Statement of User Requirements

MIS for National Health Insurance

Revised Version June 2012

KfW/Bangladesh Ministry of Health and Family Welfare

Health Economics Unit

Dhaka, June 2012

Patrick Ernst / Zia Hoque / SSK MIS Project Team

GFA-BIS GmbH

Contents

1 Executive Summary 7

2 Introduction and background 10

2.1 Objectives and methodology 10

2.2 Limitations, Risks and Assumptions 11

3 Findings and Discussion 12

3.1 Current situation at hospital level 12

3.1.1 Institutional overview 12

3.1.2 Process descriptions 14

3.1.3 IT Infrastructure and HR skills 17

3.2 Health Information Technology in Bangladeshi Context 20

3.2.1 Situation of Health Management Information Systems 20

3.2.2 Embedding SSK into the National HMIS 21

3.2.3 SSK expectations and preparedness for computerization 22

3.2.4 Options for computerization 23

3.3 Future applications 24

3.3.1 Overall System Design and Interfaces 24

3.3.2 Electronic Medical records 25

3.3.3 Hospital Management System 26

3.3.4 Membership Card Management 33

3.3.5 National Health Insurance System 35

4 Policy implications, conclusions and Recommendations 38

5 Annexes 39

5.1 Organograms UHC 40

5.2 Main reference data 43

5.3 Reporting System 46

5.3.1 Daily patient enrollment 48

5.3.2 Disease profile 49

5.3.3 Emergency Obstetric Care (EmOC) 53

5.3.4 Hospital Bed Statement 54

5.3.5 Major equipment statement 55

5.3.6 Indoor & Outdoor patients 56

5.3.7 Diarihoea report 57

5.3.8 Indoor & Outdoor patients by disease and age 58

5.4 Cost calculation 59

5.5 Training Plan 60

A C K N OWL E D G EM E N T

The consultants are taking this opportunity to salute the Government of the Peoples' Republic of Bangladesh for the well wishes for the people and interest about ICT and Kreditanstalt für Wiederaufbau (KfW) for its support.

The consultants would like to convey their highest gratitude to Mr. Prasanta Bhushan Barua, Additional Chief (Additional Secretary), Health Economics Unit, Ministry of Health & Family Welfare and Prof. Abul Kalam Azad, Additional Director General, Directorate General of Health Services, Ministry of Health and Family Welfare for their concern and kind guidance. We also thank Mr. Md. Hafizur Rahman, Deputy Chief (Deputy Secretary); Mr. Mahbub Hossain, Deputy Chief (Deputy Secretary); Dr. Ahmed Mustafa, Senior Assistant Chief (Senior Assistant Secretary) for all the kind assistance to complete the study.

We also give our thanks to the Director, Chittagong Medical College Hospital; Civil Surgeon of Chittagong and Gopalgonj. We also remember UHFPOs of Rangunia and Tungipara Upazila.

We worked closely with the Health Financing Technical Assistance of Health Economics Unit, MoHFW. We are grateful to Dr. Pulak Mutsuddy (Health Economist) and Mr. Md. Azmal Kabir (Research Coordinator) for their now and then cordial support. We want to salute the Team Leader Dr. Lars Kyburg for his kind assistance and guidance for the study.

Finally, we would like to thank the health service personnel at District, Upazila, Union and community level who kindly and patiently replied to our many questions, for the openness in providing the required data and information and for their valuable contribution to the work of the team.

Acronyms

Acronym	Description
ANC	Antenatal Care
API	Application programming interface
APL	Above Poverty Line
ARV	Antiretroviral drug,
BIRT	Business Intelligence and Reporting Tools
BPL	Below Poverty Line
GIS	Geographical Information System
BRAC	Bangladesh Rural Advancement Committee
BRN	Birth Registration Number
DG	Director General
DGHS	Directorate General of Health Services
DHIS	District Health Information System (software product name)
DHIS2	District Health Information System version 2
DMIS	Data Management Information System
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit (the German Society for International Cooperation)
HEU	Health Economics Unit
HH	Household
HISP	Health Information System Program
HMIS	Health Management Information System
HIV	Human immunodeficiency virus
HR	Human Resource
HTML	Hyper Text Markup Language
ICD	International Statistical Classification of Diseases and Related Health Problems
iHRIS	IntraHealth Human Resources Information Systems (software product name) (http://www.ihris.org)
ICT	Information & Communication Technology
ID	Identification
IPD	In-Patient Department
IT	Information Technology
JLN	Joint Learning Network
KfW	Kreditanstalt für Wiederaufbau (German Development Bank)
MIS	Management Information System
MoHFW	Ministry of Health and Family Welfare
MOVE-IT	Monitoring of Vital Events through the use of Information Technology
NGO	Non-Government Organization
NHSO	National Health Security Office
NID	National Identification
NID	National Immunization Day
OPD	Out-Patient Department
OpenMRS	Open Medical Record System (software product name)
PC	Personal Computer
PID	Population Identification
SDMX	Statistical Data and Metadata Exchange (http://www.sdmx.org)
SDMX.HD	Statistical Data and Metadata Exchange for Health Domain

Acronym	Description
SMS	Short Message Service
SSK	ShastyoShurokshaKarmasuchi (Health Protection Scheme)
WHO IMR	WHO Indicator and Measurement Registry
My SQL	Open source relational database management system (database product name)
SOUR	Statement of User Requirement
TB	Tuberculosis
UTF-8	Unicode Transformation Format-8
WHO	World Health Organization
XML	Extensible Markup Language

1 EXECUTIVE SUMMARY

The consultants had carried out two field trips, to Rangunia UHC, Chittagong General District Hospital, Chittagong Medical College Hospital, Tungipara UHC, Gopalgonj District General Hospital, interviewing 50 staff and analysing about 35 different paper forms. Two presentations were held in February and March 2012 and feedback from HEU was incorporated into the study.

In addition, learning from several meetings held at the occasion of a WHO/BRAC HMIS workshop were incorporated, including with representatives from the University of Oslo and HISP India, regarding the openMRS Hospital Management System, with DGHS-MIS on the general Bangladesh HMIS approach and with GIZ on possibilities of establishing an IT support structure for SSK.

The analysis of the current situation pointed towards some important challenges regarding data management. Concerning Infrastructure & Organisation, there are several unstructured and redundant processes, such as a patient registration that is done at 3 different receptions (OPD, Emergency, IPD). For IPD admission, the standard procedure is that one patient is routed from OPD to Emergency to IPD, having to go through three different departments (although there may be exceptions to this standard procedure).

Also the consultants observed that at one reception three different registration books were in use. Forms and registers are often entirely unstructured and different formats are in use for the same purpose. Also, currently there is no system for effective referral in place and finally, no structured systems for data quality control were seen to be in place.

Regarding the technical infrastructure, at many places there are internet and electricity problems, including one UHC, where there is no stable 2G internet connection at the premises. To cope with this situation, staff uses the service wireless modem he has been provided and enters data into the MoHFW online reporting systems from a location outside the premises.

Data management activities also suffer severely from the lack of qualified staff and the high number of vacant positions in UHCs, including MIS staff. Statisticians suffer from a massive reporting burden because of many ad-hoc and vertical reporting requirements. Also, few doctors appear to be interested in computerization, and many seem to be reluctant to use computers in a professional context. Strong policy support would be required to ensure that local managers assume an active leadership role and motivate doctors to use the new system.

Conceptually and at the central level, the Bangladeshi Health MIS was greatly improved during last years. However at hospital level, basic PC and Internet is not always available and data entry discipline is not yet sufficient at all levels. The Government product strategy for the Health MIS is focussing on open source and web-based technology. As part of this strategy, DHIS2 was identified and implemented as the key product for the aggregation of statistical data. For hospital management and medical records, openMRS was identified as the strategic product.

Within the scope of openMRS currently, there are several parallel hospital automation approaches under discussion, including BRAC Move-IT, two different approaches from

DGHS-MIS/GIZ and finally the HEU/SSK approach. In all these cases, the participating hospitals should deliver hospital statistics to the DHIS2 Data Warehouse in order to alleviate the manual data compilation activities of the statistician.

The consultants suggest a two-phase approach for the implementation of a system to support the SSK operations. The system architecture will have three main components, the Health card, the NHSO head office software and the hospital management systems.

Regarding Card management, a baseline survey team will collect beneficiary data; on this basis NHSO or an insurance company will prepare membership cards. Details of the card distribution to the beneficiaries are defined in the Socio-Economic Study. Regarding the choice of the card type, a simple solution should be sufficient for the identification of the patient.

In a first step, medical records will be kept only in the hospital database; no medical record will be stored on the card and there should be no centralized database with all patient data. A simple smart card could be used to store information about the card holder, including photos or fingerprints (biometric authentication), but it is also an option to start with a more simple system without smart cards, e.g. by printing beneficiaries photos on the card. The final decision should be a good balance between fraud prevention and reduction of technical complexity, especially considering technical maintenance issues.

In a first step, the UHCs should receive an offline system with 4-5 PCs, focussing on general patient management and IPD. 4-5 PCs would be installed at one UHC, covering Registration/SSK Help desk (including Emergency, Referral), the OPD Dispensary and the MIS room (Claiming). Hospital statistics (aggregate patient data) will be exported electronically to DHIS2 Claims are sent electronically to NHSO software. The patient flow procedures and related forms and formats should be standardized and it should be ensured that electricity supply and technical support of devices and network is available at all times.

Patients should arrive at a centralized, unique reception desk, where a card reader connected to a PC is available for ID checking. Referrals will be supported on the basis of print-outs and an asynchronous data transfer to the referral system, the referral Hospital will have only one PC at the SSK Help desk. Fraud prevention measures, including biometric authentication, should be in line with the UHC hospital management solution and be improved step-by-step.

In a second step, the UHC hospital will be further automated, including OPD rooms, Labs, etc. The referral hospital (General District Hospital) may also be further automated, possibly also including OPD. In addition, a central synchronization database can be established that allows the synchronization of patient records. The synchronization should only take place only in case of referral and upon patient authorization. The second phase approach should be built on the experiences from the first phase and determine the best system architecture and server location.

At the planned NHSO headquarters, the software needs to cover two alternative scenarios: NHSO as single payer agency and NHSO as SSK Administering Agency, monitoring the activities of insurance companies that have a territorial monopoly. NHSO defines and provides service cost codes and values to the hospital systems. Hospitals send electronic claims data to NHSO or the insurance company, following a clearly defined schedule invoices in order to meet deadlines defined by HEU. For monitoring purposes, the software will have automatic routines for claims verification, monitoring of the hospitals efficiently, disease patterns and of possible fraudulent activities.

Suggestions for the procurement of hardware and software as well as a training plan and training cost estimations are annexed to this study in order to provide MoHFW with the necessary basis for the successful implementation.

2 INTRODUCTION AND BACKGROUND

The Health Economics Unit (HEU) of MoHFW is supported by German Development Cooperation (financed through KfW) with technical assistance in the areas of health financing/ health economics/ equity. The consultancy services are provided by GFA Consulting Group and include commissioning of studies, training, workshops and seminars and undertaking analytical work. HEU/MoHFW will be assisted in building consensus on reform processes in the areas of health financing and equity.

Under the leadership of HEU/MoHFW discussions have been conducted with key stakeholders and policy makers for the identification, design and implementation of a health financing pilot in selected areas. It has been agreed that the ultimate aim of the project is to create a national health insurance scheme to be known as Shastyo Shuroksha Karmasuchi (SSK: Health Protection Scheme).

The objective of the health financing pilot is to investigate new sources of financing for the health care system in Bangladesh. Such sources may include health insurance premiums, equitable use of out-of-pocket expenditures, incorporating community financing schemes, charitable contributions, corporate social responsibility, social payroll insurance and transparent and equitable service fees. The pilot will also test mechanisms (Results Based Financing) as a tool to improve the quality of health services and increase demand as well as supply.

2.1 Objectives and methodology

The general objective of this study is to design an effective automated processing system to meet SSK operational requirements. Specific objectives are to recommend:

- a technology platform for the SSK pilot
- hardware and software to meet SSK operational requirements at all health service delivery facilities at the Upazila, Union and Community Clinic level
- Databases and reporting formats required for SSK operational needs
- Local area networks for connectivity

The Consultant will ensure to design a system, including the following functions:

- Operational systems for NHSO activities
- Automated application of RBF Standards and production of monthly RBF performance reports for the designated head of the Management Team
- Systemic checks and balances for error correction and to prevent fraud and misuse
- Concept for Establishment of Help desk and 24 hour support
- Procedures for data backup
- Planning of training of providers in technology input and administration

- Training of HPA staff in technology
- System development to migrate from a simple initial system to meet early pilot requirements, to add adjustments as pilot requirements are further defined and to eventually provide input to specifications of the more complex ultimate SSK HMIS for scale up
- Compatibility of SSK data for input to MoHFW HMIS

To raise an accurate picture of the situation at these organizations, interviews were carried out, based on a standardized questionnaire, also records and reports and existing software solutions were analysed. The outcome was a presentation of possible alternative approaches, decisions to be taken by HEU and recommendations on the next steps.

This document shall serve as the basis for the further elaboration of detailed terms of references for the procurement of a software solution.

2.2 Limitations, Risks and Assumptions

As part of the study, some risks for the successful implementation of the IT systems have been identified. During the analysis of existing patient procedures at UHC level, the consultants realized considerable challenges regarding the usage of Health Cards in a hospital system that in principle is offering free and unlimited access to the health system. Also regarding the choice of the referral hospital should be well prepared and communicated. At Rangunia UHC, today patients are almost exclusively referred to the Chittagong Medical College Hospital, not to the district hospital, which normally would be first in the referral line.

Also the consultants see important challenges in staff motivation and preparation. Currently there are many vacant MIS staff positions at several pilot hospitals. In addition the low motivation of doctors and other staff to use computers will require a lot of IT training and organizational rethinking. The geographical distances between the 3 pilot Upazilas make on-site system maintenance and hands-on user support more difficult.

A certain risk can also be found in possibly conflicting project scopes. It has been defined as an SSK objective to actively support the Digital Bangladesh Initiative in the area of hospital automation. The consultants feel that this could divert resources from SSK´s main objective to successfully introduce a basic health insurance system for the poor.

This conflict becomes evident when looking at the implementation planning. In the first phase, a duration of 6-12 months is expected before a simple hospital management system can be in place, for the second phase, enlarging the system to cover OPD as well another 6 months should be calculate. Setting up a LAN Network necessary for a full scale hospital management system entails additional complexity on large premises. Reducing the hospital management system to an absolute minimum 1 PC installation or running it on paper could speed up the piloting of the health insurance system.

Some questions could not be entirely responded as part of this study. This is due to Interfaces of other studies that were not yet carried out at the moment of finishing the IT study. As part of the Socio-Economic study further details of the Health Card distribution process will be defined, the communication study will make suggestions how beneficiaries are supposed to handle cards. As part of the base line study, targeting details will be defined.

3 FINDINGS AND DISCUSSION

3.1 Current situation at hospital level

3.1.1 Institutional overview

The Bangladesh Health Institutions are divided into three branches, the General Hospital branch working under DGHS, Medical College Hospital branch working under Medical Education and the Mother and Child care branch working under DGFP. In this analysis, we focused only on the general branch.

Within this branch, there is a clearly hierarchized institutional organization, starting with simple OPD institutions at Ward and Union level, Upazila level Health Complexes with 50 beds to Districts Hospitals and District General Hospitals. And finally, as tertiary referral points, Teaching Hospitals and Specialized Institutes at District or Divisional Level. The main focus of this analysis will be the Upazila Health Complexes and the higher level referral institutes.

Geographic level	Facility	Number of facilities	Population served	Urban / rural	Beds	Services offered Inpatient / outpatient	Level of care
Division, Districts	Teaching hospital / institute (In addition: specialized institutes)	17 Govt., 1 Army, 41 Private	10 – 15 million	Urban	250 – 1050	• Consultant level curative incl. surgery • Treatment of general diseases • Extended lab services	Tertiary referral
District	District hospital / District General Hospital	60	2,3 million	Urban (Except Dhaka)	100 - 250	• Consultant level curative incl. surgery • Treatment of general diseases • Basic lab services and X-ray, USG • Normal deliveries and C-Sections	Second referral
Upazila	Upazila Health Complex	413	270.000	Rural	31- 50	• Essential Service Delivery • Basic lab services and x-ray, ECG, USG • Normal deliveries and C-Sections (only in some UHCs) • Prompt & Effective	First referral

Geographic level	Facility	Number of facilities	Population served	Urban / rural	Beds	Services offered Inpatient / outpatient	Level of care
						Referral	
Union	Health Sub-Centre/ Rural Dispensary	About 1150	30.000	Rural	outpatient	• Essential Service Delivery • Prompt & Effective Referral	First referral
Ward	Community clinics	About 8000 (planned > 12.000)	6.000	?	outpatient	• Treatment of Minor illness • Preventive, promotive, limited curative • Prompt & Effective Referral	First referral

As part of the analysis, the consultant visited three Hospitals in Chittagong district and two hospitals in Gopalgonj district. In the table below we have outlined the key data.

The main focus of our analysis was Rangunia Upazila Health Complex and Tungipara Upazila Health Complex, which each have a capacity of 50 beds and serve a population of about 380.000 and 107.000, offering Essential Service Delivery. At Chittagong district level, we visited 2 referential hospitals, the District General Hospital and the Medical College hospital. We also visited Gopalgonj District General Hospital which has recently been declared as Medical College Hospital.

	Tungipara Upazila Health Complex	Rangunia Upazila Health Complex	Gopalgonj District General Hospital	Chittagong District General Hospital	Chittagong Medical College Hospital
Number of beds	50	50	250	250	1000
Emergency Registration	• 1 small room for emergency treatment • 1 ad joint small room for emergency registration	1 combined room: • Emergency registration • Emergency treatment	• 1 room for emergency registration • 1 ad joint room for emergency treatment	• 1 room for emergency registration • 1 ad joint room for emergency treatment	• 1 counter: Emergency registration • Several treatment rooms / Casualty unit
Staff sanctioned/available	Doctor: 21/6 Medical assistants: 2/2 Nurses: 15/11 Other staff: 78/37	Doctor: 21/20 Medical assistants: 2/2 Nurses: 16/14 Other staff: 78/35	Doctor: 61/29 Nurse: 59/53 Other Staff: 140/83	Data not available	Data not available
Out patient department (OPD)	• Treatment rooms: 4 general, 1 consultant • Number of doctors: 3 MO, 1 consultant	• Treatment rooms: 7 general, 1 consultant • Number of doctors: 10 MO, 3 consultant	• Several Departmental OPD treatment rooms	• Several Departmental OPD treatment rooms	• Several Departmental OPD treatment rooms
Emergency Patients per year/day	7.646/21	7.300/20	26.347/72	6.643/18	Data not available
Outdoor Patients per year/day	84.677/232	59.019/160	101.242/277	151.134/414	Data not available

	Tungipara Upazila Health Complex	Rangunia Upazila Health Complex	Gopalgonj District General Hospital	Chittagong District General Hospital	Chittagong Medical College Hospital
IPD Admission per year/day	16.927/46	6.289/17	19,159/52	5.604/15	Data not available
Number of different IPD treatment forms	1	1	1	3	4
MIS room	3 Computers	3 computers (one not working)	5 computers (two not working)	2 computers (one not working)	2 computers (one not working)
MIS Staff sanctioned/available	Statistician 1/0 Office Assistant/ Computer Operator 3/2	Statistician 1/1 Office Assistant / Computer Operator 3/1	Statistician 1/0 Computer Operator 1/0 Office Assistant / Data Entry Operator 1/0	Statistician 1/0 Computer Operator 1/0 Office Assistant / Data Entry Operator 1/0	0
Internet connection	Modem (No network)	Modem	Modem	Modem	Broadband

3.1.2 Process descriptions

This chapter gives an introduction to the general current workflows.

Reception

There are two receptions, one for out-patients and one the emergency room. The emergency room fulfils several purposes. It serves as receptions for emergencies, as a treatment room for certain kind of emergencies, e.g. for light wounds from cuts, heat, accidents, drowning, poisoning, etc. At the same the emergency reception serves as a gateway to in-patient.

In one roaster (or shift) the emergency room is staffed with one emergency medical officer (EMO) and one medical assistant and one emergency assistant. The assisting staff only works in the emergency room, the medical officer is shared with the other departments of the hospital.

In both Rangunia and Tungipara Upazila Health Complexes there are about 15-30 patients per day who come to the emergency room. When a patient is taken to the emergency room, his name, address, age, sex and diagnosis is written into the registration book. Each treatment gets an identification number which is composed of daily serial, monthly serial and yearly serial, starting with 01/01/01. The same identification systematics is used for out-patients and in-patients.

Patients have to pay a minimal amount for registration. This registration is valid for 1 fiscal year. After the fiscal year patients have to register again with the same amount. However the registration fee is free for poor patients. The registration number is composed of a yearly serial-monthly serial-daily serial. At UHCs, there are three registration books for general patients, ARI patients and diarrheal patients. There is no unique identifier for registration numbers enrolled in different registration books.

For OPD, there is a registration counter which assigns a registration number in three categories (male, female and child) and routs the patient to a particular OPD room. Both returning and new patient deposit their tickets to the OPD room attendant. With this serial (FIFO principle), visitors are called to OPD rooms and meet a doctor. Usually, one OPD room

is staffed by two doctors. Sometimes medical assistants also give treatments. If required, doctors may refer the patient to senior doctors.

Referrals

In theory, the Bangladeshi public health services are clearly hierarchized into primary, secondary and tertiary care institutions. Within this hierarchy the Upazila Health Complex would normally have the role as primary hospital, receiving referrals from Union Health Centres. Accordingly, it would be the role of the Upazila Health Complexes to refer patients to the secondary care level, namely the District Hospitals.

As the consultants observed, this structure is not actually followed. At the emergency room or at the out-patient registration at Upazila level, a referral slip is neither required, nor does it deliver any advantages or priority treatment to the patient. Also, there is no feedback mechanism that would inform lower levels about the acceptance of the referred patient.

The situation is similar at the higher level. Upazila Health Complexes use a hospital letter head for referral, At Rangunia Upazila Health Complex; referrals are mostly made to Chittagong Medical College Hospital, which is a tertiary care hospital. Thus the second level care, which would be the District Hospital, is skipped. According to Chittagong Medical College, patients are never rejected or sent to a lower level hospital. Tungipara Upazila Health Complex refers mostly to Gopalgonj District General Hospital and in more complicated cases refers to Khulna Medical College Hospital. Also, since the referral slip is not a structured form, it will likely contain only incomplete information about treatment and referral reasons.

In-Patients

When a patient needs to be received as in-patient, emergency room will issue a so-called „Bed Head Ticket.“ This form contains two registration numbers, the one from emergency room and a new one from IPD. The form is very little structured, containing only Bed Number, Name, Age, Sex, Family Names, Address, Admission and discharge date, Date and Cause of Death and provisional diagnosis. In the unstructured area below the header, the doctor will put treatment details, diet determination, drug prescription, but may also note on the progress of the treatment, sometimes also using the blank back of the form.

In addition, at the end of the patient´s stay, a discharge certificate, a referral slip or a death certificate is created. The discharge documents only contain the diagnosis, but no details on the treatment. Death reports are little bit more formalized, they contain an ICD 10 code for the death cause.

These forms are filed in a store room under lock and key by the nurse-in-charge but in practice never accessible and never used for follow-up treatments. Hence, when a patient is re-visiting the same institute, be it as out-patient or in-patient, normally his documented medical history is not taken into account.

The in-patient department is taken care of through doctors and nurses. In the Rangunia Upazila Health Complex, there are 13 nurses and 1 nursing supervisor in Tungipara Upazila Health Complex only 9 nurses and 1 nursing supervisor. Depending on the time of day, between 2 and 4 nurses are in service. Their documents are stored in the nurse room, which serves as central meeting and communication point for the nurses. The doctors will come for round usually 4 times per day, and will also come when called upon. There is no activity sheet protocolling the doctors' activities, but there are duty rosters for doctors and nurses.

Drug issuance

In theory, patients have the right to receive free medicine in the hospital; this is the case for In-patients, out-patients and emergency. At Upazila level, supplies are ordered by the Hospital and delivered by DGHS or the Civil Surgeon´s Office and will then be stored in a central drug store room. Smaller amounts of supplies are withdrawn from the central stock via stock requisites and are being stored in four small dispensaries (In-patient, out-patient, emergency and the operation room). Community Clinics also take medicine from Upazila Health complex.

Only out-patients dispensary gives out medicine to be taken home. In the OPD treatment room, doctors will give out drug slips along with the prescription. This allows out-patients to hand in the slip at the OPD dispensary, receive the medication and keep the prescription with the usage and dosage instructions. For IPD, a drug order register is maintained. The doctor determines the drug need when visiting the patient at his bed and notes it on the bed head sheet. This information than will be transferred into the order book by the nurse.

In practice, certain medication is not available at the Hospital, in which case the patient will need to purchase the medication at nearby licensed pharmacies. The same occurs outside of the regular opening hours (8.00h-14.30h). Emergency room patients will then also need to buy medication outside the hospital

Diagnostic Facility

There are facilities in the Upazila Health Complexes for some selected laboratory tests (pathological/biochemical), X-Ray, Echo Cardiogram and in some cases Ultrasonogram. These facilities are being used by patients from OPD, IPD and Emergency. Sometimes due to shortage of supply or equipment maintenance, the testing is not possible. In that case patient needs to take the tests in private facilities.

The technician is used to document the test results or findings in an unstructured register and to issue an unstructured paper report to the patient. Often they even use blank papers for prepare the reports. During our field visit at Rangunia UHC, the laboratory was closed as the lab technician. They have an ECG machine which has been out of order for some time. Similarly the X-ray technician was in leave at Tungipara UHC on the day of visit. As there is no back-up staff, in such a case the service disrupted.

Finance, Overseeing and Audit

The Upazila hospitals do not carry out any proper finance management. The only cash which goes through the hospitals are emergency and OPD ticket admission charge and diagnostic fees as per government approved rate chart from patients, which is deposited back to the national government. Only 2000 Taka are made available for one year for cost such as stationary. All other cost is covered by MoHFW.

Reporting

Hospitals are required to report patient statistics on a monthly basis. Monthly reports for a few datasets need to be entered into DHIS (Patient Enrolment, Disease Profile, Emergency Obstetric Care (EmOC), Hospital Bed Statement, Major Equipment Statement, Indoor & Outdoor Patients Report), but the majority of reporting is still done in Excel or on a paper basis.

There are a lot of vertical reporting requirements (e.g. EPI, IMCI etc.) as well as departmental regular reporting requirements beside ad-hoc reporting, e.g. coming from MoHFW, DGHS, DGFP and other directorates.

Out-patient department, emergency department and in-patient departments fill up blank or structured paper format at the end of each month and send it to the MIS room for aggregation. Union Sub-Centres also report in paper format to Upazila Health Complex. The designated official/worker compiles all data and enters the report in DHIS2 software. There are little to no reliable data quality verification procedures in place, some of the data was or inconsistent and difficult to verify and interpret.

Only District/General Hospitals and below are reporting to the chain. The compliance for reporting is poor for Medical College Hospitals and Specialized Hospitals. They have no positions for MIS or reporting. Beside this as they are not controlled by DGHS, the maintenance of reporting chain is difficult. There are a lot of general/specialized private hospitals are not complying reporting requirements.

Some documents are transferred electronically, but some reports need a paper format to be officialised with stamp and signature. In the case of the Rangunia and Tungipara Upazila Health Complexes, sending documents by regular postal service takes about 7-10 days, for urgent deliveries a courier service may be used, which would take 1-2 days but is much more costly than regular postal service.

Archiving Medical records

In theory, all hospitals have to archive medical records. Archiving of in-patient medical records is practiced, but there is no mechanism for archiving medical records from out-patient or emergency departments. IPD medical records are archived manually on a monthly basis. One nurse, mostly the nurse-in-charge, is responsible for archiving.

In some hospitals there is a separate room for medical record archives. Usually that room is under lock and key and under responsibility of the nurse-in-charge. The records are supposed to be kept for 10 years.

Medical record sheets, including bed head tickets, are preserved at the nurses' duty station while the patient is discharged or referred out. The nurse-in-charge files those papers daily. After completion of a month she supervises some staff for sorting the papers by discharge date and registration number. Then those papers are filed and archived.

For retrieving the files and accessing historical data there are some practical challenges. For example in Tungipara UHC there are no duplicate keys, because the nurse-in-charge was on leave, the archive room was not accessible. At Gopalgong District General Hospital the situation is even more difficult. There is no separate room for archiving. Some open shelves in the statistician´s room are used for medical record archiving. The shelves capacities are not sufficient, therefore files are piled on the floor. In practice, medical records are only trying to be retrieved if police or court demands it, then resulting in high search effort.

3.1.3 IT Infrastructure and HR skills

The Rangunia Upazila Health Complex is connected to the fixed telephone network; there are 3 land lines at emergency, nurses' duty station and at the administration room. In

addition, there is a mobile phone for incoming emergency calls at emergency department. Also, the residential medical officer is in principle always available through a personal mobile phone. Inside the Rangunia Hospital premises, there are three PCs, two of which are working. The PC that today is used for MIS reporting, which is located in the statistician's room. They use a 2G modem for internet connectivity.

The Tungipara Upazila Health Complex has no fixed telephone network. The only land phone is for UH&FPO office. In case of emergencies, this line is used. There is also a mobile phone for emergency department only for emergency incoming calls. There are three PCs, all in working condition. Two of them are being used for general administrative purpose. The laptop is used for emails as well as for MIS reporting. There is a 2G modem for internet connectivity. The office assistant/computer operator has to carry the laptop to his home for data entry as there is no internet signal within the hospital premises.

We visited the hospitals during the month of February and March, during which the electricity situation was relatively stable in all institutions. Although short electricity cuts may always occur, there are no prolonged blackouts during this period. Longer electricity cuts occur mostly during the summer, between the months of May and September. For this reason, the Rangunia Hospital has a fuel powered electricity generator, which at the time of visit was out of order. At the Tungipara Upazila Health Complex the generator is in working condition but not in use for lack of funds for buying fuel. For the main PC used for reporting, a UPS device was available but also out of order in both Upazila Health Complexes.

The number of staff permanently working in the Upazila Health Complexes (50 beds), in the three main staff categories is 21 doctors (including UH&FPO, the administrative head of the Upazila), 15/16 nurse and a good number of support staff (3rd and 4th class). Support staff size depends on the geographic extension of the UHC area.

The vacancy is the most serious problem for UHCs. There is a comparative statement of vacancy in two UHCs is as follows. The organogram with vacancy is attached as Annex.

	Staff Vacancy	
Staff type	**Rangunia UHC**	**Tungipara UHC**
Doctor	5%	71%
Nurse	13%	27%
3rd class support staff	30%	38%
4th class support staff	8%	63%
Overall Technical staff	23%	45%
Overall Non-Technical Staff	14%	60%

Rangunia Upazila Health Complex including 15 Union sub-centres has 36 defined positions for doctors, out of which 3 are vacant. Besides the Upazila Health & Family Planning Officer) and the Resident Medical Officer, there are 9 specialist/Junior Consultant and 9 Medical officers are posted. They also have 15 Medical Officer positions for 15 Union Sub-Centres, many of them are attached with the base hospital. There are 15 nurses, including 1 nursing supervisor, 1 assistant nurse and 13 senior staff nurse. Amongst the remaining support staff 118 are third class and forth class staffs include 1 statistician and 1 office assistant/computer operators.

Tungipara Upazila Health Complex including 5 Union sub-centres has 25 defined positions for doctors, out of which 18 are vacant. Besides the Upazila Health & Family Planning

Officer) and the Resident Medical Officer, there are no specialist/Junior Consultant and 5 Medical officers are posted. There are 11 nurses, including 1 nursing supervisor and 10 senior staff nurse. Amongst the remaining support staff 37 are third class staffs and 9 are forth class staffs including 2 office assistant/computer operators.

At Rangunia hospital, the statistician who is responsible to collect and compile all reports has a bachelor degree (2 year of studies after 12 years of school), having no certification in statistics or in IT. The staff distributes paper formats to the respective persons, collect those filled up formats, manually summed up, compiled together and enters in DHIS2 software or in Excel sheets. One Office Assistant/Computer Operator helps the staff preparing, compiling and submitting reports. Beside this they have to prepare all documents, draft all letters etc. In Tungipara hospital statistician is not posted yet, 2 office assistants/computer operators are mainly responsible for report collection, compilation and entry.

Regarding IT skills, some management staff hinted towards the sufficient preparation of doctorial and support staff for a computerization. However, even though some younger doctors certainly have PC experience, this is often acquired through purely personal interest. General medical colleges do not prepare students to work with PCs or even professional medical data management systems.

During post-graduation studies, the level of internet use seems to rise for some doctors, but not as a general rule. When we interviewed doctors and asked who should do data entry in case of a future computerization, many spontaneously responded that for any type of automation designated and delegated support staff is required.

Also when interviewing some nurses, the consultants had the impression that many of the nurses have had no exposure so far to PCs, not at all in a professional environment, but also not in their private surroundings. Regarding Medical Assistants and other staffs we had similar observations. Very few of them have kids who are familiar with computer culture. Some of them own a PC which is being used by their kids or grand-kids. It is interesting that almost all of them use cellular phones. Many of them have more than one cellular numbers. They easily can make and receive calls and the majority of them can read SMS but many of them admitted they had never written or sent any text message.

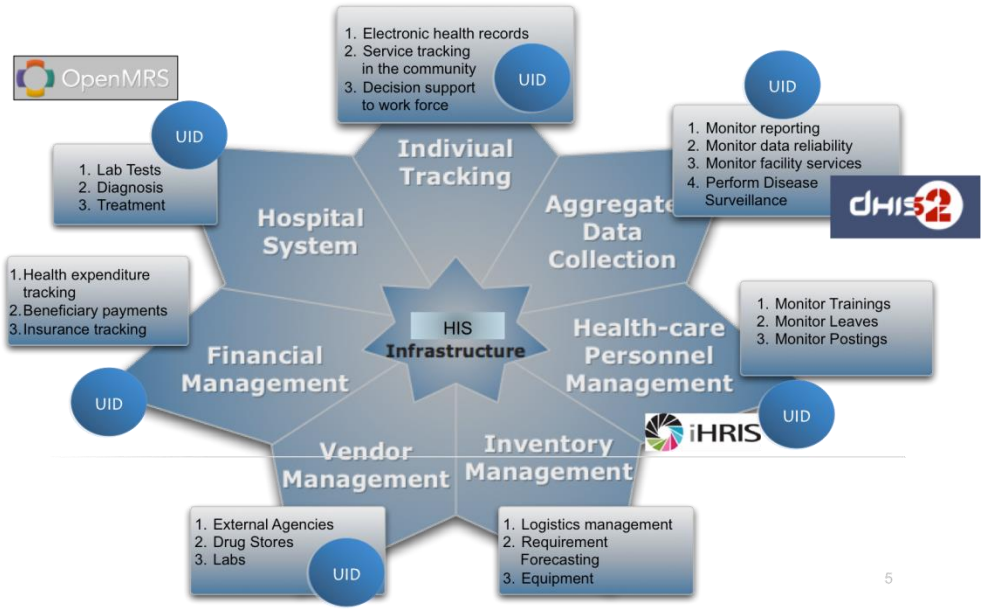
3.2 Health Information Technology in Bangladeshi Context

3.2.1 Situation of Health Management Information Systems

Over the last years, MoHFW and its sub-organizations have taken remarkable steps towards the implementation of software to improve information-based managerial decisions in the Health sector. These activities contribute to the Digital Bangladesh initiative, a cross-sectoral approach to improve the administration´s services to the public.

Since 2005 GIZ has been supporting the improvement of the monitoring and evaluation capacity of the Ministry of Health and Family Welfare. GIZ supported a Data Management Information System (DMIS) project that has already established a central data warehouse to cater the data needs at the central level.

The system architecture relies mostly on specialized open source standard software for the public health sector. A centralized data warehouse serves as a basis for integrated e-health architecture, retrieving data from all MISs and neighbouring systems, such as HR systems, Hospital Information Systems, Logistics and Finance systems, as well as patient or case based information. The following table gives an overview on its most important components.



Source: EPOS/GIZ DMIS Project Presentation, 2011

Within MoHFW, the DGHS-MIS is responsible for the information systems. DGHS-MIS has been actively participating in working towards the definition and implementation of the future IT landscape; however, since DGHS-MIS acts as a service provider to several internal customers within the ministry, some areas of MoHFW also pursue a semi-independent approach and manage their own systems and installations. In the context of the DG HEU

National Health Insurance project, DGHS-MIS is offering its services to DG HEU to support the future system installations.

3.2.2 Embedding SSK into the National HMIS

Any new system related to Health Management should be well embedded into the existing Bangladeshi HMIS Architecture, striving to maximise synergies, interoperability and mutual learning.

Since the National Health Insurance Scheme is a new initiative, there are relatively few systems that serve as a point of reference. The system will have few interfaces to existing system: NSHO will receive data from the hospitals and will deliver some data to MoHFW. The only international approach to developing a standardized National Health Insurance Software is the recent JLN initiative (http://www.jointlearningnetwork.org/content/tools). However this initiative only provides tools for the needs analysis and does not make suggestions specifying system architecture, technologies or system frameworks.

In the area of Health Card Management, the situation is similar: At the moment, there is no widespread electronic member card system introduced in the Bangladeshi Health System that would demand attention in terms of interoperability.

Yet the situation in the area of Hospital Management Systems is very different, since there are already several Hospital Systems in Place in Private, State owned (e.g. Border Guard Hospitals) or NGO hospitals. In addition, there are several initiatives involving the implementation of Hospital Management Systems in the public Health Sector in Bangladesh, targeting Upazila, District, or Tertiary Hospitals:

- DGHS-MIS is about to provide 2 new computers to all Upazila and District Hospitals this year. They are considering taking advantage of the new hardware to install a basic hospital management system with very limited functions, focusing on patient registration and discharge. This low-tech approach should serve to lay the basis for a future medical record system and help compile the most important hospital statistics (Diseases, Bed occupancy rate, etc.) that today need to be entered manually into the DHIS on the basis of paper documents.
- In a separate initiative, DGHS-MIS aims to computerize the work procedures of a few tertiary hospitals with a hospital management system. This may result in a highly complex workflow management, since tertiary hospitals typically cover a wide array of highly specialized functions.
- BRAC NGO has launched an initiative called “MOVE-IT” which aims “to register all pregnant mothers and their children in Bangladesh in a unified electronic information system that tracks vital events (births, deaths, cause of death), non-fatal health events, and coverage of priority services.”[1] While the focus in on vital events and community health, discussion has also been about providing computers to clinics it is possible that this may also lead to providing computers to Upazila and District hospitals to maintain a medical record for pregnant, birth and post-natal care.

These three initiatives were identified during an international DHIS/openMRS workshop organized by BRAC in March 2012. It is possible that additional parallel initiatives are being

[1] http://sph.bracu.ac.bd/research/Presentation/Move_IT_Concept_Note_Timothy_Evans.pdf

planned by other stake holders, but are not yet known. All these initiative have a potential overlap with the HEU Health Insurance project supported by KfW regarding the installation of an integrated hospital MIS.

In order to adequately support the ambitious HMIS initiatives in a sustainable way, MoHFW plans to create a proper non-profit company called HISP Bangladesh (Health Information System Program). This organization will be modelled after the very successful HIPS India (www.hispindia.org) and shall to ensure that local resources are available in the future for continuous maintenance and development. The planned creation of HISP could be an excellent opportunity for the SSK program to benefit from a reliable technical and HR infrastructure.

HISP India may play an important role in the set-up of a possible support infrastructure for the planned SSK systems. Not only could they contribute their know-how to the institutional set-up but also their product know-how. HISP India already gave some support to the implementation of the DHIS2 reporting system in Bangladesh. In addition, HISP has developed and implemented a free and open-source hospital management information system based on the open-source software openMRS.

3.2.3 SSK expectations and preparedness for computerization

The project success will largely depend on identifying and implementing a suitable and adapted technology approach that takes into account infrastructural, technical, organizational, financial and staff capacities.

The SSK project objectives mostly contain general requirements regarding improved access to health care services, particularly by the poor and disadvantaged, improved quality of health care services, especially for women, and the identification of new sources of revenue for the health care system. However, the project requirements also state some very specific expectations towards the improvement of IT processes through information technology. There is an explicit expectation to enhance the “Digital Bangladesh” initiative by automating medical records and patient flow processing systems.

Methodologically, the consultants consider it useful to first carry out a thorough analysis of general technology options before committing to a technology approach. The decision process should be driven primarily by outcome improvements; technology choices should only serve to reach the improvements, but should not be objectives for the sake of technology use. Ultimately, HEU and project management may have to weigh potentially conflicting project objectives: To guarantee a smooth health insurance scheme implementation OR to promote the widespread use of information technology in the Health sector.

An important indicator for the IT preparedness of an organization is the current data management: How an organization uses traditional methods shows a lot about how much attention is given today to the value of information. Today´s data management is marked by the often improvised and inconsistent use of different forms. Data management is also by influenced by logistical challenges, e.g. at Upazila level, one sole room may serve as a combined registration, emergency treatment, IPD admittance and registration records filing room. In addition to the details we have already given in the section on current hospital

procedures, several forms illustrating the inconsistent data management are attached in Annex 1.

3.2.4 Options for computerization

Finding the right level and speed for computerization is mostly relevant at the hospital level, but also the technical resource requirements for supporting the head office installation at NHSO need to be taken into account. In addition, centralized support requirements may rise in case the hospitals are computerized with sophisticated systems.

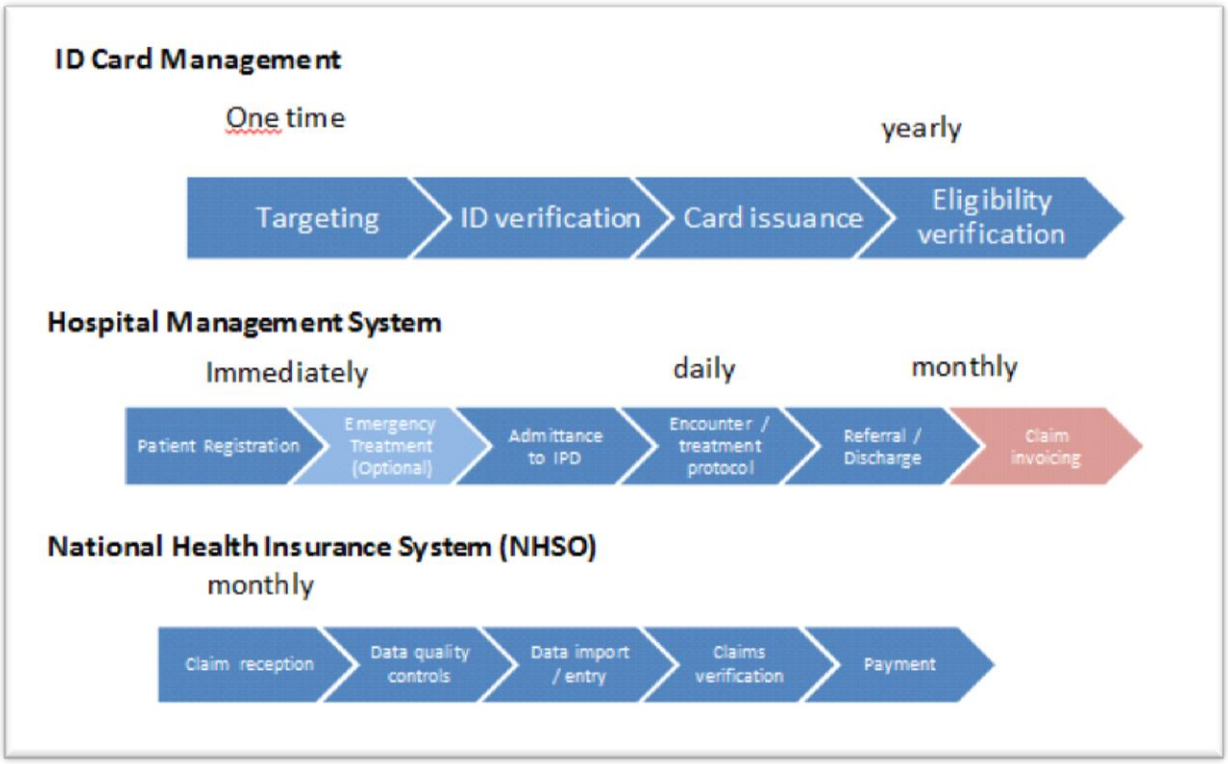
In our analysis, we present 5 levels of computerization, which could serve as a blueprint for a step-by-step implementation. The first step is a completely paper-based system, relying on optimized forms and filing systems, minimizing training effort, cost, time and risk. Obviously, this approach will have limitations regarding the information quality and the options for data analysis. The second model relies on the principle of relying on a sole computer, therefore avoiding the complexity of setting up a local area network. The next step would be to set up a network, covering only the IPD activities, thus introducing 3-5 PCs. In case the OPD activities should be all covered, an additional 8-10 PCs would be required.

.

Criteria	Paper form based	Minimum IT	IPD Network	OPD Network	Future vision
System architecture	Hospitals without PC. Revised forms	1 PC (offline)	3-5 PCs (offline)	10-12 PCs (offline)	PC Network, Online connection
PC Locations	No PC	Help desk / Registration	1 Help desk 1 IPD/Nurse room 1 Store room 1 MIS/ Statistician	1 Help desk 1 IPD/Nurse room 1 MIS/ Statistician 10 OPD	PC Network, Online connection
Staff	Training to existing staff to use new forms	Dedicated, centralized staff (MIS / Help Desk)	Dedicated, centralized staff (MIS / Help Desk)	All doctors and nurses use the system	All doctors and nurses use the system
Modules	New forms: • Registration • Treatment • Aggregate claiming	IPD Registration, Treatment, Medical record, Referral, Billing	IPD Registration, Treatment, Medical record, Referral, Billing	IPD Registration, Treatment, Medical record, Referral, Billing	OPD, Laboratory, Stock management, Dispensary, Finance Management, HR, …
IT Training need	No IT training	2-3 staff	9-15 Staff	25-40 staff	More than 40 staff

3.3 Future applications

The future applications can be divided into three areas: ID card management, Hospital Management System and a National Health Insurance System. The graphics below gives an overview on the most important functions covered in each one of these modules, including information on how often the corresponding activities are carried out.



3.3.1 Overall System Design and Interfaces

The consultants suggest a system design built around the following principles:

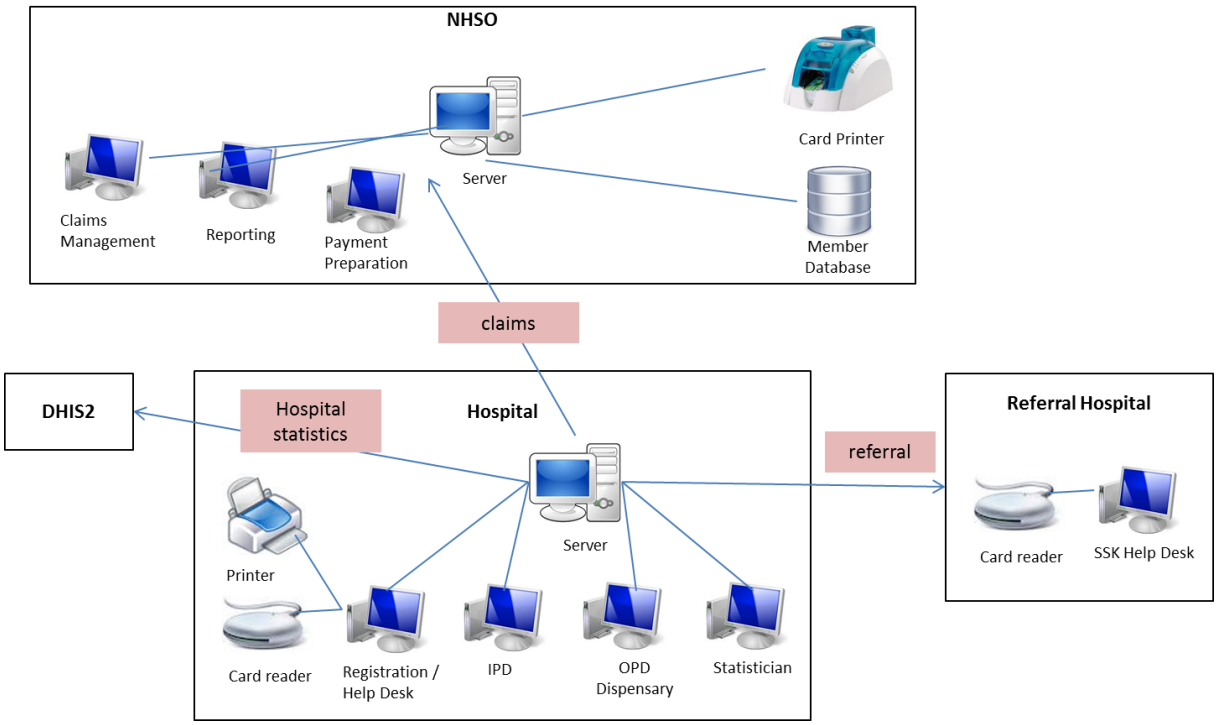
First step:

- The Health Card will serve primarily for the secure identification of the beneficiaries. No medical records will be stored on the card.
- The hospital system is an offline system with 3-5 PCs, focus on IPD. Referrals will be done on the basis of print-outs. Aggregate patient level data will be exported into the DHIS2 based on SDMX.HD interoperability standards.
- The National Health Insurance System will receive claims electronically from participating hospitals.

Future step (Enhancement phase, further analysis needed):

- Hospitals will be further automated, including OPD rooms
- A central synchronization database will be established that allows the synchronization of patient records. Synchronization also takes place in case of referral and after patient authorization.
- A copy of the medical record can be stored on the health card

The principles will be discussed in detail in the following chapters.



3.3.2 Electronic Medical records

The concept of storing medical records in a centralized database raises a number of questions regarding data privacy and data security. MoHFW and the Digital Bangladesh Initiative have developed some general ideas about data privacy, but there is no clear political decision about medical records. Therefore in a first step it is recommended to go only with the concept of local data storage. Medical records will be stored only at hospital level.

Field	Contained	Data source	Head/ Dependents	Comment
Household ID	Card, Database	Survey	Only 1	
Economic Status / Membership Type	Database	Survey	Only 1	
Card Issue date	Card, Database		Only 1	
Card expiry date	Card, Database			Yearly renewable, initially 1 year forward from card

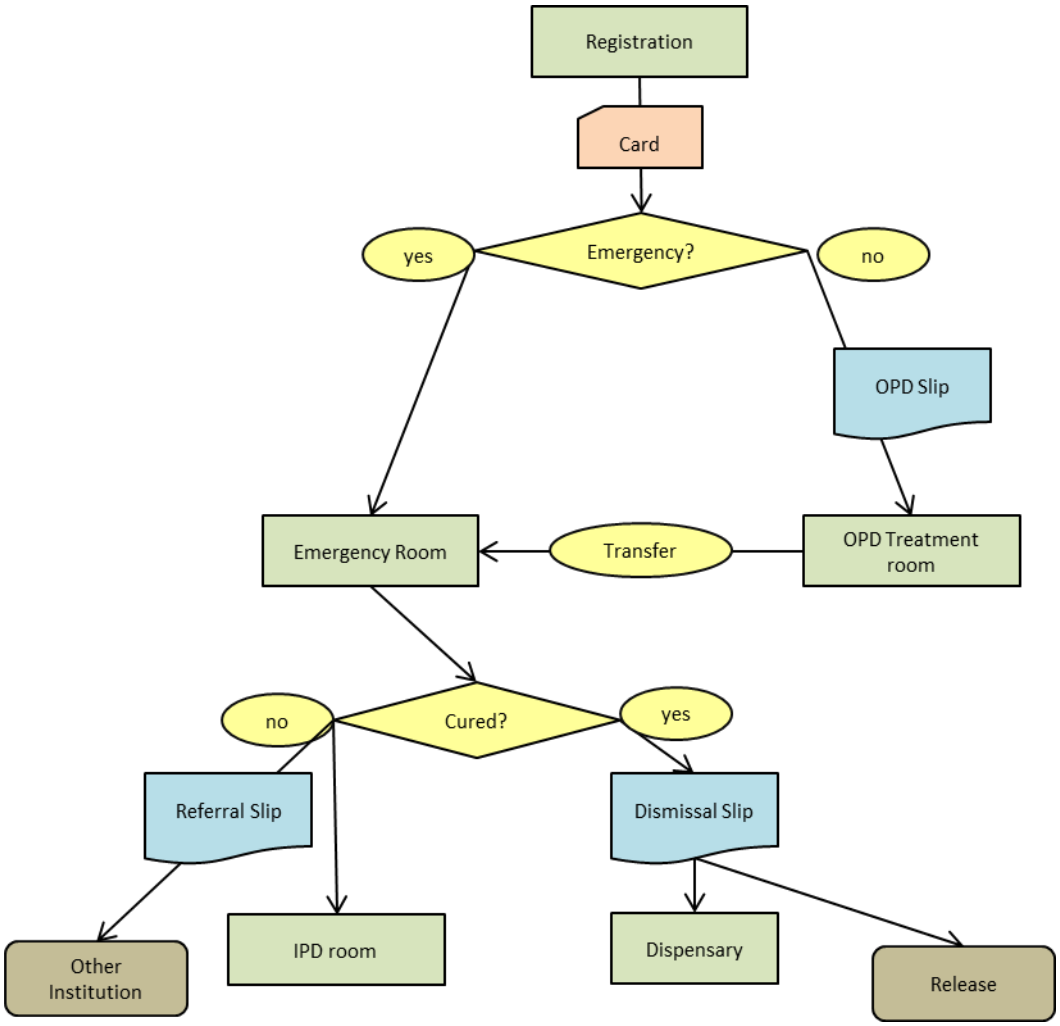
Field	Contained	Data source	Head/ Dependents	Comment
				issue date
Present Address	Database	Survey	Only 1	
Duration of stay in present address	Database	Survey	Only 1	
Permanent Address	Database	Survey	Only 1	
HH Member ID	Database	Survey	All members	serial no of household (HH) members
National ID	Database	Survey	All members	
Population ID	Database	Survey	All members	
Birth Registration Number	Database	Survey	All members	
First Name	Database	Survey	All members	
Middle Name	Database	Survey	All members	
Last Name	Database	Survey	All members	
Relationship with HH Head	Database	Survey	All members	
Father's Name	Database	Survey	All members	
Mother's Name	Database	Survey	All members	
Date of Birth	Database	Survey	All members	
Sex	Database	Survey	All members	
Religion	Database	Survey	All members	
Occupation	Database	Survey	All members	
Education	Database	Survey	All members	
Photographs, Fingerprints	Database	Survey	All members	To be determined
Maximum Yearly Limit	Database	Program threshold	All members	To be determined
Total Utilization	Database	Utilization data	All members	To be determined
Remaining Utilization	Database	Yearly Limit – Utilization	All members	To be determined

3.3.3 Hospital Management System

The system which we describe here will be based on the assumption, that hospitals should be computerized with a Hospital Management System, focussing on patient registration, IPD treatment, stock management, referral, claiming and reporting. The system is designed to work with 3-5 PCs in a Upazila Health Complex. However, it should also work in case 1 or all computers are not functioning as planned; therefore it also includes a manual paper back-up system. Also, the system can easily be expanded to cover additional areas, such as OPD.

3.3.3.1 Patient flow process description

The following graphic shows the main process flow. In this patient flow, there is a graphical.



3.3.3.1.1 Patient registration

In a first step, both walk-in and referred-in patients should arrive at a centralized, unique reception desk (today this reception desk is split between an emergency registration and an OPD registration). The reception desk might need several counters, in a first step the IPD and Emergency desk could remain without computer support, resulting in only 1 PC for registration at the reception desk.

At the reception desk, the patients should be identified with their membership card (the process is described in the separate Card Management Section). In case the patient is already registered in the facility, the system should recognize the patient through his card. In this case, a data screen pops up, showing data of the patient's household. It contains links the medical history of the household members as well as links to the individual patient records of the household member. The system should automatically provide following data:

Member Information	Patient Information
• Membership ID • National ID/Personal ID • Economic Status • Card Issue Date	• Dependent ID • NID/PID • Name • Relationship with HH Head

Member Information	Patient Information
• Card Expiry Date • Membership Type • Monthly Premium • Maximum Yearly Limit • Total Utilization • Remaining Utilization • Last Encounter Date	• Date of Birth and Age • Sex • Photograph • Fingerprint • Access to the medical history (Previous encounters)

The registration desk could be combined with the planned SSK Help Desk. Its function is to guide the patients in Upazila Health Complexes. The SSK Help Desk staff might be recruited by NHSO or provided by an insurance company, otherwise selected from regular staff of the hospital. In any case, back-up staff from the hospital should be made available to jump in in case the main staff is not available and for data entry or look-up, e.g. during emergency situations.

The total yearly coverage per household has been defined as 50.000 BDT. This amount is based on the user fees. The internal cost calculation will be based on cost code for each service, but the user fee will only be a fraction of the internal cost. In order to verify the remaining utilization amount, at the moment of registration, the system will verify the total utilization and compare it against the maximum amount. In case the maximum amount has been reached, treatment may be denied and users have to apply for a special fund. SSK help desk will support the beneficiaries to apply for the special fund.

In a first step, the calculation of the remaining amount available can also be based on the data available in the local database. In case beneficiaries receive treatment at a referral hospital, the treatment data needs to be entered into the database of the UHC hospital. Since this procedure is not online, it will need special attention by the help desk staff of the two hospitals because it may be subject to fraud attempts. Therefore in a second step, an online access to a shared synchronization database should be introduced. However as a pragmatic solution to start operations, we believe that in the first phase, the low quantity of beneficiaries actually seeking and receiving treatment at referral hospitals can be managed without an online connection.

From the registration desk, patients will be routed to emergency, out-patient or In-patient departments.

3.3.3.1.2 Emergency treatment

Currently, emergency patient registration at UHC is done inside the emergency treatment room. The number of patients per day is about 15. In the future, it should be carried out by the centralized reception as well.

Generally emergency patients have family or colleagues (attendants) with them. In current practice, when emergency patient arrive, they get priority treatment as soon as possible, simultaneously some other staff completes the formalities for registration with the help of the attendants. In the proposed system the attendant will be requested to complete the formalities at the reception while the emergency treatment would be going on.

However, in some cases, an anonymous and unconscious patient may come in. Sometimes they may have attendants with them who do not know the patient. In such a case, an alternative procedure would be carried out. It should be possible to create an anonymous

emergency patient in the system, which later will be identified and matched to existing ID data.

There should also be a clear procedure for the hours beyond the hospital's regular opening time. During this time, a dedicated staff should be called to the reception to carry out the patient identification and corresponding data entry. We suppose that this is feasible at Upazila level, as long as the registration desk is located closed to the emergency treatment room.

Then the treatment protocol data should be entered into a treatment screen, containing the following data:

- Diagnosis code
- Diagnosis details (free text field)
- Treatment code
- Treatment details (free text field)
- Prescription/Medication
- Advice

At the end of treatment a treatment result status should be entered or follow-up actions should be triggered, such as:

- Admittance to IPD (determining the ward or department)
- Prescription
- Discharge
- Referral
- Death Certificate

For IPD admittance patient and/or attendant should again go to the reception for admission. The reception team would review the bed availability and register the patient as admitted. Completing the formalities patient would be guided again to the respective ward.

3.3.3.1.3 IPD

The IPD functions should contain all the treatment protocol data described in the emergency section. In addition, the functions should allow managing clinical information of patient admissions and discharges.

The software should allow entering daily treatment, drugs taken, diagnosis and medical data updates, such as pulse, blood pressure and temperature, diagnostic results etc.

The IPD module could also serve to manage bed capacities: Each patient is allocated to a bed number; at the beginning of the treatment an expected number of the duration of the stay can be planned.

The module should also generate several reports on IPD outcomes and bed occupancy rates.

3.3.3.1.4 OPD

After the registration, the system will generate an OPD slip, mentioning the OPD treatment room number, which will be printed out and given to the patient. The OPD system will also serve to establish a queue, assigning a patient to a specific OPD room and establishing a sequential order. The patient takes the slip to the OPD area and presents it to the doctor once he is called into the OPD room.

Up on preliminary diagnosis the patient will be issued a drug slip along with prescription and depart from OPD treatment room. Now the patient will take medicine from dispensary and exit from hospital.

The patient might be advised to have some sort of diagnostic procedure. In such case, patient has to carry the OPD slip where doctor advised for diagnostic tests to the respective room. Receiving the diagnostic report the patient will again visit OPD for consultation in the same process up to exit.

The medical officers in the OPD rooms will refer complicated cases to more senior in-house consultants for specific OPD treatment. In that case, the patient has to wait in a queue for consultation; it might be on the same day or might be on a later day, depending on availability. More complicated cases might be advised for in-patient admission. Patients advised for admission have to go to the reception again. Severely complicated cases might be referred out to higher level facilities.

In a first step, the consultants suggest not to computerize the Out Patient Department. In a later step it may be computerized, using a module that allows for the OPD doctors to select from the queue the next patient, open the patient dashboard to select the diagnosis from the drop down menu of diagnosis, enter prescriptions and follow up outcomes. History of previous encounters of the patient and laboratory results can also be made available, allowing the doctor direct access to support the analysis of the current encounter.

The same applies to the pathology room. In a second phase of computerization, all diagnostic results (possibly also pathology, X-Ray and sonography), could be entered into the system.

3.3.3.1.5 Dispensary and Stock Management

The software could support the hospital’s stock management. One PC should be made available in the centralized OPD dispensary, which is the place which has most stock movement. Currently there are 5 main places in the UHC where drugs are given out or where supplies are being used: Central store room, OPD Dispensary, Emergency, IPD and Operation room. The computerized stock management should cover the consumption, in-house requisition, central store room and re-ordering process. Whenever stock is given out to the OPD dispensary, Operation room or the IPD supply stock, the stock movement should be recorded in the software. At the other locations (e.g. Emergency, Community Clinic), the stock could be managed entirely on paper.

The software should generate orders, which could be printed out and be sent to respective authority. Also, the software should generate stock reports, suggest re-order times and print out orders.

3.3.3.1.6 Referral and Referral Clinics

The software should support the referral to other clinics by providing a print-out of a referral slip, containing diagnosis and treatment details of the referring hospital as well as contact details of the SSK Helpdesk of the referred hospital. The SSK helpdesk should be established in the referral hospitals (only those hospitals have MoUs with NHSO).

At the receiving hospital, a help desk should be established; it could be located close to the emergency area. There are two options to cover the help desk activities. The simple solution would be a paper based system. Patients would bring along a print-out of the referral slip, containing all relevant data, including the medical history when relevant.

In case the help desk should be computerized, the software should cover the following functions: Registration, IPD and Referral (in, out and back).

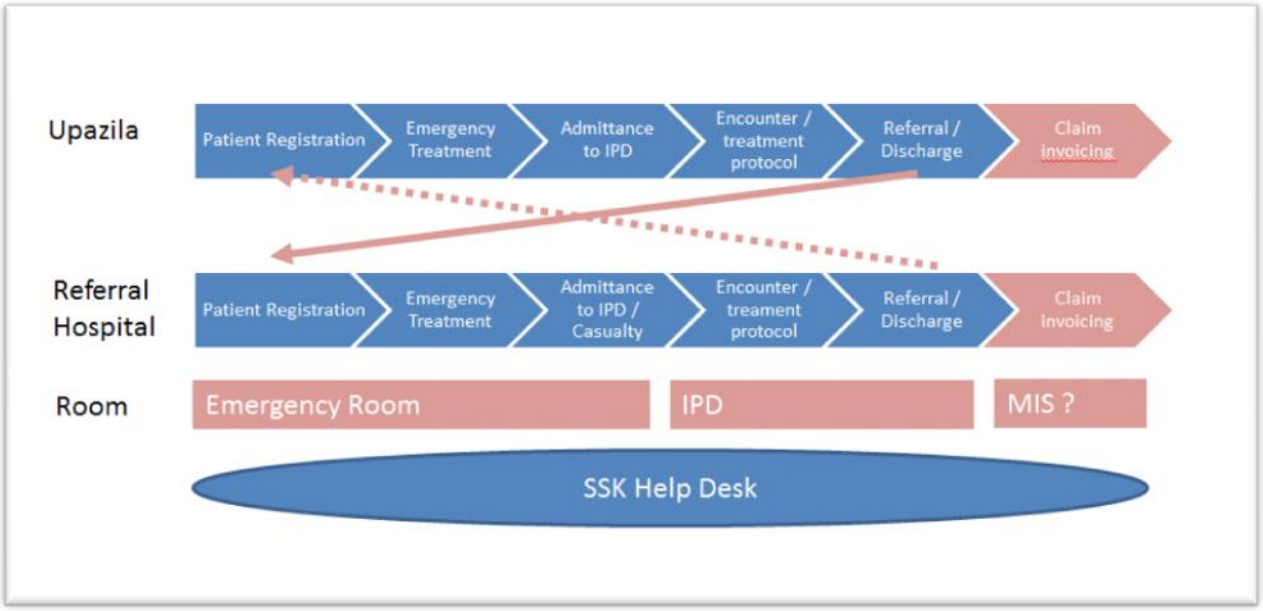
In a first step, there should be a very simple, robust system architecture to support the data synchronization between the UHC and the referral system. The referral hospital database should only receive patient records for referral patients. These data records should be sent by the UHC in an automated way, e.g. in case a referral slip is created in the UHC database, the patient and corresponding treatment records are sent to the referral hospital database by an email or made available through a web service. Also, a notification e-mail or text message should be sent to the referred hospital's SSK Helpdesk.

In case the patient reaches the referral hospital before the notification message, he can use the paper referral slip to help the SSK help desk to identify and retrieve his data from the UHC server.

After treatment, the referral hospital´s SSK help desk would enter the treatment data and send the data back to the UHC system. It is crucial that the UHC system has appropriate functions to integrate the new patient and treatment data. As long as there is no centralized synchronization server, the UHC system would be the leading system, responsible for accepting the changes in case of data conflicts. In case of conflicting data, after the synchronization at the UHC, the new data should be automatically sent back to the referral system. A well-organized change history should be logged, allowing for tracking.

The receiving hospitals may have several specialized IPD area. The SSK helpdesk staff will support the referred patient to find the respective area and give any other kind of required assistance. The helpdesk would also be responsible for daily data update and daily synchronization with the server.

The staff who will work in the referral hospitals might be provided by the hospital regular staffs or would be recruited by NHSO or by the insurance company. It should be considered in the work organization, that during the first phase of the pilot, with only one Upazila participating, the receiving clinic may only receive 3 or 4 patients per week.



3.3.3.1.7 Claim invoicing

The software should be capable of claiming services to NHSO or to an insurance company, in order to be able to cater for both institutional set-ups.

The software should have a function to group treatments into claim packages. Before a treatment is added to a claim package, the system will carry out verification for the completeness and consistency of the treatments. The software should provide the user an overview report, showing the contents of the claim package. This overview should contain totals about the number of treatments, most frequent diseases and most important cost positions. This will allow the staff to quickly verify whether the claim is complete.

After verification, the data should be sent in an electronic format to the recipient. Also an aggregated claim summary might be printed out and send to the recipients and/ or the overseeing authority, including proper signatures and stamps.

Regarding financial data, the database should contain unit rates codes for the treatment services. These rates should be provided by NHSO. There should be an import interface to import the data. The software must be capable of storing a price history, in the sense that for one service prices can be maintained for different dates. Another alternative would be to completely exclude financial cost codes from the system. In that case, this data will be added by NHSO or the insurance company.

Claiming invoices from participating hospitals should follow a clearly defined schedule. The main objective is to meet deadlines defined by HEU. International standard procedures to collect data, group it into claim groups and issue monthly claims. The objective of the monthly grouping is to reduce the administrative effort. In case the organizations do no manage to ensure a timely payment to the service providers, a fortnightly or weekly claiming process could be considered to speed up the payment procedures.

3.3.3.2 Mobile Camps

In case OPD should also be covered in the second or third phase, this system might be installed in the Community Clinics to facilitate mobile camps. Existing hardware would be used. The software should have the same configuration as software used in the OPD rooms.

3.3.4 Membership Card Management

The basis for smooth identification and service procedures is a well-defined and well-established membership card management. All users of the participating UHC should carry an identity card bearing required information. Direct beneficiaries or dependants have to produce this card at the reception of the Upazila Health Complex at the time of seeking service. The reception will then verify the card, cross-check with the local database and then make hospital services available to them. In case of SSK treatments, an additional check directly with the insurance company may be required to make sure the beneficiary still have SSK credit.

There are several technical card options available on the Bangladeshi market, ranging from simple paper cards to sophisticated biometric options. The following table gives an overview on the principle options:

Type	Data Transfer	Card Cost (BDT)	Printing Cost (BDT)	Reading Tool cost (BDT)	Remarks
PVC	Barcode Reader	20	15	25,000	Only 16 values can be stored on the barcode, **cannot** be reprogrammed
MagStripe	Magnetic Reading Head	88	50	55,000	Only 16 values can be stored in the magnetic strip, **can** be reprogrammed
Smart Chip	SmartCard Reader	200	50	60,000	32/64 KB storage, Additional data can be stored on the Card, such as names of all household members and their medical records. The amount of details that can be stored depends on the capacity of the memory chip, which also influences the card cost.
RFID Chip	RFID Reader	63	50	60,000	Radio, No memory, The contact would recognize the device ID and retrieve data form database
RFID with Smart Chip	RFID Smart Reader	250	50	75,000	Radio+32/64 KB storage, Additional data can be stored on the Card, such as names of all household members and their medical records. The amount of details that can be stored depends on the capacity of the memory chip, which also influences the card cost.
Biometric	Fingerprint Reader	-	-	75,000	No Card is required. Sophisticated. Not suitable for the people who has to use fingers intemperately for their day to day works.

When choosing the appropriate card type, the question is which card type gives the best support to the project scope. In different countries different concepts are applied, such as using the card as:

- Insurance card: Containing the patient ID and policy information
- Remaining SSK treatment credit
- Emergency medical card: Containing medical and contact information
- Follow-Up cards: Medical record for specialties such as chronicle diseases, cardiology, diabetes or maternity
- Prescription information

Each additional function a Health Card is supposed to support may add organisational complexity. Therefore the main focus of the Bangladeshi Health Card should be cautiously determined. We suggest that in a first step the cards should mainly support the secure identification of the main beneficiaries and their household members. The medical records should not be stored on the Health Card but only in the Hospital Management Systems of the corresponding UHC. In a second step, the cards could also store the amount remaining for SSK treatment, although this would require a rather complex setup (card reader device with online access to central database at the insurance company).

3.3.4.1 Targeting and card production

As part of the targeting, HEU will conduct a baseline survey for the identification of the members according to the project criteria. During this survey, the data needed for the membership card management should be collected.

There are several options to use photos and fingerprints to identify beneficiaries. Fingerprints and photo can be printed on the card and/or stored in the database. Photos can be printed on the card, but the physical space on the card is restricted, therefore the photos printed on card may suffer from bad resolution. Therefore a maximum of 2 photos (male and female heads of households) can be printed on the card. Fingerprints can also be printed on the card, however this needs to be done in high quality to avoid high error rates. In case of the usage o a smart card, photos and fingerprints can be stored on the card.

A photo can be easily added to the database. At the moment of the card issuance, photos are taken with a digital camera and saved into the profiles in the databases. Fingerprints can be easily added to the database. At the moment of the card issuance fingerprints are taken with a biometric scanner and saved into the profiles in the database.

For a final decision on the approach, suggestions from the Socio-Economic Study need to be taken into account. Also, there should be a clear procedure for the card production. There must be clear lead times for the card production. It must be possible to provide new cards, e.g. to new programme member or to replace a lost card within a maximum of 4 weeks.

3.3.4.2 Cards issuance and activation

Upazila Health & Family Planning Office and/or NHSO and/or insurance company will arrange a Membership Card Distribution program where local leaders and community gatekeepers would be present. From this program members would learn what benefits could they avail, receive cards and learn how and where to use it. More details are defined in the separate Socio-Economic study.

Before distribution each cards must be cross-checked with local database whether all information is okay or any editing is required. If so, data would be edited now and then. This final verification is aimed to (1) locate and edit inconsistent or wrong data (2) physically identify and confirm the person is about to receive the card is the genuine member and (3) a hard copy receiving document should be kept having signature and a finger print.

The cards would not be activated by default. Explicitly each card would need to be activated on the first date of visit upon following requisites: Card activation order from NHSO (there might be several factors before launching of the program e.g. premiums are deposited, staff mobilization is done and trained, full-fledged system is implemented etc.).

3.3.4.3 Card update

There will be a clear procedure for card updates carried out by NHSO or the insurance companies. On a yearly basis, all membership cards will expire and require re-issuing. This could be used as a security mechanism during the pilot. After a few years and depending on the pilot experiences, the validity duration could be prolonged to two or three years. In any case, the validly date printed on the card is only one security mechanism, since the card will always be checked at the registration desk, the card status inside the database is the more relevant information.

There would also be clear procedures for adding new members, update existing members and terminate memberships. For status updating, there should be a continuous mechanism based on documents that prove status changes such as new birth, death, marriage or divorce. For any kind of changes the member has to report to the local SSK helpdesk. Helpdesk needs to have clear guidelines on what changes to carry out and which changes need to be forwarded for authorization by NHSO or the insurance company.

In case of card loss or theft, a card blocking mechanism must be established in the database.

3.3.5 National Health Insurance System

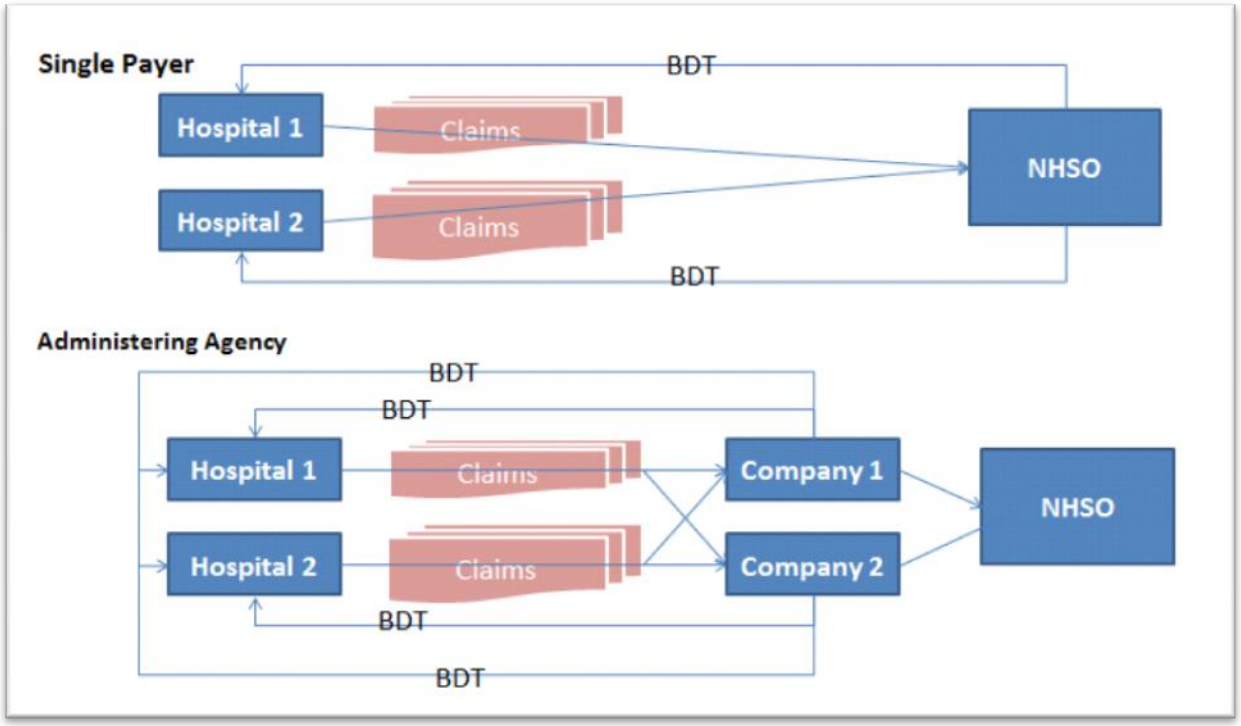
3.3.5.1 Institutional alternatives

It is planned that in a first phase, NHSO will be single payer agency for the SSK pilot. Eventually NHSO will become an autonomous independent agency to administer the national SSK program, the insurance services will be provided by separate insurance companies, which will have a territorial service monopoly.

These two institutional scenarios have consequences for the system design. The first case is comparably simple: NHSO will have one software system that receives the claims from the hospitals, processes them and carries out payments. Reports about the hospital activities and claim patterns can easily be derived from the software. In our detailed analysis we will foucs on this first scenario.

In the second case, the Insurance companies will all need their own IT system for claims management. In case NHSO has already established an IT solution, it could offer the solution to the insurance companies. In case the software companies use their own IT

system, these systems must follow the same data exchange standards, which should be established by NHSO. NHSO needs to define very clearly what kind of reports they want to receive from providers and insurance companies; otherwise they will have no access to crucial performance indicators necessary for continuously monitoring and improving the overall insurance system and controlling fraud.



3.3.5.2 Process flow

NHSO will receive the compiled claims from the UHCs in an electronic format in a clearly defined frequency (monthly, every two weeks, …). The claim package will be imported into the NHSO software. During the importing process, automated technical data quality control takes place. This consists of checks for data consistency, making sure that the data records are complete, legible and that sums add up.

There are several different approaches for the control of claims. The main control should take place on the basis of cumulated data, comparing the attendance, diagnosis and treatment patterns between the three pilot Upazilas, searching for logical consistency and derivation patterns.

For this purpose, the software should provide comparative reports, showing percentages, averages and totals of the pilot provinces. Some of the reports should be provided immediately, others should be added once a certain amount of data has been collected, allowing for more detailed analysis of claim patterns. Also, the software should provide flexible analysis tools, allowing the users to quickly create verification reports, choosing his own combination of indicators. The reporting function should also allow drill-down functions.

The software should be able to calculate payment amounts based on the monthly or bi) monthly claim packages. For each treatment or other service (e.g. tests, laboratory services)

a cost code is stored in the system. A monetary value can be connected to this cost code. This will allow for a case based payment to facilities.

3.3.5.3 Monitoring and Security Mechanisms

NHSO will assume the responsibility for monitoring the hospital treatment activities, the utilization patterns of patients, the hospitals claiming and payments. The software will support NHSO with automated reports. The reports should also suggest actions to be taken by NHSO, in case certain pre-defined values are not reached.

NHSO should not only rely on the data generated by the system, but also develop a physical monitoring and inspection mechanism in the field. This would allow NHSO to verify the data quality of the reports. These on-site monitoring activities will also as a feedback mechanism for the report design and the usability of the software.

Hospital procedures

Related to	Description	Security measure
Member	Member/dependant might produce a card that has already expired.	During ID verification, the system would check the expiry date. If it already expired, the system will not allow the patient to receive SSK benefits. However the patient is always entitled to normal treatment.
Member	Member/dependant might lose the card	ID verification would have a lot of verification and cross-checking mechanism. Photographs and fingerprints of member and all dependents could be stored in the local database. Other information might also be cross-checked. In such a scenario a new card must be issued.
Member	Member/dependant might visit repeatedly to receive large quantities of drugs	Special reports could identify abusive or fraudulent drug reception patterns. Corresponding notification alerts could be displayed in the patient data record..

Referral procedures

Related to	Description	Security measure
Unconventional referral	Referral Document	To make sure only beneficiaries will receive SSK support at the referral hospital, a print-out of a referral slip, containing diagnosis and treatment details of the referring hospital as well as contact details of the SSK Helpdesk of referring hospital would be given to the patient.

Other procedures

Related to	Description	Security measure
Claim Management	Irregular claims /Over claims	System reports that help identify claiming patterns, e.g. different percentages of certain diagnoses, treatments and drug issuances.
Claim Management	Local database manipulation	User access logs and data change logs allow to follow a complete audit trail.

4 POLICY IMPLICATIONS, CONCLUSIONS AND RECOMMENDATIONS

The computerization of the SSK initiative is a very ambitious project that could have an important impact on the progress of electronic Health Management Information Systems in Bangladesh. The challenge is to introduce in parallel three large scale system components, Health Cards/Electronic Medical Records, Hospital Management Systems and a head office application for monitoring and claims payment.

Despite the possible difficulties, we see great opportunities for the project. A more systematic data management at hospitals could contribute to the patient service quality. It can also contribute to important organisational and cultural changes in the hospital work procedures. In order to implement the hospital management system successfully, HEU/SSK should take care to make full of synergies with other system initiatives, namely the HISP Bangladesh.

Regarding the Head office application, a powerful claims processing and monitoring system is indispensable to the control and management of the newly defined operations. The system should provide timely reports and enable management to closely follow and analyse operational activities at hospital level. Since there is no history of large-scale health insurance programs in Bangladesh, this gives management staff the possibility to incorporate learning and to adapt the programs scope and activities in a timely manner.

Regarding the card management, a low-tech solution for simple identification would be perfectly sufficient. In a first step, the medical record system should be limited to the UHCs with only a limited synchronisation procedure. A central national medical record system should not be the scope of the current initiative.

In order to successfully implement the new system, a special focus should be on continuously and sustainably building up technical and managerial know how for staff at different levels. A centralized development, maintenance and support unit, as proposed in the HISP initiative, could play an important role in this initiative. But also staff at the hospital level should receive sufficient training and hands-on support during all stages of the implementation and operations.

In summary, the future system´s potential can be best unleashed, if a realistic and progressive step-by-step implementation approach and an intensive monitoring of the implementation progress are applied.

5 ANNEXES

5.1 Organograms UHC

Sl	Name of Position	Rangunia UHC			Tungipara UHC		
		Sanctioned	Occupied	Vacant	Sanctioned	Occupied	Vacant
Class 1		**21**	**20**	**1**	**21**	**6**	**15**
1	Upazila Health & Family Planning Officer	1	1		1	1	
2	Specialist (Medicine)	1	0	1	1	0	1
3	Specialist (Surgery)	1	0	1	1	0	1
4	Junior Consultant (Anesthesia)	1	1		1	0	1
5	Junior Consultant (Cardiology)	1	1		1	0	1
6	Junior Consultant (Dermatology & Sex)	1	1		1	0	1
7	Junior Consultant (Ear, Nose & Throat)	1	1		1	0	1
8	Junior Consultant (Gynecology & Obstetrics)	1	1		1	0	1
9	Junior Consultant (Medicine)[2]	0	1	-1			
10	Junior Consultant (Ophthalmology)	1	1		1	0	1
11	Junior Consultant (Orthopedics)	1	1		1	0	1
12	Junior Consultant (Pediatrics)	1	1		1	0	1
13	Residence Medical Officer	1	1		1	1	
14	Emergency Medical Officer	1	1		1	0	1
15	Indoor Medical Officer	1	1		1	0	1
16	Medical Officer	4	4		4	4	
17	Medical Officer (Pathology)	1	1		1	0	1
18	Medical Officer (Anesthesia)	1	1		1	0	1
19	Dental Surgeon	1	1		1	0	1
Class 2		**16**	**14**	**2**	**15**	**11**	**4**
20	Nursing Supervisor	1	1		1	1	
21	Senior Staff Nurse	15	13	2	14	10	4
Class 3		**105**	**73**	**32**	**48**	**30**	**18**
22	Accountant				1	0	1
23	Assistant Health Inspector	12	12		4	4	
24	Assistant Nurse				1	0	1
25	Cashier	1	1		1	1	
26	Compounder				1	0	1
27	Head Assistant				1	0	1

[2] A Junior Consultant (Medicine) posted against Specialist (Medicine) at Rangunia UHC.

Sl	Name of Position	Rangunia UHC			Tungipara UHC		
		Sanctioned	Occupied	Vacant	Sanctioned	Occupied	Vacant
28	Head Assistant cum Accountant[3]				0	1	-1
29	Health Assistant	69	41	28	20	13	7
30	Health Inspector	4	3	1	1	1	
31	Lady Health Inspector	1	1				
32	Medical Assistant	2	2		2	2	
33	Medical Technologist (Cardiography)	1	1		1	0	1
34	Medical Technologist (Dental)	1	1		1	1	
35	Medical Technologist (EPI)	1	1		1	1	
36	Medical Technologist (Laboratory)	3	3		2	2	
37	Medical Technologist (Pharmacy)	2	2		2	0	2
38	Medical Technologist (Physiotherapy)				1	0	1
39	Medical Technologist (Radiography)	1	1		1	1	
40	Office Assistant cum Computer Operator	3	1	2	3	2	1
41	Sanitary Inspector	1	1		1	1	
42	Statistician	1	1		1	0	1
43	Storekeeper	1		1	1	0	1
44	TB & Leprosy Control Assistant	1	1		1	0	1
Class 4		**25**	**23**	**2**	**27**	**10**	**17**
45	Aya	2	2		2	1	1
46	Cook	2	1	1	2	0	2
47	Driver	1	1		1	1	
48	Emergency Attendant	1	1		1	0	1
49	Gardener	1	1		1	1	
50	Herbal Assistant	1	1				
51	Junior Mechanic	1	1		1	0	1
52	Laboratory Attendant	1	1		1	0	1
53	MLSS	4	4		7	1	6
54	OT Boy/Attendant (for Operation Room)	1	1		1	0	1
55	Security Guard	2	2		2	2	
56	Sweeper	5	4	1	5	4	1
57	Ward Boy	3	3		3	0	3
Total		**167**	**130**	**37**	**111**	**57**	**54**

[3]1 Head Assistant and 1 Accountant position has recently created but not posted yet. 1 Head Assistant Cum Accountant was posted before and remained till visiting date.

Union Sub-Centers under UHC[4]

Sl	Name of Position	Class	Rangunia (15 USC)			Tungipara (5 USC)		
			Sanctioned	Occupied	Vacant	Sanctioned	Occupied	Vacant
1	Medical Officer/Assistant Surgeon	1	15	13	2	5	4	1
2	Medical Assistant	3	15	12	3	5	3	2
3	Medical Technologist (Pharmacy)	3	15	2	13	2	1	1
4	MLSS	4	15	7	8	2	1	1
Union Sub-Center Total			**60**	**34**	**26**	**14**	**9**	**5**

[4] In many cases staffs from Union Sub-Centers are deputed/attached to base UHC up on local order. This happens mainly (1) to reduce work load of UHC and (2) for poor motivation of staff to stay and/or work at Union level.

5.2 Main reference data

Reference data serve to define and maintain a common data structure the system and its components. Definitions and data in the reference data section can only be entered and modified by administrative users.

Organizations

ID	Organization Name	Organization Type	Responsible Authority	MIS Contact name
		Upazila Health Complex	Private Company	
		District Hospital / District General Hospital	Public Hospital	
		Medical College Hospital		
		Specialized Hospital		

This data needs to be available both in the in the National Claims Management System and the hospital management systems. This classification should follow the standards defined in the existing Data Management Information System (DMIS.

Diagnosis and treatment

The Data Management Information System (DMIS) of MoHFW has developed a set of standard diagnosis and treatment codes based on international standards. To ensure synergies and interoperability, these standards should be followed.

Connected to treatment codes are internal cost codes and user fees, which will be defined as part of the SSK studies.

Technical Requirements

The major technical requirements to be considered in the technical architecture are sustainability, simplicity and reliability.

The system must be easy to use, run stable and reliably, it must be maintainable with minimal effort and the system should allow employees to execute simple administrator function without having to acquire advanced technical skills.

Multilanguage functions

The system interface should be initially in English. A Bengali interface would be added during 2nd phase of implementation. The system and database design should prepare already the second language option.

Browser based architecture and offline data import

All system functions should be accessible through any standard browser. Since internet connectivity may be poor in many hospitals, the system will mainly be used in a local area network in offline mode. Still there should be a mechanism to export, import and synchronise data (as described in the system design and referrals sections).

Security

Professional security measures should be taken. This includes clear procedures for user access rights, virus protection and OS maintenance (Patching, Updates).

Detailed instructions should be elaborated for daily backup procedures, data should be stored at a safe location, e.g. in a safe in a different room than the server room. Restoring procedures should be well documented and practised.

Part of the security concept should also be a well-prepared disaster recovery plan and corresponding disaster recovery procedures. In a first step, clear business continuity objectives should be defined, such as system availability and data security requirements. The disaster recovery plan should include a specific planning of backup and recovery procedures as well as its system-wise configuration, physical preparation, documentation and testing.

System Users

The following user types should be created. The system should include standard functions regarding password security, password recuperation and activity logs.

User type	Functions
Technical administrator - Administrator (IT centre) Only Admin will be able to define new users and user classes	Administrative functions View and edit all data
Power User	Edit reference data Create, edit and view reports
HQ Managers	Create, edit and view reports
Hospital User: Registration	Data entry and report creation
Hospital User: IPD	Data entry and report creation
Hospital User. Stock management	Data entry and report creation
Hospital User: MIS staff	Data entry and report creation

Documentation and help functions

The software should contain a browser based help function. The help function should be available through a help menu item in the first level horizontal menu bar. For some specific functions, some additional help functions could be added. These help functions could consist in contextual links, leading directly to certain sections of the help section, opening in a separate window. In other cases it may be sufficient to include some instructions directly into the page.

In the help section, documents should be available for download, for example electronic copies of the organizational manual and the software training manual.

Copyrights, source code access

All code is intellectual property of MoHFW / SSK. MoHFW / SSK will have full access to all software code.

5.3 Reporting System

The software should deliver some standard reports and should also give power users the possibility to create additional reports without programming knowledge. The standard reports should have standard filters such as date or organizational unit. They should be shown online, in addition export to PDF and Excel should be possible.

The power-user reports should give users the possibility to create reports by freely combining filters such as:

- Dates
- Organizational units
- Geographical areas
- Diagnostics and treatment**s**
- Patient age

Users should have the possibility to save the newly created reports **in formats that allow further editing**.

In addition, it would be desirable to have **drilldown-functions**, meaning that you can click on any cumulated quantity in a standard report, and drill down to further details, choosing the filters you want to apply.

The following table gives an overview on the reports required by SSK. Some have been already designed in details, others will be finished together with the software company. The purpose of this table to give the bidder information about the complexity of SSK´s reporting requirements and to calculate an adequate budget for the programming of these reports.

Number	Title	Issuing / Responsible	Receiving / Access	Frequency	Major Variables
1.	Patient Enrolment	Upazila/District Hospital	Director (MIS), DGHS; DHIS2	Daily	Patient enrolment in OPD, EPD as well as admission to IPD disaggregated by sex and age-groups.
2.	Disease Profile	Upazila/District Hospital	Director (MIS), DGHS; DHIS2	Monthly	Patient enrolment disaggregated by sex, age-groups and Diseases.
3.	Emergency Obstetric Care (EmOC)	Upazila/District Hospital	Director (MIS), DGHS; DHIS2	Monthly	ANC, Delivery, Complication, Referral, PNC, NNC, Birth, Death
4.	Hospital Bed Statement	Upazila/District Hospital	Director (MIS), DGHS; DHIS2	Monthly	No. of sanctioned beds, Average length of stay, Total patient days, Bed occupancy rate
5.	Major Equipment Statement	Upazila/District Hospital	Director (MIS), DGHS; DHIS2	Monthly	Number and Status (functional, repairable) disaggregated by equipments
6.	Indoor & Outdoor Patients Report	Upazila/District Hospital	Director (MIS), DGHS; DHIS2	Monthly	Patient enrolment/admission/discharge disaggregated by sex, child and dates
7.	Diarihoea Report	Upazila/District Hospital	IMCI	Monthly	Number of under 5 years diarrhoeal cases disaggregated by sex and departments
8.	Indoor & Outdoor patients by disease and age	Upazila/District Hospital	IMCI	Monthly	Number of under 5 years ARI cases and deaths disaggregated by sex, age-groups and dates

5.3.1 Daily patient enrollment

Report: **Daily Patient Enrollment**
Date: **Frequency:** **Daily**
Facility: **Upazila:** **District:**

Age Group	Outdoor		Emergency		Admission	
	Male	Female	Male	Female	Male	Female
0-4 year						
5-14 year						
15-24 year						
25-49 year						
50+ year						

Prepared By
Name, Designation, Date, Seal

Verified By
Name, Designation, Date, Seal

Approved By
Name, Designation, Date, Seal

•

5.3.2 Disease profile

Report: **Disease Profile**

Date From: **Date To:** **Frequency:** **Monthly**

Facility: **Upazila:** **District:**

-
-

	0-28 days		29 days-11 months		1-4 years		5-14 years		15-24 years		25-49 years		50+ years	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F
Abortion														
Acid Burn														
AIDS/HIV														
Allergic Reaction														
Anemia														
Anal fistula														
Angina Pectoris														
Depressive Disorders														
Ante partum hemorrhage														
Appendicitis														
Arsenicosis														
Arthritis														
Assault														
Bacillary dysentery														
Bone tumor														
Brain Tumor														
Bronchial Asthma														
Bronchiectasis														
Bronchiolitis														
Burn (Others)														
Congestive cardiac failure														
Ca-Cervix														
Ca-bladder														
Ca-Breast														
Ca-Colon														
Ca-Gall bladder														
Ca-Kidney														
Ca-Larynx														
Ca-liver														
Ca-Lungs														
Ca-esophagus														
Ca-Oral Cavity														
Ca-Pancreas														
Ca-prostate														
Ca-Rectum & anal Canal														

	0-28 days		29 days-11 months		1-4 years		5-14 years		15-24 years		25-49 years		50+ years	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F
Ca-scrotum														
Ca-Skin														
Ca-Stomach														
Cataract														
Ca-thyroid														
Cholecystitis														
Cholelithiasis														
Cirrhosis of liver														
Congenital Heart Disease														
Chronic obstructive pulmonary diseases														
Corneal Ulcer														
CVA														
Dengue														
Diabetes mellitus														
Diarrhea														
Diphtheria														
Disc prolapse														
Drowning/ Near Drowning														
Drug Reaction														
Dysentery														
Ectopic pregnancy														
Electric shock														
Emphysema														
Encephalitis														
Enteric Fever														
Epilepsy														
Fibroid														
Filariasis														
Food poisoning														
Fracture														
Fungal infections														
Gangrene														
Glaucoma														
Glomerulonephritis														
Gonorrhea														
Hemolytic Jaundice														
Hemorrhoids (Piles)														
Head injury														
Heart failure														
Hepatic failure														
Hepatitis														
Hernia														
Hydrocephalous														
Hydrocele														
Hydronephrosis														
Hypercholesteremia														
Hypertension														
Hyperthyroidism														
Hypertrophied Prostate														
Hypothyroidism														

	0-28 days		29 days-11 months		1-4 years		5-14 years		15-24 years		25-49 years		50+ years	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F
Infective Endocarditis														
Intestinal Obstruction														
Kala-azar														
Leprosy														
Leukemia														
Liver Abscess														
Lymphoma														
Lymphosarcoma														
Malaria (Vivax / Falciparum)														
Mastoiditis														
Measles														
Meningitis														
Mental retardation														
Mumps														
Myocardial infarction														
Nasal Polyp														
Nasopharyngal Carcinoma														
Nephrotic Syndrome														
Night Blindness														
Obstructive jaundice														
Obstructed Labor														
Orchitis														
Osteomyelitis														
Osteosarcoma														
Ovarian tumor														
Pancreatitis														
Pelvic Infectious Disease														
Peptic Ulcer														
Perforation (GI Tract)														
Peripheral Vascular Disease														
Pleural effusion														
Pneumonia														
Pneumothorax														
Poisoning														
Poliomyelitis														
Postpartum hemorrhage														
Prostatic Tumor														
Prostatitis														
Protein Energy Malnutrition														
Pulmonary fibrosis														
Pyelonephritis														
Rabies														
Rectal prolapse														
Refractive error														
Renal failure														
Renal Stone														

	0-28 days		29 days-11 months		1-4 years		5-14 years		15-24 years		25-49 years		50+ years	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F
Retinal Problem														
Rheumatic fever														
Rhinitis														
Rickets														
Road Traffic Accident														
Rupture Uterus														
Scabies														
Schizophrenia														
Septicemia														
Spinal Cord Injury														
Suppurative Otitis Media														
Syphilis														
Tetanus														
Thalassemia														
Tonsillitis														
Tuberculosis (Extra-Pulmonary)														
Tuberculosis (Pulmonary)														
Urethritis														
Urinary Stone Disease														
Urinary Tract Infection														
Valvular Heart Disease														
Viral fever														
Whooping cough														
Worm Infestation (Intestinal)														
Other														

Prepared By
Name, Designation, Date, Seal

Verified By
Name, Designation, Date, Seal

Approved By
Name, Designation, Date, Seal

5.3.3 Emergency Obstetric Care (EmOC)

Report: **Emergency Obstetric Care (EmOC)**

Date From:	**Date To:**	**Frequency:**	**Monthly**
Facility:	**Upazila:**	**District:**	

Data element	No.
No. of ANC service recipients	
No. of admitted women	
No. of cases with pregnancy/ delivery related complications	
No. of cases with prolonged/ obstructed labor (complication1)	
No. of cases with antepartum hemorrhage (complication2)	
No. of cases with pre-eclampsia/ eclampsia (complication3)	
No. of cases with cases of full term pregnancy with hand or cord prolapse (complication4)	
No. of cases with ruptured uterus (complication5)	
No. of cases with septic abortion (complication6)	
No. of cases with non-specific abortion (complication7)	
No. of cases with ectopic pregnancy (complication8)	
No. of cases with puerperal sepsis (complication9)	
No. of cases with retained placenta (complication10)	
No. of cases with post-partum hemorrhage (complication11)	
No. of cases with hydatiform mole (complication12)	
No. of cases with leaking membrane (complication13)	
No. of total normal deliveries	
No. of normal deliveries	
No. of vaginal deliveries with breech or face presentation	
No. of cesarean deliveries	
No. of live births	
No. of still births (fresh or macerated)	
No. of other pregnancy related surgeries	
No. of patients referred in	
No. of patients referred out	
No. of women received postnatal care (PNC)	
No. of maternal deaths	
No. of total newborn deaths	

Prepared By
Name, Designation, Date, Seal

Verified By
Name, Designation, Date, Seal

Approved By
Name, Designation, Date, Seal

5.3.4 Hospital Bed Statement

Report: Hospital Bed Statement

Date From:	**Date To:**	**Frequency:**	**Monthly**
Facility:	**Upazila:**	**District:**	

No. of sanctioned beds	
Average length of stay	
Total patient days	
Bed occupancy rate	

Prepared By	Verified By	Approved By
Name, Designation, Date, Seal	Name, Designation, Date, Seal	Name, Designation, Date, Seal

5.3.5 Major equipment statement

•

Report: **Major Equipment Statement**

Date From:	**Date To:**	**Frequency:**	**Monthly**
Facility:	**Upazila:**	**District:**	

Name of equipment	No. of available	No. of functional	No. of repairable out of the non-functional
Ambulance			
Anesthesia machine			
Autoclave			
C-arm			
Cobal-60			
Colorimeter			
CT Scan			
Defibrilitator			
Desktop computer			
Diathermy			
Dot matrix printer			
ECG			
EEG			
Endoscopy			
Fax machine			
Ink Jet Printer			
Laparoscopy			
Laptop computer			
Laser Printer			
Linear Accelerator			
Microscope			
MRI			
Photocopy machine			
Scanner			
Slit lamp			
Spectrophotometer			
Sucker			
Ultrasonogram			
Ventilator			
X-ray machine			

Prepared By
Name, Designation, Date, Seal

Verified By
Name, Designation, Date, Seal

Approved By
Name, Designation, Date, Seal

5.3.6 Indoor & Outdoor patients

Report: **INDOOR & OUTDOOR PATIENTS REPORT**
No of Bed: **Month:** **Frequency:** **Monthly**
Facility: **Upazila:** **District:**

Date	Indoor								Outdoor			Emergency		
	Admission		Discharge		Death		Patient days							
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Child	Male	Female	Child
1														
2														
3														
4														
5														
6														
7														
8														
9														
…														
24														
25														
26														
27														
28														
29														
30														
31														
Total:														

Prepared By
Name, Designation, Date, Seal

Verified By
Name, Designation, Date, Seal

Approved By
Name, Designation, Date, Seal

5.3.7 Diarihoea report

Report: **DIARIHOEA REPORT**
No of Bed: **Month:** **Frequency:** **Monthly**
Facility: **Upazila:** **District:**

	No Dehydration				Some Dehydration				Severe Dehydration			
	<5 Year		>5 Year		<5 Year		>5 Year		<5 Year		>5 Year	
	M	F	M	F	M	F	M	F	M	F	M	F
ORTC												
INDOOR												
EMERGENCY												
OTHER												
Total												

	DYSENTRY (BLOOD IN STOOL)											
	No Dehydration				Some Dehydration				Severe Dehydration			
	<5 Year		>5 Year		<5 Year		>5 Year		<5 Year		>5 Year	
	M	F	M	F	M	F	M	F	M	F	M	F
ORTC												
INDOOR												
EMERGENCY												
OTHER												
Total												

	TOTAL						**Grand Total**	
	No Dehydration		Some Dehydration		Severe Dehydration			
	M	F	M	F	M	F	M	F
ORTC								
INDOOR								
EMERGENCY								
OTHER								
Total								

Prepared By
Name, Designation, Date, Seal

Verified By
Name, Designation, Date, Seal

Approved By
Name, Designation, Date, Seal

5.3.8 Indoor & Outdoor patients by disease and age

Report: **INDOOR & OUTDOOR PATIENTS REPORT**
No of Bed: **Month:** **Frequency:** **Monthly**
Facility: **Upazila:** **District:**

Date	Common Cold				Pneumonia				Severe Pneumonia				Severe Diseases				Total	Total Death
	0-11 Month	1-5 year	Sub Total	Death	0-11 Month	1-5 year	Sub Total	Death	0-11 Month	1-5 year	Sub Total	Death	0-11 Month	1-5 year	Sub Total	Death		
1																		
2																		
3																		
…																		
29																		
30																		
31																		
Total																		

Prepared By
Name, Designation, Date, Seal

Verified By
Name, Designation, Date, Seal

Approved By
Name, Designation, Date, Seal

5.4 Cost calculation

a) Assumptions

Phase	Pilot UHCs	Referral Hospital
Phase 1	3	3
Phase 2	30	3
Total	**33**	**6**

b) Cost overview

Phase 1

Item	Unit cost	Units	Total cost	Cost share
Software development + software maintenance (3 yrs) - Develop and maintain main system	20.000.000 BDT	1	20.000.000 BDT	9,0%
Training costs (National & local)	1.320.000 BDT	1	1.320.000 BDT	0,6%
Hardware (Computers and furniture sets per facility)	100.000 BDT	15	1.500.000 BDT	0,7%
Health cards (96.000 Cards per Upazila, 3 Upazilas)	50 BDT	288.000	14.400.000 BDT	6,5%
Maintenance contract for facilities (computer + network) - 3 years (cost per facility	50.000 BDT	6	300.000 BDT	0,1%
			37.520.000 BDT	**16,8%**

Phase 2

Item	Unit cost	Units	Total cost	Cost share
Develop additional modules for OPD, Lab and Referral hospital	5.000.000 BDT	1	5.000.000 BDT	2,2%
Re-Training costs	8.379.800 BDT	1	8.379.800 BDT	3,8%
Hardware (30 Upazials à 5 sets + 15 District Sets)	100.000 BDT	165	16.500.000 BDT	7,4%
Maintenance contract for facilities (computer + network) - 3 years (cost per facility	50.000 BDT	35	1.750.000 BDT	0,8%
Health cards (96.000 Cards per Upazila, 32 Upazilas)	50 BDT	3.072.000	153.600.000 BDT	69,0%
			185.229.800 BDT	**83,2%**

Total Phase 1 & 2			**222.749.800 BDT**	**100,0%**

2.227.498 €

5.5 Training Plan

	Cost assumptions	
	Cost per diem / food / stationary	1.100
	Cost of venue rent	2.000
	Trainer fee	5.000
	Transport	2.000

Target Groups	
Group 1	All related stakeholders from Govt., other Health MIS initiatives as well as development partners
Group 2	2 participants from each pilot UHC, 1 from each referral hospital. 5 workshops of 1 day each.
Group 3	UHC/Referral Hospital (7 staff x 3), NHSO (3 staff) and MoHFW (1 staff)
Group 4	On the job, by staff who atttendedTOT, QA+M&E by consultant

Phase 1

Month	Topic	Level	Duration (days)	Target group	Number of Participants	Number of events	Per diems	Trainer per event	Trainer days	Transport	Venue rent days
1	Kick-off Workshop	National	1	1	15	1	15		-	7	1
2 to 6	User requirement & Test workshops	National	1	2	9	5	45		-	35	5
6	Training of Trainers (ToT)	National	5	3	25	1	125	3	15	25	5
6	UHC/Referral Hospital Training	Local	5	4	51	3	255	3	15	9	15
18	Refresher ToT + New functions	National	5	3	25	1	125	3	15	25	5
18	Refresher UHC/Referral Hospital + New functions	Local	5	4	51	3	255	3	15	9	15
30	Refresher ToT	National	5	3	25	1	125	3	15	25	5
30	Refresher UHC/Referral Hospital Training	Local	5	4	51	3	255	3	15	9	15
	Total quantities					**18**	**1.200**		**90**	**144**	**66**
	Total Cost	**2.190.000**					**1.320.000**		**450.000**	**288.000**	**132.000**
	Phase 2										

Phase 2

Month	Topic	Level	Duration (days)	Target group	Number of Participants	Number of events	Per diems	Trainer per event	Trainer days	Transport	Venue rent days
12 to 18	User requirement & Test workshops	National	1	2	9	2	18		-	7	2
18	Training of Trainers (ToT)	National	5	3	250	15	1.250	3	225	25	75
18	UHC/Referral Hospital Training	Local	5	4	510	30	2.550	3	450	90	150
30	Refresher ToT	National	5	3	250	15	1.250	3	225	25	75
30	Refresher UHC/Referral Hospital Training	Local	5	4	510	30	2.550	3	450	90	150
	Total quantities					**92**	**7.618**		**1.350**	**237**	**452**
	Total Cost	**16.507.800**					**8.379.800**		**6.750.000**	**474.000**	**904.000**
	Phase 2										