocated budget remaining unspent.
This indicator is calculated as:

$$\frac{\text{Unspent budget for each category}}{\text{Total budget allocation for each category}} \times 100$$

Data Source
1. Expenditure statement

Use
This indicator will help in understanding the utilization of budget. Especially if calculations are made according to each budget head, it will tell what amount of head-wise budget is left for the rest of the year. This indicator will also help to identify occurrence of any unusual expenditure or non-expenditure.
Some of the action that may be necessary based on the review of this indicator can be:
  - Investigation of the cause of unusual (very high or low) expenditure
  - Re-appropriation of the budget, if necessary
  - If less expenditure, expediting processes for appropriate procurement, maintenance activities, etc.
  - Take measures (including liaison/consultation with District Government) to increase budget allocation in the relevant line-head of the proposed budget for next year

66.   Per capita non-salary budget allocation

Definition
This indicator represents the situation of budget allocated for public health services by the district.
It is calculated as:

$$\frac{\text{Total non-salary budget allocation for the year}}{\text{Total population in the district}} \times 100$$

Data Source
1. Budget statement

Use
The indicator provides a reflection of the district's responsiveness to population's health needs.

67. Stock out of tracer drugs / supplies

Definition
This indicator measures the percent of health facilities that experienced a stock-out of any tracer drug/medicine for any number of days at any time of the month.
This indicator is calculated as:

$$\frac{\text{Number of health facilities in the district that experienced a stock-out of a tracer drug/medicine}}{\text{Total \# of facilities}} \times 100$$

Data Requirements
Occurrence of Stock-out of tracer drugs/medicines

Data Source
Stock Register

Use
Ideally, there should not be any stock-out situation in the facilities. Occurrence of stock-out of any tracer drug for any number of days in a month will indicate that there is a breakage anywhere in the logistic system. By analyzing this indicator the district manager can identify whether breakdown in the logistic supply system in the district is a wide-spread phenomenon involving many health facilities or only occurring sporadically; whether such breakages are occurring regularly throughout the year or only occur occasionally. In this way the probable site of fault in the supply line can be identified and appropriate measures can be taken to improve the situation.

At facility level, the facility can calculate the percent of months a facility reported stock-out in a year. Frequent occurrences of stock-outs at the facility can indicate weaknesses in stock management within the facility.

Related Indicators
Percent of months a facility reported stock-out in a year

68. Proportion of staff positions filled

Definition
This indicator refers to the percentage of sanctioned staff positions filled in the facility.
This indicator is calculated as:

$$\frac{\text{Filled staff positions, by category}}{\text{Total sanctioned staff positions, by category}} \times 100$$

Data Source
1. Facility's personnel file(s)

Use
The indicator is a reflection of the availability of staff in the facility according to its sanctioned positions. Calculation of category-wise percentage of filled staff positions will yield a detailed picture of essential staff strength in the facility.

70. Facility equipment need

Definition
This indicator refers to the percentage of facilities in need of specific equipment.
This indicator is calculated as:

$$\frac{\text{Number of facilities without functional equipment/unit in question}}{\text{Total number of facilities}} \times 100$$

Data Source
1. Stock register for equipment/furniture

Use
This indicator will provide the overall picture of the need for particular equipment in the district.

71. Facility repair need

Definition
This indicator refers to the percentage of facilities that need major repair (i.e., repair work that is not within the financial or administrative authority of the facility in-charge.)
This indicator is calculated as:

$$\frac{\text{Number of facilities requiring major repair}}{\text{Total number of facilities}} \times 100$$

Data Source
1. Health Institution Database (HID)

Use
This indicator will provide the overall picture of the extent of major repair work of the facilities needed in the district.

72. Functional patient toilets

Definition
This indicator refers percentage of facilities with functional toilets (i.e., toilets that are usable, clean and have sufficient water supply and are used) for the patients in the facility.
This indicator is calculated as:

$$\frac{\text{Number of functional toilets for patients' use in the facility}}{\text{Total number of toilets for patients' use in the facility}} \times 100$$

Data Source
1. Health Institution Database (HID)

Use
This is a quality of care indicator and provides the overall picture of the responsiveness to the patients' needs.

73.   Facility waste disposal

Definition
This indicator refers to the percentage of facilities with functional toilets (i.e., toilets that are usable, clean and have sufficient water supply and are used) for the patients in the facility.
This indicator is calculated as:

$$\frac{\text{Number of facilities for a given level with proper waste disposal arrangements}}{\text{Total number of facilities by that level}} \times 100$$

Data Source
1. Health Institution Database (HID)

Use
This indicator reflects adherence to safety procedures by the facility

74.   Emergency Obstetric Care

Definition
This indicator refers to the distribution of Emergency Obstetric Care (EmOC) facilities in the district.
This indicator is calculated as:

$$\text{Number of facilities providing Basic EmOC and Comprehensive EmOC services in the Tehsil/District}$$

Data Source
1. Health Institution Database (HID)

Use
In order to cater to the emergency obstetric care needs, there should be at least 4 Basic EmOC facilities and 1 Comprehensive EmOC facility for 500,000 population and appropriately distributed over the geographical area. This indicator will depict the availability of EmOC services in the district and their geographical distribution.

75.   Blood bank screening facilities

Definition
This indicator refers to the availability of screening facility in the blood banks.
This indicator is calculated as:

$$\frac{\text{Number of registered blood banks with HBV, HCV, HIV and syphilis screening facilities}}{\text{Number of registered blood banks}} \times 100$$

Data Source
1. Health Institution Database (HID)

Use
This indicator will reflect the extent of safe/unsafe blood transfusion services in the district.

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76. Private facility registration

Definition
This indicator refers to the percentage of private hospitals/clinics registered with the government authority.
This indicator is calculated as:

$$\frac{\text{Number of registered private hospital/clinics in the district}}{\text{Total number of private hospitals/clinics in the district}} \times 100$$

Data Source
1. EDOH Office Records

Use
This indicator will reflect on the extent of private sector health care facilities brought under government's health regulatory authority and indirectly reflect the performance/capacity of such authority.

77. Reporting timeliness

Definition
This indicator refers to percent of public health facilities providing monthly reports in accord with time protocol.
This indicator is calculated as:

$$\frac{\text{Number of facilities submitting monthly reports in time}}{\text{Total number of facilities}} \times 100$$

Data Source
1. District HMIS Cell Log Book/DHIS Computer Application

Use
This indicator provides a reflection of one aspect (i.e., timeliness) of the DHIS data quality. If facilities are not sending monthly reports on time, the data from the reports will not get entered in the DHIS computer application in time, thereby, making availability of complete DHIS data set for any kind of analysis and use for decision making improbable.

78. Reporting completeness

Definition
This indicator refers to percent of monthly DHIS reports that are complete.
This indicator is calculated as:

$$\frac{\text{Number of complete DHIS monthly reports from the health facilities for a month}}{\text{Total number of monthly reports submitted for the month}} \times 100$$

> **Complete** means all the relevant data elements in the monthly report have been reported, and the submitted report does not contain any cell that is unduly left blank.

Data Source
1. DHIS Computer Application

Use
This indicator is a reflection of the DHIS data quality.

79.   Reporting accuracy

Definition
This indicator refers to level of data accuracy (measured in percentage) of the monthly reports as assessed through using the Lot Quality Assurance Sampling (LQAS) technique.

> **Level of Data Accuracy** of the monthly report means the extent to which the data in the monthly reports cross-match with the data in the registers from where the data have been transferred to the monthly reports.

Data Source
LQAS Job Aide for District HMIS Coordinator

Use
This indicator is a reflection of the DHIS data quality.

ANNEX 3

DHIS INSTRUMENT LIST

TABLE 1:   LIST OF DHIS INSTRUMENTS

DHIS Instrument No.	DHIS Instrument
DHIS – 01 (R)	Central Registration Point Register
DHIS – 02 (F)	OPD Ticket
DHIS – 03 (R)	Outpatient Department Register
DHIS – 04 (F)	OPD Abstract Form
DHIS – 05 (R)	Laboratory Register
DHIS – 06 (R)	Radiology/Ultrasonography Register
DHIS – 07 (R)	Indoor Patient Register
DHIS – 08 (F)	Indoor Abstract Form
DHIS – 09 (R)	Daily Bed Statement Register
DHIS – 10 (R)	Operation Theater (OT) Register
DHIS – 11 (R)	Family Planning Register
DHIS – 12 (C)	Family Planning Card
DHIS – 13 (R)	Maternal Health Register
DHIS – 14 (C)	Antenatal Card
DHIS – 15 (R)	Obstetric Register
DHIS – 16 (R)	Daily Medicine Expense Register
DHIS – 17 (R)	Stock Register (Medicine/Supplies)
DHIS – 18 (R)	Stock Register (Equipment/Furniture/Linen)
DHIS – 19 (R)	Community Meeting Register
DHIS – 20 (R)	Facility Staff Meeting Register
DHIS – 21 (MR)	PHC Facility Monthly Report Form
DHIS – 22 (MR)	Secondary Hospital Monthly Report Form
DHIS – 23 (MR)	Tertiary Hospital Monthly Report Form
DHIS – 24 (YR)	Catchment Area Population Chart
DHIS – 25 (YR)	Health Institute Database (HIS) Report Form

ANNEX 4

DHIS DATA QUALITY ASSURANCE JOB AIDS

1. Checking Data Accuracy of Monthly Report, Using LQAS Table

1. Selection of data elements is random, which means select data elements without any preference. A broad representation of the data elements from different sections of the monthly report form is required to assure all data elements are given equal opportunity for selection. A sample of 12 data elements is required based on LQAS table.

2. Select randomly one data element from each section of the previous monthly report. Write the selected data element in the first column of the data accuracy check sheet given below. Repeat the procedure till all data elements from different sections are entered in first column.

3. Copy the figures of the selected data elements as reported on the monthly report form in second column of data quality check sheet, under the heading of "figures from monthly report form".

4. Pick the register which has the selected data element. Count the actual entries in the register related to a specific selected data element. Put the figure you counted in third column of check sheet, under the heading "figure from register". Repeat this procedure for all data elements.

5. If the figures in column 2 and 3 are same, put a cross under YES in column four. If they are not the same (does not match), put a cross under NO in column four. Repeat this procedure for all data elements.

6. Count total crosses under "YES" and write in row of total of "YES". Repeat the procedure for "NO" column. Both YES and NO total should be equal to sample size 12.

Data Accuracy Check Sheet	Write down month for which data accuracy is checked_____			
Randomly Selected Data Elements from the monthly reporting form	Figures from the Monthly report form (2)	Figures counted from registers (3)	Do figures from column 2 &3 Match?	
			YES	NO
1. OPD monthly report section-				
2. OPD monthly report section –				
3. EPI monthly report section –				
4. Family planning monthly report section -				
5. Mother health monthly report section –				
6. LHW monthly report section –				
7. Community meeting monthly report section				
8. Stock monthly report section –				
9.				
10.				
11.				
12.				
	Total			

7. Total in "Yes" column corresponds to the percentage of level of data accuracy in the following LQAS table. For example, if total "yes" number is 2, the accuracy level is between 30-35%; if total "yes" number is 7, the accuracy level is between 65-70%.

8. Circle the data accuracy percentage and write it in section 15 of monthly report in the monthly report and submit to district office.

2. Monitoring the Data Accuracy Using LQAS Table

LQAS Table: Decisions Rules for Sample Sizes of 12 and Coverage Targets/Average of 20-95%																	
Sample Size	Average Coverage (Baselines)/ Annual Coverage Targets (Monitoring and Evaluation)																
	Less than 20%	20 %	25 %	30 %	35 %	40 %	45 %	50 %	55 %	60 %	65 %	70 %	75 %	80 %	85 %	90 %	95 %
12	N/A	1	1	2	2	3	4	5	5	6	7	7	8	8	9	10	11

- You could set a target for achievement in a specified period and use it for monitoring progress. The target can be broken down on monthly basis. For example, if data accuracy is improving by 5% on monthly basis, the correct match number should increase accordingly as shown in the LQAS table. As the correct match number increases compared to previous months, it reflects improvement in level of data accuracy.

- Achievement of data accuracy level at 95% means high level of accuracy and needs to be maintained at that level.

Note: Please note that with sample size of 12 data elements, the data accuracy ranges +15%. That means that if the data accuracy is 30%, the range is between 15% and 45%.

ANNEX 5

DHIS Cost

Annex 5   DHIS cost

1. Initial cost for 120 Districts (Rs.)	120 Districts	@	4,234,000	Total	508,080,000
2. Initial cost for 4 Provinces (Rs.)	4 Provinces	@	573,000	Total	2,292,000
3. Annual operation cost for each District (Rs.)					1,411,000
4. Annual operation cost for each Province (Rs.)					384,000

A. Initial cost for District (1st year) (Unit : Rs.)

		DA Rate (Rs.)	No. of person	Duration	Refreshment/ stationary, etc.	
1. Printing of DHIS tools/instruments/manuals						1,136,000
2. Strengthening of HIS Unit, etc. - District HIS Unit equipment, Stationary, printing of report, Monthly/annually - Hospitals (x 6) - DHDC	Multimedia, Computer, Laser Printer, UPS, Hub, LAN, Software, Internet charges, etc. (see Table E)					2,018,000
					Sub-total	3,154,000
3. Capacity building of Health staffs. managers						
- Training on DHIS data collection & Data quality assurance	for FLCF staffs	800 /day	90 Medi.	2 days	5,500	150,000
		500 /day	270 P. Medi	2 days	10,500	270,000
	for Hospital staffs	800 /day	50 Medi.	3 days	4,000	124,000
		500 /day	100 P. Medi	3 days	5,000	155,000
	for Facilitators	1,500 /day	10 Person	10 days	0	150,000
- Training on DHIS information use	for participants	800 /day	180 Person	1 day	8,000	152,000
	for Facilitators	1,500 /day	10 Person	2 days	0	30,000
4. Training on DHIS Software	for participants	800 /day	20 Person	2 days	2,000	34,000
	for Facilitators	1,500 /day	2 Person	5 days	0	15,000
					Sub-total	1,080,000
					Total	4,234,000

B. Annual operation cost for District (2nd year ~)

1. Supply of tools/instruments			
- Printing of DHIS tools/instruments	960,000	R 80,000 x 12 months (ave.. 80 facilities)	960,000
- Distribution	56,000	Rs. 1,000 x 14 days x 4 times	56,000
2. Cost for M&E			126,000
- Follow-up of training	60,000	Rs. 1,000/day x 30 days x 2 persons	
- Monitoring (quarterly)	48,000	Rs. 1,000/day x 6 days x 4 times x 2 persons	
- Evaluation	18,000	Rs. 1,000/day x 3 days x 4 person	
3. Meetings			
- Review of monitoring result (2 times)			86,000
TA for participants	80,000	Rs. 500 x 80 facility in-charge x 2 times	
Refreshments	6,000	Rs. 30 x 100 persons x 2 times	
- Review of evaluation result (1 time)			44,000
TA for participants	41,000	Rs. 500 x 80 facility in-charge	
Refreshments	3,000	Rs. 30 x 100 persons	
4. Consumables/paper/internet			139,000
- District HIS Unit	76,000	see Table F	
- Hospitals	33,000	ditto	
- DHDC	30,000	ditto	
		Total	1,411,000

C. Initial cost for Provincial HIS Unit, etc. (1st year)

1. Provincial HIS Unit				
- Multimedia	90,000			90,000
- OHP	60,000			60,000
- Internet setting charge	1,000			1,000
- Consumables/Paper	58,000	see Table G		58,000
- Workshop of evaluation result (1 time)				140,000
TA for participants	138,000	Rs. 2,300 x 30 representative of District x 2days		
Refreshments	2,000	Rs. 30 x 30 persons x 2 days		
			Sub-Total	209,000
2. PHDC				
- Computer (Linux)	50,000			50,000
- Computer (included in Windows XP)	60,000			60,000
- Printer	20,000			20,000
- Software (Microsoft Office, Antivirus)	20,000			20,000
- UPS	30,000			30,000
- Hub	2,000			2,000
- LAN cable	1,000			1,000
- Internet setting charge	1,000			1,000
- Multimedia	90,000			90,000
- OHP	60,000			60,000
- Consumables/Paper	30,000	See Table G		30,000
			Sub-Total	364,000
			Total	573,000

D. Annual operation cost for Province (2nd year ~)

2. Cost for M&E				156,000
- Follow-up of training	60,000	Rs. 1,000/day x 30 days x 2 persons		
- Monitoring (quarterly)	48,000	Rs. 1,000/day x 2 days x 12 times x 2 persons		
- Evaluation	48,000	Rs. 1,000/day x 2 days x 12 times x 2 persons		
3. Meetings				
- Workshop of evaluation result (1 time)				140,000
TA for participants	138,000	Rs. 2,300 x 30 representative of District x 2days		
Refreshments	2,000	Rs. 30 x 30 persons x 2 days		
4. Consumables/paper/internet				88,000
- Province HIS Unit	58,000	see Table G		
- PHDC	30,000	ditto		
			Total	384,000

E. Breakdown of cost for strengthening of HIS Unit, etc.

1. District DHIS Cell				
- Computer (Linux)	50,000			50,000
- Computer (included in Windows XP)	60,000			60,000
- Printer	20,000			20,000
- Software (Microsoft Office, Antivirus)	20,000			20,000
- UPS	30,000			30,000
- Hub	2,000			2,000
- LAN cable	1,000			1,000
- Internet charge	13,000	Rs. 1,000 x 12 months + Initial cost Rs. 1,000		13,000
- Multimedia	90,000			90,000
- OHP	60,000			60,000
- Consumables/Paper	64,000			64,000
			Sub-Total	410,000

2. Hospitals				
- Computer (Linux)	50,000			50,000
- Computer (included in Windows XP)	60,000			60,000
- Printer	20,000			20,000
- Software (Microsoft Office, Antivirus)	20,000			20,000
- UPS	30,000			30,000
- Internet charge	12,000	Rs. 1,000 x 12 months		12,000
- Consumables/Paper	21,000			21,000
			Sub-Total	213,000
3. DHDC				
- Computer (included in Windows XP)	50,000			50,000
- Printer	60,000			60,000
- Software (Microsoft Office, Antivirus)	20,000			20,000
- UPS	20,000			20,000
- Multimedia	90,000			90,000
- OHP	60,000			60,000
- Internet charge	12,000	Rs. 1,000 x 12 months		12,000
- Consumables/Paper	18,000			18,000
			Sub-Total	330,000

F. Details of operation cost for District

1. District HIS Unit				
- Consumables/Paper	29,000	80 facility x 15 pages x 12 months		
	5,000	10 officials x 20 pages x 12 months		
	30,000	Toner Rs. 15,000 x 2		64,000
- Internet charge	12,000	Rs. 1,000 x 12 months		12,000
			Sub-Total	76,000
2. Hospitals				
- Consumables/Paper	1,000	MS x 20 pages x 12 months		
	5,000	20 Chief x 10 pages x 12 months		
	15,000	Toner Rs. 15,000		21,000
- Internet charge	12,000	Rs. 1,000 x 12 months		12,000
			Sub-Total	33,000
3. DHDC				
- Consumables/Paper	3,000	10 staffs x 25 pages x 12 months		
	15,000	Toner Rs. 15,000		18,000
- Internet charge	12,000	Rs. 1,000 x 12 months		12,000
			Sub-Total	30,000

G. Details of operation cost for Province

1. Provincial HIS Unit				
- Consumables/Paper	3,000	30 Districts x 20 pages x 4 times		
	1,000	10 officials x 20 pages x 4 times		
	12,000	20 pages x 20 pages x 30 District (eva.)		
	30,000	Toner Rs. 15,000 x 2		46,000
- Internet charge	12,000	Rs. 1,000 x 12 months		12,000
			Total	58,000
2. PHDC				
- Consumables/Paper	3,000	10 staffs x 25 pages x 12 months		
	15,000	Toner Rs. 15,000		18,000
- Internet charge	12,000	Rs. 1,000 x 12 months		12,000
			Total	30,000