

**TECHNICAL ASSISTANCE TO ZAMBIA
FOR INTERNATIONAL HEALTH
MANAGEMENT INFORMATION
SYSTEM (HMIS) DEVELOPMENT**

September–December 1996

Mary Church

BASICS Technical Directive: 019-ZA-01-033
USAID Contract Number: HRN-6006-Q-3032-00

|

TABLE OF CONTENTS

ACRONYMS

I.	EXECUTIVE SUMMARY	1
II.	PURPOSE OF VISIT	2
III.	BACKGROUND	3
IV.	TRIP ACTIVITIES	3
VI.	RECOMMENDATIONS	4
VI.	FOLLOW-UP ACTION REQUIRED	5

APPENDIXES

APPENDIX A	Design and Implementation Plan for a DART-HMIS
APPENDIX B	Requirements for International Tender Document for Computer Hardware, Software, Installation, Maintenance, and Training at Districts, Regions, and Levels I, II, and III Hospitals

ACRONYMS

BASICS	Basic Support for Institutionalizing Child Survival
CA	Collaborating Agency
CBoH	Central Board of Health
CDC	Centers for Disease Control
CHW	Community Health Worker
DANIDA	Danish International Development Agency
DDM	Data for Decision Making
HMIS	Health Management Information System
HRIT	Health Reform Implementation Team
QA	Quality Assurance
TBA	Traditional Birth Attendant
USAID	United States Agency for International Development
ZCHP	Zambia Child Health Project

I. EXECUTIVE SUMMARY

Zambia has set itself the goal of providing cost-effective quality health care as close to the family as possible. In pursuance of this goal, in 1993 the Ministry of Health began to reform its centralized, vertical, top-down service delivery system into a decentralized, integrated, bottom-up model. In order to manage the reform process, the Ministry's Health Reform Implementation Team (HRIT) identified development of a robust Health Management Information System (HMIS) as a priority. The purpose of this trip was to provide technical assistance in the area of international HMIS development.

Both USAID and the Danish International Development Agency (DANIDA) have provided technical assistance in information systems since 1995. These missions produced useful preliminary studies and consensus building, but there was no design or implementation plan for the new HMIS. HRIT, USAID, and DANIDA agreed to coordinate their efforts through a multinational, multilateral team reporting to Dr. Eddy Limbambala, HRIT's director of monitoring and evaluation. The team's task was to propose a design and implementation plan for the HMIS.

Building on the needs assessment sponsored by DANIDA and completed by one member of the team a month before this mission began, the team prepared a plan. The Ministry adopted the plan as policy and the team was asked to continue its work through the implementation effort scheduled for 1997.

The design and implementation plan emphasizes the following issues:

- *Support of reform implementation.* The HMIS supports decisionmaking and action at all levels, from the community to the national Central Board of Health (CBoH). The information it supplies leads directly to decentralized, timely, action-oriented management of health care resources. (Towards the end of this visit the HRIT, a temporary organization, became the CBoH, a permanent, implementation-oriented organization. The term HRIT is used in this report unless it would be confusing or clearly wrong.)
- *Overall monitoring and evaluation framework.* The HMIS provides warning signals to indicate that the system is not operating according to plan. It may not provide all the information to respond to a specific problem. The overall monitoring and evaluation tool kit includes health systems research, sentinel surveillance, and a variety of special purpose data collection and analysis techniques.
- *Indicators and analytic tools.* Some 70 indicators are proposed to monitor various components of the health system: health status, drugs and supplies, finances,

1

4

assets, human resources, and overall systems performance. Tools for analyzing and interpreting the information are outlined.

- *Schedule.* A month-by-month plan outlines the timetable for defining the indicators, for field-based forms development, and for pretest and roll out of training and system. The timetable is geared to have the new HMIS operating nationwide by 1 January, 1998.
- *Resources.* Budgets and estimates of training requirements are included. It is planned to automate the system at the district, regional, and national levels; training and recurrent expenses associated with automation are included.
- *Community-based system.* A task force has begun developing a community-based system; field testing is scheduled for completion in the fourth quarter of 1997. The national HMIS and community based system will be coordinated when the community system begins operation.

After the design and implementation plan was completed, a request was made by HRIT to extend the visit to prepare a draft of the international bid tender for procurement of the information technology to support the HMIS.

HRIT requested ongoing assistance in the process of forms and procedures documentation. Drafts of these documents were prepared in the United States, then distributed and reviewed by the HMIS collaborators.

II. PURPOSE OF VISIT

The major purpose of the visit was to produce the HMIS design and implementation plan. A copy of this document is attached. It was produced by collaboration of the four members of the HMIS development team credited in the document.

The two requests for additional assistance have corresponding products: a bid tender for information technology, and a draft of the procedures manual for instrumentation and collection of health indicator data. (Preparation of the procedures manual is an ongoing collaborative task of the HMIS development team. The draft prepared with technical assistance provided through BASICS reflected the forms before the development phase; the draft attached is current and reflects the forms used in the development phase.)

III. BACKGROUND

The Centers for Disease Control's Data for Decision Making Project (CDC/DDM) has taken a lead role in USAID support for the HMIS. DDM had undertaken two earlier HMIS support missions in 1996: a situation analysis followed by a consensus workshop on indicators. The current trip built on the CDC's work, as well as assessments from 1995 onwards sponsored by the World Bank and DANIDA. The first week of this trip overlapped with the visit of DDM's acting director and provided the opportunity for in-depth briefings on the CDC experience.

BASICS has been working in Zambia since 1995 implementing the Zambia Child Health Project (ZCHP), as well as providing support to other USAID Collaborating Agencies (CAs). This trip began with a collaborative meeting sponsored by BASICS to facilitate collaboration between HMIS, Quality Assurance (QA), and ZCHP. This meeting helped frame the major issues in defining indicators and provided important technical input into that process.

IV. TRIP ACTIVITIES

The main activities revolved around design work. Colleagues in the Ministry, CBoH, and various external agencies and CAs were consulted as the need arose.

After the collaborative meeting sponsored by BASICS and described above, the HMIS team participated in three major meetings.

1. Workshop for development of district health officers' training curriculum. The team participated in this two week workshop in Kabwe for one day. The workshop included most members of the HRIT, who had assembled to design the curriculum to be used to enhance district-level management skills. The team had the opportunity to observe the process at work, as well as to provide input into the information systems and technology portions of the training.
2. Consensus workshop on community-based health information system. The team attended this three day workshop in Mongu, Western Province, in order to understand the community-based task force's plans for implementing the community-based information system. Community health workers (CHWs), traditional birth attendants (TBAs), and workers from all levels of the formal health care system participated.

As a result of this meeting, some indicators of the level of activity of the community system were incorporated into the HMIS, and other indicators were defined in such a way that the community data could be added easily when it becomes available.

After this workshop the team visited the district offices in Mongu and Kaoma, Western Province, to enlist their participation in the first, development phase of the HMIS, when the system's forms are tested.

3. Presentation of HMIS plan to Ministry, HRIT, and external agency senior staff. The HRIT monitoring and evaluation director and the HMIS coordinator presented the design and implementation plan as Ministry policy and solicited technical input as well as ongoing technical and financial support for training.

The additional task of preparing the tender document resulted in overlap and collaboration with two other technical specialists with work related to the HMIS: a CDC epidemiologist working on HMIS case definitions, and a DANIDA information technology specialist.

V. RESULTS AND CONCLUSIONS

The HMIS design and implementation plan was received positively by HRIT and external agencies. The main criticism has been that the schedule is overly ambitious. While it is acknowledged to be ambitious, the question lies in the adjective "overly." The main concern is whether the effort required will overstress the management and delivery system. The health reforms have placed added responsibility and authority at districts and health centers. While the HMIS supports management decisionmaking, its roll out requires investment in building new technical and supportive capacities at the CBoH, regions, districts, and health centers. (Six to eight weeks for training from more than half of the district management team, and two weeks each from two health center staff, followed by changes in all reporting forms and analytic and interpretive responsibilities.) On the other hand, district and health center staff need the information from the HMIS to assume their new management responsibilities. Institutionalization of the HMIS is definitely a priority.

Checkpoints are built into the implementation process, when all of the participants can assess the progress. There are reviews at the completion of each implementation phase. At the beginning of each new phase a schedule of critical tasks is laid out; these tasks must be completed before the training is begun.

VI. RECOMMENDATIONS

The major recommendations from this visit concern the functionality to be expected from the HMIS and the implementation plan. They are included in the design and implementation plan and have been adopted by the CBoH.

VI. FOLLOW-UP ACTION REQUIRED

The CBoH has requested ongoing technical assistance during the implementation phase and support for training. The ZCHP and DANIDA have agreed to provide financial support for HMIS training. USAID support for technical assistance to the HMIS development team is routed through CDC/DDM, with ZCHP providing local logistic support.

APPENDIXES

APPENDIX A

Design and Implementation Plan for a DART-HMIS

Health Management Information System

**Design and Implementation Plan
for a DART-HMIS**

HMIS Unit

*Prepared for
Ministry of Health and
Central Board of Health of Zambia*

by HMIS Development Team

6 November 1996

N

This report contains the design and implementation plan for a new Health Management Information System for the Ministry of Health, Central Board of Health, and Health Management Boards of Zambia. The new system has been given the acronym DART-HMIS, which represents its cardinal objectives: a Decentralised, Action-oriented, Responsive, Transparent HMIS.

This document was written by Mr. Charles Mundale, Dr. J.A.R. Koot, Ms. Mary Church, and Ms. Anne Young who constitute the HMIS Development Team of the Central Board of Health. It presents the findings and recommendations of an assessment undertaken by Dr. Koot in collaboration with the HMIS section of the Health Reforms Implementation Team during August, 1996, as well as the feedback received since submission of that report. A number of other documents served as background for the report, and are listed below. In addition, the document contains information gathered during field visits to Kabwe for the curriculum development for the Diploma Course for District Directors of Health and Deputies, and the consensus workshop on Community Based Health Management Information Systems in Senanga, Western Province. During preparation of this report the advice of members of the Health Reforms Implementation Team (HRIT), the HMIS Advisory Working Group, Ministry and Central Board of Health staff was actively solicited, and the document incorporates this input.

As this report was being finalised, the Health Reforms Implementation Team was being replaced by the Central Board of Health of Zambia. Implementation of proposed activities will occur within the HMIS unit of the Central Board of Health, under the directorship of Dr. Eddie Limbambala.

Abbreviations

AFP	Acute Flaccid Paralysis
AIDS	Acquired Immunodeficiency Syndrome
ARI	Acute Respiratory Infection
CBoH	Central Board of Health
CBHMIS	Community Based Health Management Information System
CHW	Community Health Worker
CMAZ	Churches Medical Association of Zambia
CSO	Central Statistics Office
DHB	District Health Board
DHIO	District Health Information Officer
DHMT	District Health Management Team
DHO	District Health Office
DHS	Demographic and Health Surveys
DPT	Diphtheria, Pertussis, Tetanus
EPI	Expanded Programme on Immunisation
FAMS	Financial & Administrative Management Systems
FHANIS	Food Security, Health and Nutrition Information System
GIS	Geographic Information System
HC	Health Centre
HCC	Health Centre Committee
HIV	Human Immunodeficiency Virus
HIS	Health Information System
HIU	Health Information Unit
HMB	Hospital Management Board
HMIS	Health Management Information System
HQ	Headquarters
HRD	Human Resources Development
HRIT	Health Reforms Implementation Team
HSR	Health Systems Research
IDA	International Development Agency
IP	In-Patient
LAN	Local Area Network
LQAS	Lot Quality Assurance Sampling
M&E	Monitoring and Evaluation
MCH	Maternal and Child Health
MOH	Ministry of Health
NGO	Non Governmental Organisation
NHC	Neighbourhood Health Committee
ODA	Overseas Development Assistance (UK)
OPD	Out-Patient Department
ORT	Oral Rehydration Therapy
PHIO	Provincial Health Information Officer
PHP	Public Health Practitioner
PPAZ	Planned Parenthood Association of Zambia
RHO	Regional Health Office
STD	Sexually Transmitted Disease
TB	Tuberculosis
TBA	Traditional Birth Attendant
tTBA	Trained Traditional Birth Attendant
UCI	Universal Childhood Immunisation
WHO	World Health Organization

13

BEST AVAILABLE COPY

Y200311A/11A/11A/11A

Table of Contents

EXECUTIVE SUMMARY	6
1 Background and History	10
1.1. The National Strategic Health Plan	10
1.2. The Current System of Monitoring and Evaluation.....	11
1.3. Assessment of the Utilisation of Existing Information Systems.....	11
2 Monitoring and Evaluation	13
2.1. Elements of a Monitoring and Evaluation System in Health	13
2.2. Relationships between Elements of M&E	14
2.3. Monitoring and Evaluation at the Centre.....	15
2.4. Monitoring and Evaluation at Peripheral Levels.....	16
2.5. Options for Selecting M&E Tools.....	16
3 Health Management Information System Design Principles.....	19
3.1. Whoever Collects Also Analyzes	19
3.2. Data for Decision Making	19
3.3. Reporting Frequency Tuned to Decision Making	21
3.4. Criteria for Including Data Elements in HMIS	21
4 Health Management Information System Characteristics	23
4.1. Subsystems within the HMIS.....	23
4.2. Criteria for Data Sets and Indicators.....	25
4.2.1. Information Requirements for each Subsystem.....	25
4.2.2. Information Requirements for each management level.....	27
4.3. Notifiable Diseases	31
4.4. Information Flow and Reporting Frequency.....	33
4.4.1. Flow of information.....	34
4.4.2. Timeliness.....	36
4.5. Characteristics of Data Interpretation and Decision Making Tools.....	38
4.6. Enabling Factors	38
4.6.1. Organisation and human resources	39
4.6.1.1. Organisational Structure and Inter-communication.....	39
4.6.1.2. Capacity and Human Resources	39
4.6.2. Automation and supporting infrastructure.....	40
4.6.2.1. Where to introduce computers?.....	40
4.6.2.2. Experiences in automation	42
4.6.2.3. Introduction of computers	43
4.6.3. Finances and sustainability.....	44
4.7. Data Quality Assurance.....	45
5 Implementation Strategy.....	47
5.1. Priorities and Phases	47
5.2. Time Frame.....	48
5.3. Capacity Building.....	49
5.4. Strategy for Introduction of Computers.....	50
5.5. Financial Issues.....	51
6 Related Issues.....	53
6.1. Other Issues related to HMIS.....	53
6.2. Hospital MIS.....	55
6.3. Participation of Private Providers	56
6.4. Development Strategy for Complete M&E System.....	56

6.5 Legal Requirements	56
7 Data Elements and Core Indicators.....	57
7.1. Introduction	57
7.2. Data Sets and Indicators.....	57
7.3. Health Subsystem.....	59
7.4. Finances Subsystem	59
7.5. Human Resources Subsystem	59
7.6. Drugs and Supplies Subsystem.....	61
7.7. Assets Subsystem	64
7.8. Subsystem Health Systems Performance	65
8 Data Interpretation and Decision Making Tools	66
8.1. Framework for Investigation	66
8.2. Tools within the Framework for Investigation	67
8.3. Tools Used at the Community Level.....	68
8.4. Tools used at Health Centre Level.....	71
8.5. Tools Used at Hospital Level.....	72
8.6. Tools Used at District Level	73
8.7. Tools Used by the Central Board of Health.....	74
8.8. Capacity Building	74
9 Community Based Health Management Information System	76
9.1. Introduction	76
9.1.1. Background information.....	76
9.1.2. Preamble	77
9.1.3. Rationale	77
9.1.4. Principles	78
9.1.5. Assumptions	78
9.1.6. Organisational structure	79
9.2. Model Community Based Health Information System	79
9.2.1. Objectives	79
9.2.2. Users.....	80
9.2.3. Information needs	80
9.2.4. Indicators	80
9.2.5. Data collection instruments and personnel.....	81
9.2.5.1. Community Register.....	82
9.2.5.2. Community Map	83
9.2.5.3. Disease Surveillance and Service Delivery Registers.....	83
9.2.6. Data aggregation.....	84
9.2.7. Data analysis and reporting	84
9.2.8. Resource requirements	85
9.3. Implementation Schedule for CBHMIS	85
9.4. Interface with HMIS	85
References.....	87
Annexes.....	88

15

Annexes

- Annex 1: Notifiable Diseases: Form submitted by Health Institutions to the District Health Office
- Annex 2: Notifiable Diseases: Form submitted by the District Health Office to the Central Board of Health
- Annex 3: Hardware and Software Recommendations for Automated Support of HMIS
- Annex 4: Timeline and Estimated Costs: HMIS Implementation, 1996-7
- Annex 5: Estimated Recurrent Costs for HMIS Operation
- Annex 6: Proposed Indicators for HMIS Subsystems
- Annex 7: Example of Health Centre Rehabilitation Database
- Annex 8: Example of Community Based Health Management Information System Forms

16

BEST AVAILABLE COPY

EXECUTIVE SUMMARY

This report begins by summarising the historical process which has led to the development of a new Health Management Information System in Zambia. It also delineates the function of the HMIS system within the newly created Directorate for Monitoring and Evaluation in the Central Board of Health. The basic design principles and characteristics of the system are then presented along with a detailed plan for implementation and a proposed set of core indicators for measuring the overall functioning of the health system. In addition, the report calls attention to the different tools which can be used at every level of the health system to analyze and use data for decision-making. Finally, this report describes the community-based health management information system, which is still under development.

PRINCIPLES

Improvement of the Health Management Information System is an important component of Zambian Health Reforms. The current system of monitoring and evaluation is overly centralized and fragmented, and hence results in the collection of large amounts of data by health staff which is not useful for decision making and action. In response, some District Management Teams have already begun developing their own concurrent systems for health information which allow them to analyze information in a timely fashion for planning at the community and health centre level. This suggests the importance of the implementation of a new national HMIS system which is flexible and responsive to the needs of all levels of the health system.

The main characteristics of the new proposed HMIS are:

Decentralised--whoever collects analyzes: Analysis and self-assessment is carried out at the level where data is collected and used for decision making at that level. Data is not merely collected for upward reporting.

Action oriented--data is collected for decision-making

The old paradigm of collecting "as much data as possible" through the HMIS will be abandoned. Health Management Boards require operational information for day-to-day management and supervision; the Central Board of Health requires information for longer term strategic management and support, and for setting national policy. Different health information needs also exist for the community, health post, health centre, hospitals (first level, district, second and third level) as well as the Regional Boards of Health. Specialised or vertical programmes will be encouraged to satisfy information needs which fall outside the boundaries of the routine HMIS through sentinel surveillance, surveys and other techniques.

Responsive--data is reported in an appropriate timeframe according to its use, and flexible in terms of adaptation to local needs.

Transparent--Obtaining information should be easy and dissemination facilitated by the newly created Regional and National Resource Centers. In addition, correlation of data collected by the various subsystems will be greatly facilitated.

17

The Health Management Information System is designed to raise flags, not answer questions. It is not the role of the HMIS to analyze a problem and tell the manager how to rectify the situation; instead the HMIS serves as a signal that attention is required. The HMIS alerts managers that something unexpected may be occurring in three areas: health status and disease patterns, service delivery, and resources to support service delivery.

Additionally, the routine HMIS cannot be relied upon for the collection of all data and for the reporting of all indicators. The three units directly falling under the new Directorate include not only the HMIS unit but the Health Systems Research and Epidemiology Unit, and the Quality Assurance and Management Audit Unit. Together, these units will be responsible for conducting alternative monitoring and evaluation exercises, including Performance Audits, sentinel surveillance, rapid assessment methods including Lot Quality Assurance Sampling (LQAS) and other related research such as focus groups, Delphi panels, and medical records reviews.

FRAMEWORK

The rationale for the development of the overall HMIS and its subsystems is derived from the framework used by the Ministry of Health known as the Health Inputs, Processes, Outputs, and Outcomes (HIPPOPOC) model.

The following subsystems will be required:

Health Status--This measures the outputs of the health system (curative care, preventive activities, and health promotion) as well as outcomes in health status. Zambia's National Strategic Health Plan has delineated six priority areas for health services: Safe Motherhood (including antenatal and postnatal care, and family planning); Child Health (including immunisations and nutrition); AIDS and Sexually Transmitted Diseases; Malaria; Tuberculosis (TB); and Environmental Sanitation (including water and latrines). The health status indicators proposed focus on these priority areas.

Finances--This focuses on financial inputs into the health system necessary. It allows managers to measure costs involved in delivering the six priority thrusts for health services as well as providing basic accounting information. The reporting format has been developed under FAMS and will not change.

Human Resources--This subsystem allows for the understanding of staffing patterns, movements and training requirements.

Drugs and Supplies--Information will be used to measure utilisation and stock management. The distribution system will change from a "push" to a "pull" system to allow Districts to determine their own needs for drugs and supplies. The Central level will be responsible for supplying those needs and assuring that the Essential Drugs Stores are sufficiently stocked. This subsystem also provides information on the rational use of pharmaceuticals.

Assets--Information on the infrastructural and equipment inputs (including transport) allow the District and Central levels to plan and budget for maintenance and rehabilitation/upgrades. Indicators help measure progress against minimum physical quality standards already developed for some health institutions (health centres).

Data from these five subsystems will be linked with the subsystem on Health Systems Performance. With this subsystem, financial reporting can be linked to health status and service delivery to measure cost-effectiveness. Also staff workload can be linked to utilisation of institutions.

A total of 70 national indicators have been proposed for incorporation in the HMIS and await concurrence. These indicators provide information for each of the required subsystems.

The Notifiable Disease list has been revised to only include those diseases which require immediate action by the Central Board of Health. Other diseases which pose a more localized public health threat may be added at the District's discretion.

The new HMIS will focus on the interpretation of data for decision-making. A number of tools can be used for assessing needs, understanding the kind of services the health sector provides, improving coverage rates, and planning for unmet needs. A variety of analytic tools have been proposed for use at different levels of the system. During the development and pretest phase of implementation, these will be formalised in procedures and forms.

The essential principle of using one single channel to move information from one level to another has been observed. Data will be communicated from the community level (through a Community Based Health Management Information System now under development) to health posts or directly to the health centre, depending on whether a health post exists in a given area. These data are aggregated and a subset of information sent to the District Health Office; these data are combined with information from level I hospitals and other health providers in the area (NGO and private). Districts and Level II hospitals report to the Regional Health Office and from there an agreed upon set of information is sent to the Central Board of Health. The CBoH combines this information from that which is received from Level III hospitals. The resource centres at the Regional and Central level will be responsible for making information accessible to interested stakeholders: this includes donors and research institutions.

A quarterly reporting schedule has been proposed which is less taxing than the current monthly system. Reporting will occur according to the use of information for planning and action. In exceptional cases such as epidemics, shorter reporting periods are foreseen.

IMPLEMENTATION STRATEGY

Introduction of the new HMIS will require a great deal of financial and human resource commitment on the part of the Ministry of Health/Central Board of Health as well as collaborating agencies.

The implementation strategy for the proposed system is designed to assure that the new HMIS system will be operational nationwide by January 1998. The implementation of the manual HMIS will occur in three phases: development, pretest and roll out. The development phase will involve testing and refining the system in two districts of the Western Province. After revisions have been made and an operations manual updated, the system will be tested in at least 10 districts with various levels of experience in data management; other districts where interest has been expressed in using a new HMIS in the near future will be invited to join the pretest phase provided they meet certain minimal requirements for staffing and expertise. Between October and December 1997, the remaining districts will be trained in the new HMIS. The training will incorporate components of HMIS, stores procedures, and the six main health thrusts.

Automation at district, regional and headquarters levels, as well as at hospitals, will greatly ease information flow and provide greater flexibility and depth in analysis. Prerequisites for automation include the availability of computers, computer literacy on the part of staff, standardization in hardware and software, preparation of a procedures manual, and the development of support systems for maintenance and trouble-shooting. Implementation of a plan to bring an automated HMIS to the District and higher levels will commence with the development and pretest sites by mid-1997 and have a roll out phase within the second quarter of 1998.

19

1

Background and History

1.1. The National Strategic Health Plan

Within the Zambian Health Reforms the need for improvement of the health management information system was recognized at an early stage. The aim of "bringing cost-effective quality care as close to the family as possible" can only be reached if a proper system of monitoring and evaluation is put in place. To use the metaphor of a vehicle: when driving a car - be it a Cadillac or a Fiat - a driver monitors instruments to check if the car is operating correctly: speedometer, fuel gauge, engine temperature meter, oil pressure indicator, even mirrors.

In the National Strategic Health Plan (1996) one of the goals of the health reforms is formulated as follows:

to establish a self-sustaining monitoring and evaluation system which will improve decision making at all levels of the health care system with timely, valid and appropriate information required to increase the effective utilisation of quality health services.

The National Strategic Health Plan (1996) continues:

The intention is to monitor and evaluate implementation of the plan through a process of constantly assessing whether standards are being met and maintained, and to review their appropriateness. This will require an assessment of:

- *the ability of the system to achieve standards - producing the anticipated outputs, functioning according to prescribed processes, and utilising inputs as intended;*
- *the accuracy of the assumptions made regarding the linkage between the use of inputs, processes (or system organisation and structure), and outputs;*
- *the accuracy of the assumptions made regarding the linkages between outputs and outcomes are supported by anticipated changes in health status.*

In simple words monitoring and evaluation should give answers to the questions:

- Are we doing a good job (reaching standards, using the inputs well)? And suggest answers to the corollary question, How can we do a better job?
- Are we producing results (reaching our targets)?
- Are we making an impact (do the achievements really bring better health for the people)?

1.2. The Current System of Monitoring and Evaluation

As in many other countries, existing monitoring and evaluation activities in the health sector are organised vertically. The Health Information Unit collects data on medical statistics, the accounts department collects data on finances (now partly taken over by the Central Board of Health), the personnel division collects data on human resources, etc. In the last fifteen years vertical programmes also have come in, each with a parallel monitoring and evaluation system (Essential Drugs, Universal Childhood Immunisation, Control of Diarrhoeal Diseases, Family Planning, AIDS, STD, Tuberculosis and Leprosy, Child Nutrition, and other programmes).

Situation analyses of the HMIS have been prepared and documented several times. The most detailed appears in the *Systems Requirements Document for a Health Management Information System* (September 1995). The current analysis and implementation strategy builds on the findings of these earlier studies.

The current monitoring and evaluation activities can be described with the keywords: fragmentation, duplication, centralized, delay and unreliability:

- **fragmentation:** Each department concentrates on its own interests. Therefore no overview can be obtained. Issues like cost-effectiveness and impact cannot be monitored.
- **duplication:** Different programmes or departments are interested in the same type of information and use different forms and formats for reporting. The record holder is leprosy where each case is (or should be) reported through 4 different information systems. The health institutions are overburdened with report forms (an estimated 36 distinct forms).
- **centralised:** Health institutions, district health offices, and provincial health offices have to report raw and aggregated data to the centre. The systems do not provide tools for analysis at the periphery and are not geared toward the needs of District Health Management Teams or Hospital Management Teams.
- **delay:** Overburdened by reporting requirements, and completely demoralized because of lack of feed-back, health institution staff delay reporting. But even if the motivation were there, the absence of report forms, severely limited communications in the rural areas, etc. would cause reporting delays.
- **unreliability:** Reporting is incomplete (sometimes even fake), too late, contradictory and often not processed or analyzed at national level. The information provided to the Ministry of Health proves to be not useful for decision making at either central or peripheral levels.

1.3. Assessment of the Utilisation of Existing Information Systems

Before development of the implementation strategy outlined in this document occurred, assessments were made of the existing information systems, in order to come up with more explicit constraints and requirements for each subsystem. During the assessment that laid the groundwork for the current design, interviews were conducted with National Department Heads and Programme Officers, as well as health providers from the community level to Level III hospital. The results of the interviews conducted by the HRIT's HMIS unit in May 1996 among all MOH departments and programmes were used in the development of this assessment.

The problem mentioned above, earlier described in other documents were identified again. A detailed appraisal of all forms can be found in Annex A of the assessment report that preceded this design. The focus of this report is on the development of a new integrated health management information system. The conclusions from the assessments are used for the design of the new HMIS.

The four most important conclusions of the assessments are:

- A. **Change in Attitude.** Compared to four years ago, when the Health Reforms started, a clear change in attitude toward health management information can be seen in the districts. Four years ago the attitude could best be described as "filling in forms to please the bosses". Now the attitude is "we want to know things, because we have to make decisions". District health Management Teams (DHMTs) try harder to get reliable information and analyze it. Most of them have even developed their own reporting forms, because the national forms are considered to be deficient. There is much eagerness to change to a Health Management Information System geared toward district level needs. Now more and more districts are involving communities and health centres in the planning process; the same interest for health management information is growing at these levels. This new attitude found in the districts can be used as a leverage for the introduction of a new HMIS.
- B. **Current system not producing results.** Most heads of departments and programme coordinators in the Ministry of Health (MOH) recognise the problems in the existing information systems. In reality, much of the information gathered from districts is scanned but not systematically analyzed by MOH headquarters' programme and administrative departments. None of the departments or programmes could produce (during the assessment in August 1996) a 1995 report with a comprehensive data analysis, conclusions and proposals for action. One may wonder how much information is really used in decision making by programme coordinators.
- C. **System is donor driven and not used for decision making.** Programme coordinators refer to their responsibilities with regard to specific activities, for example distribution of drugs and supplies. Therefore frequent and timely information from districts is required. But in reality the information gathered from districts only plays a marginal role in the decision making process and practice of distribution. Also donor requirements are mentioned as an argument for requiring very detailed information from districts, sometimes even if the programme coordinators themselves do not understand the necessity. Scientific interest seems to be the drive behind this. One may question if the routine data collection by health institutions should be used for such purposes.
- D. **Alternative initiatives already occurring may prove helpful.** Private providers such as the mine hospitals have well-established monitoring systems. Communities can be involved in data collection and analysis, as has been shown in a number of districts. Further improvement of partnership with other stakeholders will be very fruitful in the implementation of a new Health Management Information System. The sharing of experiences should be stimulated. Contracting out certain tasks could be considered.

2

Monitoring and Evaluation

2.1. Elements of a Monitoring and Evaluation System in Health

Several different terms, such as monitoring and evaluation system (MES), health management information system (HMIS), and health information system (HIS) are used in the health reform documentation, sometimes as synonyms. These terms describe three distinct information systems, which serve separate objectives.

A Monitoring and Evaluation System comprises all activities that contribute to increased knowledge of inputs, processes, outputs, outcomes, and impacts of health services. Routine reporting, sentinel reporting, performance audits, surveys, research, and censuses are methods used to collect the information. The primary objective of the MES is to provide information to set policy and to monitor its effects.

A Health Management Information System includes routine activities that increase knowledge of inputs, processes, outputs, outcomes, and impacts of health services. Performance audits, surveys, and research are not included. The primary objective of the HMIS is to provide operational information on policy implementation.

A Health Information System concentrates on information related to diseases and health status, mainly outputs, outcomes, and impact of health services with little attention for inputs and processes. Medical statistics and disease surveillance belong to a health information system. The primary objective of the HIS is to provide information on the health status of a population; it is used both to set policy and to manage operations.

There is no doubt that the MOH and the Health Management Boards require a comprehensive MES to inform policy and strategic planning. In the Central Board of Health (ChOH), a Directorate of Monitoring and Evaluation will have a prominent place and will exercise the broad range of functions pertaining to monitoring and evaluation. It is essential to include partners in the MES so that the policy implications for other groups can be established. Communities, the private sector, and other ministries are among the key partners in the health reform MES.

The following diagram shows different elements of monitoring and evaluation and potential partners to be involved.

23

Types of Data Collection for Monitoring and Evaluation

Community Based Health Information			
- Yearly community diagnosis by NHC's with HP's and HC's - Community Registers			
within Governmental Health Services			
Routine reporting on subsystems in HMIS - Health Posts - Health Centres - Level I Hospitals - Districts - Level II Hospitals - Level III Hospitals - CBoH :units	Performance Audit - Districts > health unit - CBoH-RHO>Districts - CBoH-RHO > private providers - CBoH-RHO > Level II Hospitals - CBoH-HQ > RHO's - CBoH: Regional Office - CBoH > Level III Hospitals	Sentinel Surveillance - Malaria Sentinel Stations - TB diagnosis/treatment units - HIV test surveillance antenatal visits	Surveys/Research - Health Systems Research DHMTs - Health Systems Research CBoH - Malaria resistance/ prevalence survey - Iodine deficiency survey
other health providers and other sectors			
Routine reporting on subsystems in HMIS - private providers - mine hospitals - mission health institutions - city councils - Medical Council - Nursing Council	Performance Audit - Med Council >private providers	Sentinel Surveillance - FHANIS food nutrition	Surveys/Research - National Demographic and Health Census - CSO vital statistics - Tropical Disease Research Centre

2.2. Relationships between Elements of M&E

The HMIS focuses on routine operational activities whose inputs and outputs can be quantified. The HMIS captures data from specific locations at regular, predefined intervals. The information produced by an HMIS is often used to assess operational performance by examining time trends and by comparing the situation at different locations. Another important application of an HMIS is to combine financial and health outcome information in order to provide more cost effective service delivery.

While determining the information requirements included in an HMIS, awareness of the broader range of monitoring and evaluation methods is required in order to establish the most appropriate method of capturing the data for a required piece of information. Some data that are collected routinely could be collected through surveys like the Demographic and Health Survey or through sentinel surveillance. For example, information on drug resistant malaria can better be obtained through sentinel surveillance or incidental surveys than through routine reporting. Performance audit is not included in the HMIS because it is much more qualitative and employs a dialogue mode to collect data. However, information generated by the HMIS is a necessary input for performance audit. Surveys and research are not included in an HMIS because they are non-repetitive activities whose results cannot be captured in routine reports. Information gathered through the HMIS often

suggests research questions, and the recommendations following research may be used to improve operations and the HMIS itself.

The Health Information System is part of the HMIS and is called the "health status subsystem" in this report.

2.3. Monitoring and Evaluation at the Centre

An active Monitoring and Evaluation Office is a keystone of health reform. The information collected through the Monitoring and Evaluation System (MES) both guides health reform policy formulation and reflects the successes and constraints of the reform process. The Working Group responsible for establishing an M&E Office has defined the major subject areas to be addressed in a *Proposal Report on Establishment of a Monitoring and Evaluation Office for the Health Sector* (May 1996). These areas include progress in implementation of health reforms, particularly the essential package of health services; the status of infrastructure and human resources; and the systemic concerns of quality, accessibility, equity, and affordability.

While some of the details of the organisation of the division responsible for M&E have changed slightly, its responsibilities remain as outlined in the Working Group's Proposal. In the most recent organisational structure proposed for the reformed health sector, the Monitoring and Evaluation Directorate falls within the Central Board of Health; it consists of three units: Health Information Systems, Health Systems Research and Epidemiology, and Quality Assurance and Management Audit.

Health Management Information Systems Unit

This unit provides data management services, including support for electronic data processing. It is also responsible for the interpretation and dissemination of the results of its analysis. It sets standards for data processing at both central and peripheral levels and provides advice to the peripheral levels in data management and processing. This unit should also have responsibility for processing the HMIS data forwarded to the centre and for providing technical support in the operation of the HMIS at the peripheral levels.

Health Systems Research and Epidemiology Unit

This unit is the national repository of information and expertise on health related research in Zambia, including information and research on health financing. It is also responsible for disease surveillance and outbreak investigation. The unit conducts research, pilot tests, and special studies according to priorities established in the National Strategic Health Plan and upon the request of the Central Board of Health. This unit also has the responsibility for training peripheral levels in survey and surveillance techniques so that Regional, District, and Health Centre staff can use these methodologies to augment the information generated by the routine reporting of the HMIS.

Quality Assurance and Management Audit Unit

This unit monitors performance in all areas of management, such as finance, service delivery, human resources, logistics, etc. It also monitors clinical quality of care and the observance of standards at all levels of the health care system.

While the organisational structure and responsibilities of the M&E Directorate await official confirmation by the Ministry of Health, many of the M&E functions to be assumed by the Directorate are currently performed by sections of the Central Board of Health and the Ministry. The establishment of a decentralised, action-oriented HMIS is considered the highest priority for information systems development, and is therefore the main area of concern in this report. For other elements of Monitoring and Evaluation, like performance audit and health systems research, workplans have been elaborated in the CBoH. With regard to the systematic use of sentinel surveillance and surveys no plans have been developed yet. It is highly recommended that workplans for all elements of M&E be integrated in a comprehensive M&E strategy.

The Directorates of Health Services Commissioning and of Systems Development in the new Central Board of Health, as well as the Ministry of Health, at all times desperately need timely and adequate information. In the

past the Health Information Unit in the Ministry failed to provide other units with such information, so these units set up parallel information systems. The most important lesson to be learned from the past is that the Directorate of Monitoring and Evaluation should set up systems for communication with other Directorates in the CBoH. To a large extent the Directorate of M&E is a service department for other Directorates. It is recommended that lines of communication between departments, procedures for reporting etc. be well laid out from the onset of the CBoH.

2.4. Monitoring and Evaluation at Peripheral Levels

While the routine reporting through the HMIS is designed to respond to the management needs of the District and community levels, each of these groups has additional information requirements as well. Performance audits of service delivery facilities and health management boards will be undertaken at the peripheral level. These require qualitative information, often obtained through dialogue, and utilize methodologies similar to those employed by the Quality Assurance and Management Audit Unit at the centre. The frequency and standards employed during these audits are currently under development by the District Capacity Building (DCB) Unit in HRIT.

Peripheral level managers also have ad hoc information requirements. For example, a Health Centre may wish to assess client satisfaction through an exit survey after care has been provided. A survey may be required to gauge the effects of a disease outbreak and guide response to the situation. Disease patterns may vary from district to district, and are known to vary between Regions. Sentinel surveillance may be necessary to monitor the situation in a specific geographic area or to detect patterns of specific diseases.

It is necessary to build the capacity in the districts to decide on appropriate monitoring and evaluation tools, to train district officers in some tools and to make expertise available from the central level to the periphery in the implementation of M&E elements (possibly through sub-contracting the University or other research institutes).

2.5. Options for Selecting M&E Tools

Several options for data collection and analysis besides the routine reporting in the HMIS have been mentioned in the preceding narrative. The list of options in this section is not intended to cover all possible analytic techniques, but it does represent the range of analytic tools that should be available in a comprehensive MES. Establishing criteria for selecting which one to use in a given situation, as well as the training requirements to build the capacity to employ them successfully, remain tasks for the development of a more complete MES.

Performance Audit

Assessment of institutional and provider performance has been identified as a crucial factor in health reform, both to assure quality of care and to make the system more responsive to the needs and expectations of communities and clients. These audits rely on information from the routine reporting system to suggest areas where performance can be improved and on qualitative information obtained through interviews. It is important that the managers and providers undergoing audit be involved in the process so they may learn better practices from the audit, rather than simply being given an appraisal as an end product.

The draft District Performance Audit document, developed by the DCB Unit in the HRIT requires further attention, as well as supervisory checklists developed in several programmes and districts.

Survey

Surveys may be used to assess a variety of factors in a health care system: health status; disease prevalence; service delivery outputs, outcomes, and impact; and client satisfaction. Surveys indicate the status under investigation at a single point in time; time trends and the status before and after and intervention may be assessed by successive surveys. Examples of the use of survey techniques in the Zambian context are the

Demographic and Health Surveys (DHS), which is currently conducted every four years to give a reading of a variety of indicators; and the immunisation coverage survey, which provides an estimate of the coverage attained during the previous year and can be advantageous in situations where census counts or the routine reporting system are questionable. Accuracy of survey results depends on a methodological selection of a sampling frame and a survey design that eliminates factors that confound the results.

The work of Health Systems Research and Applied Health Research provide other examples of the use of survey methodology.

Rapid Assessment Method

The central purpose of Rapid Participatory Appraisal is to define a community's perspective on priority needs in order to influence policy making. Three elements can be distinguished:

- epidemiological data: including patterns of disease and disability and use of resources
- cultural perspective of needs: individual and group views and their context
- consensus that respects both medical and cultural viewpoints.

A community profile is created with information on:

- community composition: demographic data
- community organisation: traditional, religious and political
- community capacity: available resources
- physical environment: geography
- socio-economic environment: poverty and vulnerable groups
- disease and disability: epidemiology
- health services: community and formal services
- social services
- education, housing, environmental services, including water and sanitation
- health policies: existing policies that target community health problems

A number of priorities emerge from the appraisal from the side of the community as well as from the side of the professionals. Finally a methodology for reaching consensus in setting priorities is used.

Lot Quality Assurance Sampling

Lot Quality Assurance Sampling (LQAS) is an example of a rapid assessment method for assessing coverage, service adequacy, and health workers' techniques. It is a method derived from industrial quality control, and adapted for health services in Middle America under the supervision of the Pan American Health Organization. LQAS can be introduced in decentralised health services as a regular monitoring tool for community based programmes. Small sample sizes can provide reliable information. Health Centre Staff can be trained in the methodology, which does not require high levels of knowledge of statistics.

Sentinel Surveillance

Sentinel surveillance may be used to monitor health status and the factors affecting its change over time. Because of the expense of individual surveys, sentinel surveillance is a preferred methodology when the indicators in question must be observed many times or to establish seasonal fluctuations. In addition sentinel surveillance can be used to avoid overburdening peripheral health workers with information requirements that are not action-oriented. In Zambia, this methodology is used to monitor malarial drug resistance. The FHANIS sentinel system, which monitors nutrition, combines nutritional status information from the routine reporting system with data on the availability of food obtained from other sources.

Focus Groups

Focus groups provide a technique of probing for information on open-ended questions. They are often used to assess cultural and personal preference factors that influence health behaviours such as the adoption of family planning methods.

Delphi Panels

21

The Delphi Method was developed for consensus building in industrial management, and adapted in Kenya for use in health services. The essence of the method is that peer pressure or domination by individuals in the process of reaching consensus is eliminated. It is a valuable addition to focus group discussions, since it allows everyone (including representatives from minority groups) to express an opinion. In Kenya the method was used to obtain communities' views on socio-economic factors of ill-health and various intervention strategies.

Medical Records Review

Systematic review of a sample of medical records may be used to assess an institution's or practitioner's adherence to standards of care. Coupled with outcome information, they can help establish preferred practice standards. Review of cases of treatment failure can reveal systemic weaknesses in care, as well as inappropriate care.

Verbal Autopsy

The verbal autopsy methodology collects information regarding specific types of deaths using a questionnaire administered by a field worker and later reviewed by a team for analysis and intervention. For example, a questionnaire designed specifically to capture information about the circumstances of a maternal death could be administered by a CHW or TBAs shortly after the death. The responses can then be assessed by a team from the health center and district office to determine causes and take action.

3

Health Management Information System Design Principles

3.1. Whoever Collects Also Analyzes

The traditional data collection method, in which health institutions collect and send raw, or even aggregated data, to higher levels, can be called the conveyor belt method. In a highly centralised health care system it is an appropriate approach, but in a decentralised health care system, simply forwarding information to another level does not work.

In the decentralised model of Health Reform, each level in the health care system assumes responsibility for certain aspects of service delivery. Communities, guided by the neighbourhood health committees, carry out promotive health activities, and contribute to the planning of health centres. Health Posts and Health Centres develop and implement action plans in conjunction with the community; Hospital Management Teams do the same. District Health Management Teams consolidate health centres' and hospitals' plans in one operational plan, and then oversee implementation and monitor performance. Second and third level hospitals develop action plans and implement them. The Central Board of Health (divided into Regional Offices and the Central Office) monitors performance of all health management boards and develops policies. Finally the Ministry of Health monitors the Central Board of Health and assumes responsibility for obtaining political support.

Each level in the health care system should perform some analysis of the data it collects, geared to its own specific needs. In the HMIS design, analytic tools to assist each level are proposed. Self-assessment is an important activity in a decentralised health system, as it provides the rationale for adjustment of action plans.

3.2. Data for Decision Making

Each level in the health care system has been given its own specific responsibilities under the Health Reforms. Nearly all operational decisions are delegated to the Health Management Boards. The Central Board of Health and the Ministry of Health formulate policy and strategy, while the Regional, District, and community levels implement the strategy and manage operations. Different information is needed for policy development and for implementation: hence the information required at the centre differs from that which is required at the District. The classical approach in HMIS design, in which all information collected is reported to the central level, can be abandoned in the reformed model of health care.

For example, once hiring and firing has been delegated to the Health Management Boards, the Central Board of Health has no need to know the career development of nurse A or clinical officer B in District X. Once the distribution of drugs and supplies has changed from a push into a pull system, the responsibility for

29

maintaining adequate stocks devolves to the District, and the central level does not need to be informed of specific district stock levels.

During the assessment of MOH's current health information systems, it became clear that the concept of differentiation in information requirements is not well accepted at the central level. Peripheral levels lack information for operational management and are burdened by central data requirements, as there is still a tendency at the central level to collect "as much data as possible." The centre's unwillingness to reduce its data requirements appears to emanate from two main sources. First, national programme officers still feel that they should control all activities at district level. Second, only routine data collection is seen as an option for getting relevant information; sentinel surveillance and surveys are largely ignored as options for data collection. In addition, central officers do not differentiate between the qualitative information required for performance audit from the routine quantitative data available through the HMIS.

In the development of an HMIS to support health reforms, clear differentiation between the decisions taken at each level, and the information relevant to those decisions, is crucial.

- Health Management Boards require operational information, especially for day-to-day management of inputs and processes, and for assessment of outcomes and impact.

- The Central Board of Health requires information for strategic management and support functions; this information is primarily related to processes, outputs, outcomes, and impact. In addition, both central and peripheral levels have the responsibility of ensuring that the human and physical infrastructure and operations within their domains meet the standards mandated by policy. To fulfill this supervisory function all levels need similar types of information on the institutions that report directly to them. For example, the district needs to know whether the staffing pattern at each health centre corresponds to the standards and then to prepare a plan for enhancing the staffing at each substandard health centre. The region simply needs to know what proportion of the health centres in a district do not meet the staffing pattern. This information may be used in a performance audit, or the region may observe the staffing trend over time to make sure that the situation improves.

Chapter 4 and Annex 6 propose a core set of data to be collected and analyzed by communities, health centres, districts and hospitals. These groups have the freedom to add data on issues specifically relevant to their activities. For the CBoH, on the other hand, a maximum set of data has been proposed. This data set should be expanded only if the unit involved can convincingly prove that additional information is needed for strategic management or support functions. There must be evidence that information is indeed used, analyzed and fed back to operational managers. Additions to the core data set should be made only after concurrence has been obtained from the peripheral levels.

The almost automatic tendency of "vertical programmes" to view routine data collection through the HMIS as the sole means to satisfy information needs should be abandoned, and the use of sentinel sites and surveys should be encouraged.

3.3. Reporting Frequency Tuned to Decision Making

In the Zambia MOH reports have traditionally been submitted monthly. Most of the MOH's current information systems require monthly reporting from health institutions to the districts, and sometimes even monthly reporting from districts to provinces and headquarters. During the information assessment it became clear that districts, provinces, and the central level very rarely analyze the data on a monthly basis; usually the analysis is done quarterly, or sometimes even annually.

In most DHMT's the aggregated reports from health institutions are discussed quarterly, and activity plans are adjusted quarterly. Even most distribution of drugs and supplies occurs quarterly. At the central level most

incoming district reports are merely scanned. Virtually no quarterly reports are produced at the center. And annual reports of national programmes are almost invariably late.

Most of the reporting from health institutions to districts can be done quarterly. The only situation identified during this assessment that requires immediate and frequent reporting is an epidemic outbreak.

In addition to the quarterly reporting format, an annual reporting format for districts, health centres, and hospitals has been proposed in Chapter 4. Some of the data now collected on a monthly or quarterly basis can be shifted to an annual reporting frequency.

3.4. Criteria for Including Data Elements in HMIS

Three essential elements in the new HMIS are:

- self-assessment (decentralisation of analysis)
- collection of data for decision making (action-oriented)
- appropriate timing of reporting (responsive)

leading to

- transparency (ease of obtaining information).

Before the comprehensive MES is in place, the need may arise to collect and analyze data outside the routine system at peripheral levels. The following decision diagram can assist in determining when the required information must be collected through a mechanism other than the HMIS.

<i>Question</i>		<i>Frequency</i>	<i>Output</i>
Which information is required for district management?		Is this information needed quarterly?	Quarterly self-assessment form
		Is this information needed annually?	Annual self-assessment form
Out of the information required for district management, what should be reported to the CBoH?		Is this information needed quarterly?	Quarterly report form
		Is this information needed annually?	Annual report format
Are there information needs that are not covered by routine reports?	Can these information needs be covered by sentinel or survey?		Sentinel surveillance Surveys (interval, type)
	Should this information be collected routinely?	Is the information required quarterly?	Add to quarterly report form
		Is this information needed annually?	Add to annual report format

NB:

The same questions can be asked for information required by hospital management boards.

The main characteristics of the HMIS provide its name.

31

-
- Decentralised
 - Action oriented
 - Responsive
 - Transparent
-

4

Health Management Information System Characteristics

4.1. Subsystems within the HMIS

In the health management information system the following subsystems can be distinguished:

1. Health Status
2. Finances
3. Human Resources
4. Drugs and Supplies
5. Assets
6. Health Systems Performance

Health Systems Performance is not a traditional subsystem that collects its own data and produces reports from it. Health Systems Performance provides the essential link between the more traditional subsystems. With its facility to correlate data, it creates the added value inherent in an integrated health management information system in comparison to a fragmented system. For example, the Health Systems Performance subsystem permits comparison of an output, like immunisation coverage, with an input, like cost, over all of the health centres within a district. This subsystem also supports correlation of activities in different types of health institutions. For example, one could compare the number of at-risk pregnancies referred with the number seen at the referring institution.

The Health Systems Performance subsystem is also crucial in eliminating the duplicate reporting, and sometimes inconsistent values, that have been identified as problems in the current reporting system. For example, disease cases will be reported on only one form, and a consistent value for cases detected will be used to generate the information for reports to all departments and programmes.

The subsystems can be related to the Health Inputs, Processes, Outputs, and Outcomes (HIPPOPOC) model, which is the basis for planning, monitoring and evaluation in the Ministry of Health. (See also Chapter 1: Background and History.) The table on the next page shows the relationships. (In the HIPPOPOC terminology "outcome" includes the "impact" category of indicators that may be familiar to some readers.)

HIPPOPOC and Subsystems in HMIS

HIPPOPOC	Subsystem	Focus	Justification
----------	-----------	-------	---------------

Inputs	Finance	Income accounts Expense accounts	Accountability Accountability
	Human Resources	Individual records Aggregated data	Career development Staff distribution Planning/training
	Drugs and supplies	Medical supplies Non-medical supplies	Accountability /Procurement Accountability /Procurement
	Assets	Buildings Equipment Transport	Maintenance Maintenance/Replacement Maintenance/Replacement
Processes	Performance Health Services	Quality Standards Utilisation Cost-effectiveness	Medical/Technical Standards Equity Essential Health packages
Outputs	Health Status	<i>Curative Care:</i> - Outpatients - Inpatients	Service delivery figures/rates Morbidity Service delivery figures/rates Morbidity/Mortality
		<i>Preventive Activities</i> - Reproductive health - Child Health	Service delivery figures/rates Service delivery figures/rates
		<i>Health Promotion</i> - Environmental health - Healthy lifestyles	Service delivery figures/rates Service delivery figures/rates
Outcome	Health Status	<i>Vital statistics</i> - Population, Births - Deaths	Trends over time
		<i>Community Health Status</i> - Child Health - Reproductive Health - Environmental Health - Healthy lifestyles	Impact of services delivered Impact of services delivered Impact of services delivered Impact of services delivered

In the first working document of the HRIT working group on financial management (May 1994) the term Unified Management System was used, because the essential relation between financial control and monitoring and evaluation of performance was recognized. The budget spreadsheet and financial reporting format were designed so that they could serve the needs of both the financial controllers (attributing costs to the category of item, or item cost accounting) and the medical managers (associating costs with the service delivered, or cost centre accounting). A progress reporting format, which includes information on health status outcomes, was designed to be linked to the financial reporting by District Health Management Boards. So far this system has been introduced only in the Western and Northern Provinces. In January 1995 the term Financial and Administrative Management System (FAMS) replaced the term Unified Management System. This has created the impression that only input monitoring was to be done under FAMS. However, it has always been the

intention to maintain the linkage between financial reporting and progress reporting. In the design of HMIS reporting formats, the close link among all subsystems should be sustained.

4.2. Criteria for Data Sets and Indicators

Each indicator included in the HMIS is directly related to action. If the indicator lies outside the range of expected values, it alerts the manager that this aspect of service needs attention. It is not the role of the HMIS to analyze the problem and tell the manager how to rectify the problem; instead the HMIS serves as a signal that attention is required. Monitoring disease patterns may be used as an example. The information system provides the information that an outbreak may have begun, and the health care system responds by conducting an outbreak investigation. Program targets provide another example. If immunisation coverage falls below targeted levels, the programme manager must investigate the cause, which could be vaccine shortage, transport problems, faulty communication with mothers, or a host of other reasons. After determining the source of the problem, and taking appropriate action, the manager uses the indicators in the HMIS to monitor improvements in the situation.

To determine the indicators to be included in the HMIS, the information requirements for each subsystem and each level of management have been analyzed.

4.2.1. Information Requirements for each Subsystem

The criteria used for selecting the indicators for each of the six subsystems within the HMIS are listed below. Part II includes the indicators selected, the data required to calculate the indicator, the cut-off points that should alert management to problems, and the actions that might be taken in response to an abnormal or unexpected value.

Health Status

The essential health packages have guided the formulation of minimum requirements for indicators of health status. Services to be included in the essential package have been determined by an analysis of the disease burden in Zambia using the Disability Adjusted Life Years (DALY) methodology. (See *National Strategic Health Plan 1996*) The results of this analysis led to the delineation of six priority thrusts for health service: Safe Motherhood (including antenatal and postnatal care and family planning); Child Health (including immunisation and nutrition); AIDS and Sexually Transmitted Disease (STD); Malaria; Tuberculosis (TB); and Environmental Sanitation (including safe water and latrines).

The situation analysis that preceded this HMIS design found that a large amount of data that is collected by the system is not analyzed. While additional indicators of health status, particularly morbidity, have been selected from the current reporting system, the goal has been to eliminate all information that is not action-oriented. The HMIS development team has had lengthy discussions with programme officers, officials, and health boards at all levels, in order to reduce the amount of data collected.

Finances

The information requirements and reporting requirements have been adapted from the FAMS documentation. The primary information requirements have been to satisfy the regulations that govern accounting practices for public monies, and to provide managers with financial information in a form that is conducive to understanding the costs involved in delivering the six priority thrusts for health service.

Human Resources Management

35

Information requirements have been derived from the document *Staffing Situation Survey for Ministry of Health 1995*, final report August, 1996, and from consultation with Human Resource specialists within the Ministry. The information included in the HMIS indicates compliance with standards for staffing patterns and training. Data on the qualifications, training, and performance of each individual staff member is not included in the HMIS. In the decentralised health system, where districts have the authority to hire and fire, as well as the responsibility to budget and plan training, the centre has no need to know the details of each individual's dossier. A District-based Human Resources Information System for maintaining personnel records does need to be established.

Drugs and Supplies

The drugs and supplies system within the MOH is a current focus of reform. A system of essential drugs has been introduced, and the ordering and budgeting procedures are being changed from a centrally controlled push system, into a pull system controlled at the district. The indicators in the HMIS show utilisation of basic drugs and supplies and whether stocks have been controlled to avoid outages and overstocking. The HMIS also includes information on consumption to support the rational use of pharmaceuticals. At the District level a more detailed inventory management system will likely be required, and the Ministry has already begun investigating an automated drug inventory system that might be used at the District level.

Assets

The major physical infrastructure assets in the MOH are buildings, vehicles, and medical equipment. The Ministry has initiated a programme of upgrading Health Centres' physical structures and equipment to meet minimum basic standards as specified in the *District Planning Guide for 1997*. At the central level information systems have been established in order to identify Health Centres that require upgrading and to schedule the improvements. These information systems do not form a part of the HMIS because the data is not required at the central level routinely, but only until the rehabilitation has been completed.

In principle, central levels of management monitor more peripheral levels to insure that the assets specified in the standards for service delivery are in place and in proper working order, and the HMIS includes indicators for this management function. These indicators include the proportion of Health Centres and functioning transport that meet the standards, as well as an indicator of whether basic inventory and pilferage control measures are in place.

While peripheral levels are responsible for the maintenance of their assets, the details of central and peripheral responsibility for capital investment to replace these assets is less clear. Indicators of the Districts' management of funds to support its assets in accord with national policy appear in the Financial subsystem. Districts will likely need more detail to plan and budget for maintenance and replacement of the assets for which it is responsible. Specification of more detailed information requirements regarding asset management at the district level can be developed as more detailed policy regarding the Districts' responsibility in this area is developed.

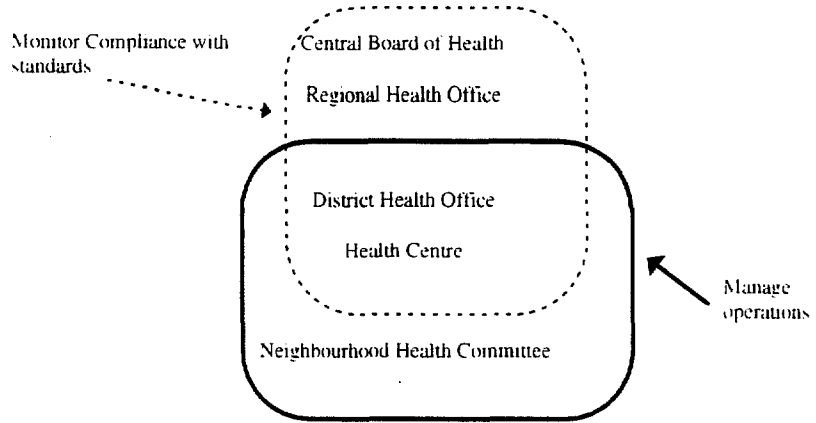
Health Systems Performance

Information requirements have been defined in the document *Monitoring and Evaluation*, May 1995, in the *Handbook for District Health Board Members*, June 1996, and in *The District Health Plan, Guidelines for 1997*. The progress report format developed under FAMS (Livingstone, 1994) also has a number of performance indicators. The list of indicators developed by the Essential Health Packages working group also provides guidance for indicators for these initiatives.

4.2.2. Information Requirements for each management level

In general, each level of management has the following responsibilities:

1. to ensure that managers and practitioners at its periphery are observing the standards set for their institutions and services, and
2. to plan and deploy its own resources in the most cost effective manner possible to accomplish its objectives.



The HMIS provides information to assist in fulfilling both of these responsibilities. While monitoring peripheral levels usually requires less detail than managing one's own resources, in both cases the HMIS signals when processes have gone awry and are not producing the expected products. The HMIS does not determine the remedial action to be taken; this is the manager's responsibility.

In the analytic model of the role of health management information in planning for action, four key categories of indicators may be distinguished. (These categories are used in Chapter 8 which describes tools for making decisions.)

- health needs
- service delivery
- coverage,
- planning for the unmet needs, to fill the gaps between needs and coverage

Ideally the coverage category not only provides information on services per target group, but also information on services delivered in comparison to services required, for example, the number of malaria cases treated compared to malaria incidence in the community. The unmet needs identified, which are the health needs minus coverage, lead to proper planning for improvement of services.

1. Community level

<i>Information on Health Needs</i>	<i>Service Delivery</i>	<i>Coverage</i>
- vital statistics, including births, deaths, migration, age and sex specific information	- activities by neighbourhood health committees	- access to safe water

57

- environment, especially sanitation and food security	- activities by CHWs and TBAs including use of drug kits	- access to services, e.g. TBA, CHW, contraceptives
- incidence of major health problems (concentrating on the major thrusts)	- main diseases treated by CHWs	

2. Health Post (all relevant subsystems)

<i>Information on Health Needs</i>	<i>Service Delivery</i>	<i>Coverage</i>
- consolidation of data from community in catchment area	- preventive and promotive activities	- community perceptions of performance of health institutions
	- curative activities	- coverage of preventive and curative services

3. Health Centre (all relevant subsystems)

<i>Information on Health Needs</i>	<i>Service Delivery</i>	<i>Coverage</i>
- community data aggregation	- health post data aggregation	- community perceptions of performance of health institutions
	- preventive and promotive activities	- coverage of preventive and curative services
	- curative activities OPD including referrals	
	- curative activities IP including referrals	
	- maternity - laboratory	
	- general management issues	

4. First level hospital (all relevant subsystems)

<i>Information on Health Needs</i>	<i>Service Delivery</i>	<i>Coverage</i>
- actual referrals	- curative activities OPD including referrals	- coverage of patients actually referred
- expected serious cases (e.g. at risk pregnancies)	- curative activities IP	- coverage of expected serious cases needing hospital attention
- training needs of health workers	- laboratory, X-ray and other paramedical services	- covered training needs
	- theatre	
	- training	
	- general management issues	

NB If part of the hospital OPD functions as an urban health centre the information requirements mentioned under 3. Health Centre apply.

5. District level (all subsystems)

<i>Information on Health Needs</i>	<i>Service Delivery</i>	<i>Coverage</i>
Consolidation of Health Centre and Hospital figures	- Consolidation of Health Centre and Hospital figures	- Consolidation of Health Centre and Hospital figures
	- consolidation of data from NGOs and private practitioners.	
	- activities implemented by DHO. e.g., training	
	- research activities	

6. Second and third level hospital (all relevant subsystems)

<i>Information on Health Needs</i>	<i>Service Delivery</i>	<i>Coverage</i>
	- curative activities OPD including referrals per specialty	- coverage of patients actually referred
- actual referrals from level 1 hospitals	- curative activities IP per specialty	- coverage of expected serious cases needing hospital attention
	- laboratory, X-ray and other paramedical services	- covered training needs
	- theatre	
	- training	
	- general management issues	

NB If part of the hospital OPD functions as an urban health centre the information requirements mentioned under 3. Health Centre apply.

39

BEST AVAILABLE COPY

7. Central Board of Health (all subsystems)

a. Regional Health Office

<i>Information on Health Needs</i>	<i>Service Delivery</i>	<i>Coverage</i>
	- consolidation of relevant district and hospital figures	- assessment of performances of districts compared with contract obligations
	- performance audit for districts and second level hospitals	

b. Head Quarters

<i>Information on Health Needs</i>	<i>Service Delivery</i>	<i>Coverage</i>
- needs assessment using research and surveys, and sentinel surveillance	- consolidation of regional figures and third level hospitals	
	- performance audit of regional offices and third level hospitals	

8. Ministry of Health

<i>Information on Health Needs</i>	<i>Service Delivery</i>	<i>Coverage</i>
	- performance audit of Central Board of Health	- analysis of policy development compared to targets formulated in Health Policy document

4.3. Notifiable Diseases

The report of April 1996 on *Strengthening Disease Surveillance*, describes the current problems with regard to the surveillance of notifiable diseases. The problems are: no timely reporting, incomplete reporting, and absence of follow-up or feedback by the central level. The underlying causes are: insufficient knowledge of procedures, insufficient stationery, lack of confidence and communication between different levels, and the absence of a focal point in the Ministry to receive reports, process information or take action.

The revision of the HMIS provides an opportunity to revise the surveillance of notifiable diseases. The HMIS aims at providing timely, reliable and adequate information for decision making in the health services. Therefore, data are collected on many diseases and conditions of ill health. Quarterly reports provide information on the diagnosed diseases in health institutions. The quarterly reports are aggregated in the district health offices and sent to the Central Board of Health.

The basic question with regard to a National Surveillance of Notifiable Diseases is: why should diseases be reported outside the system of regular reporting? In the context of the revised HMIS notifiable diseases are those diseases which should be reported immediately to the Central Board of Health, so that swift action can be

taken. The key issue is immediate action: if the information does not require immediate action by the CBoH, reporting can follow the regular flow of information.

Action by the centre

In the decentralised mode of operation, where the District Boards of Health have the responsibility for managing most operations, the following actions can be expected from the Central Board of Health and the Regional Health Offices:

- informing health authorities in neighbouring districts, regions, or even countries on the outbreak of highly contagious diseases;
- supporting the district health services with drugs, supplies, and technical assistance.

There may also be a number of diseases, which the District Health Office would need to know for immediate action, but which do not constitute a national urgency. The District Health Office should list such diseases, and agree with health institutions on conditions and procedures for urgent reporting.

Diseases to be reported immediately to the CBoH

The current list of notifiable diseases in Zambia includes 25 diseases. Most of them do not require immediate action by the CBoH, since they do not present the risk of an epidemic. The report cited at the beginning of this section includes a revised list of notifiable diseases.

AIDS	Malaria	Rabies
Anthrax	Maternal Deaths	Relapsing Fever
Cholera	Measles	Sleeping Sickness
Dysentery	Leprosy	Typhoid Fever
Encephalitis	Paratyphoid Fever	Tuberculosis
Epidemic Cerebro Spinal Meningitis or CSF	Plague	Cancer
Food Poisoning	Poliomyelitis	

Diseases in the international surveillance list are:

AIDS	Plague	Yellow Fever
Cholera	Relapsing Fever (Louse Borne)	

For comparison here is the list of notifiable diseases in Uganda:

Acute Flaccid Paralysis	Guinea Worm	Rabies
Cholera	Meningitis	Neonatal Tetanus
Dysentery	Plague	Typhoid Fever
Yellow Fever		

In accordance with the criterion of action-oriented indicators the following list of diseases is proposed to be included in the list of notifiable diseases:

Acute Flaccid Paralysis	Measles	Typhoid Fever
Cholera	Plague	Yellow Fever
Dysentery	Rabies	
Meningitis	Neonatal Tetanus	

NB. Acute Flaccid Paralysis (AFP) is included in lieu of Poliomyelitis, in order to conform to WHO recommended protocols for detecting and investigating potential cases of Poliomyelitis. Investigation of AFP should proceed according to the WHO protocols.

This list concentrates on serious infectious diseases, which could spread quickly or constitute a serious public health hazard. Also diseases preventable by immunisation are included for close monitoring of the national efforts to reduce or if possible eradicate these diseases.

Forms to be used

Information requirements are different for the District Health Office and for the Central Board of Health. The health institutions will inform the District Health Office using the form as in Annex 1, while the DHO will inform both the Regional Health Office and the Monitoring and Evaluation Department in the CBoH through fax or e-mail. (The Level II and Level III hospitals should also report through the DHO, because of the public health implications of the disease.) The DHO will use a summarizing form which includes information on actions already taken and on support requested. See Annex 2 for the proposed form.

4.4. Information Flow and Reporting Frequency

The situation analysis that preceded this HMIS design identified major constraints related to information flow and reporting frequency. The unresponsiveness of the current information system has led to repetitive and overlapping flows of information. The absence of a clear and consistent relationship between data and action has led to unnecessarily frequent collection and has exacerbated the problem of overcollection.

4.4.1. Flow of information

Health managers at all levels need timely and reliable information in order to make appropriate decisions. The failure of the existing health information system (through the Ministry's centralized Health Information Unit) to provide such appropriate information forced the national vertical programmes to introduce their own independent information systems. The assessment in August, 1996, revealed that most national programme officers are willing to give up their own information systems as long as they have access to timely and reliable information. While national programme officers do not appear to be opposed to relying on a single HMIS to receive information, some national officers appear unwilling to eliminate operational and research data that are unnecessarily detailed and often unused. This reluctance has been described in Section 3.2.

In the integrated HMIS proposed in this document, the essential principle of one single flow of information from one level to another has been observed. The reports passed from one level to the next includes a narrative describing the reporting institutions self-assessment and response to the information as well as the raw data.

The HMIS starts at the community level, where in partnership with Neighbourhood Health Committees, data will be collected by Community Health Workers (CHWs) and trained Traditional Birth Attendants (TBAs). The health posts, staffed by one public health officer, will collect data on their activities. Communities and health post staff will communicate relevant data to the health centres, where data are aggregated. The health centre staff together with communities and health post staff will analyze the information for the catchment area

of the health centre. Formation of the Neighbourhood Health Committees and selection of CHWs and trained TBAs is still in the beginning stages in most areas. The HMIS development team has participated in workshops with community groups and begun to incorporate their requirements into the design of the system; specification of community level data collection and reporting protocols and training in their use will be implemented in accord with capacities of districts and communities. Chapter 9 outlines recent progress made in the development of a Community Based Health Management Information System.

Reports will be sent to the District Health Office (DHO) from all health institutions (both health centres and level I hospitals managed by government and by NGO and private organisations). The health management information desk in the DHO receives and processes the information and reports to the district's Deputy Director for Programming. At the same time the HMIS desk makes the information available to programme officers. The District Health Management Team (DHMT) discusses the reports and takes appropriate action. At least twice per year, feedback should be given to health institutions, for example through a district meeting for all health institutions.

An agreed upon set of information (aggregated report) is sent from the DHO to the Regional Health Office (RHO). The HMIS desk in the RHO receives reports from the districts and from the level II hospitals, aggregates the reports and analyzes them. As at the district level, all information is immediately made available to RHO programme officers. The resource centre in the RHO will guarantee proper availability of information. Inter-district meetings, organised by the Regions, will create a forum for feedback and comparison of information from different districts.

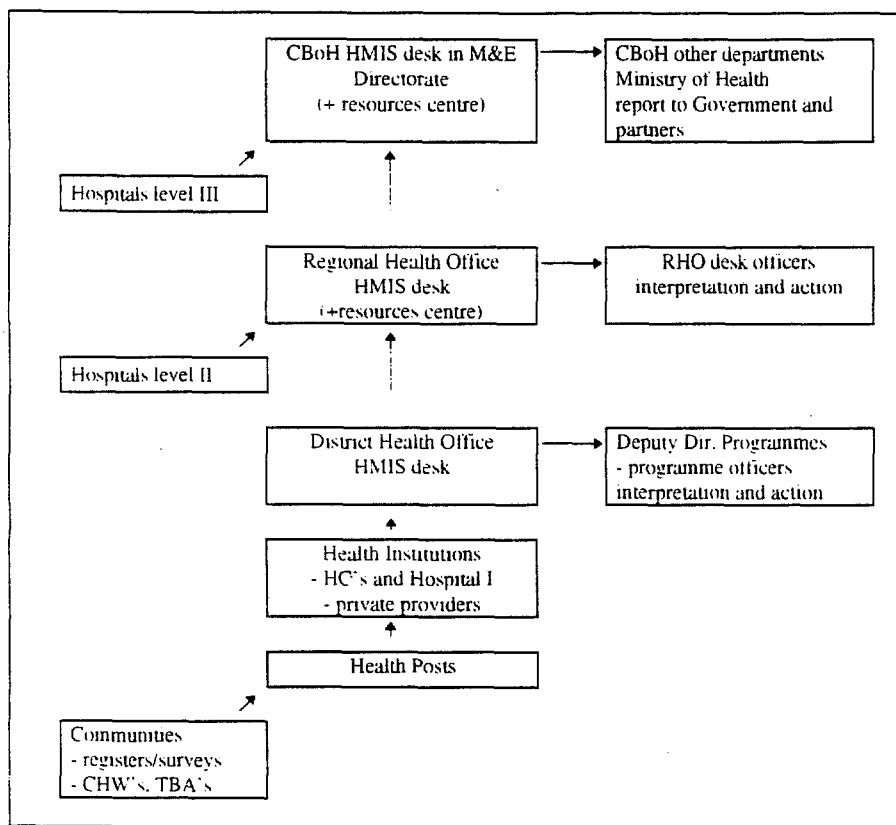
From the RHO the agreed upon information is forwarded to the HMIS desk in the Monitoring and Evaluation Directorate of the Central Board of Health (CBoH). Information from level III hospitals is also received by the CBoH. Information is processed there and made available to all other Directorates in the CBoH and to the Ministry of Health, as well as to peripheral levels. The resources centre in the Monitoring and Evaluation Directorate will have as a specific task to make information accessible to all interested parties, including donors and research institutions.

The following diagram illustrates the information flow described in the preceding narrative.

43

BEST AVAILABLE COPY

Information flow in the Health Management Information System



NB: Feedback reports must be returned to the institutions and health offices providing information. Schedules for providing feedback are proposed in this chapter.

CH

4.4.2. Timeliness

The issue of timeliness is of utmost importance in the system. Two potential bottlenecks threaten timely receipt of information: the speed with which the data can be aggregated and reports prepared at the reporting nodes; and the speed with which reports can be transmitted from one level to the next. Automation, including telecommunications, from the district to the region and from the regions to the centre will increase the responsiveness of the HMIS, but timeliness remains a significant issue at health centre, health post, and community levels. While reduction of reporting frequency reduces the health institutions' data burden, discipline is nonetheless required to produce reports immediately at the end of the quarterly reporting cycle. In the reporting institutions' action plans and Gantt charts, time and resources must be budgeted for the reporting activity. The weakest links in the communication system are between health posts / communities and health centres and between health centres and the district health office. Communication problems in the rural areas often cause delay of submission of reports. By reducing the reporting frequency to once per quarter, quick communication between health institutions and the district health office is required only four times per year instead of twelve. Districts could consider a "report run" to all health institutions four times each year, perhaps combined with the distribution of drugs and supplies.

Communication between district and regional health offices will remain a bit cumbersome during the initial stages of HMIS implementation, especially while regional health offices continue to supervise several provinces. However, the communication will be improved once computers are installed in the districts and electronic data transmission is established. Completion of the automated support is anticipated in mid 1998.

UK

The following tables summarize the time frames for quarterly and annual reporting cycles.

Time Frame for Submission of Quarterly Reports and Action

<i>Level</i>	<i>time required from the end of quarter to report</i>	<i>Action</i>
Health Posts and Communities	two weeks after the end of the quarter	Discuss analysis with Neighbourhood Health Committees and plan action.
Health Centres and Hospitals	four weeks after the end of the quarter	Discuss analysis with Area Health Boards and adjust quarter's plan.
District Health Office	six weeks after the end of the quarter	Discuss analysis with DHMT and DHB, adjust quarter's plan. Use information for performance audit of HCs.
Regional Health Office	seven weeks after the end of the quarter	District performance audits. Advise on funding districts.
HMIS unit CBoH	eight weeks after the end of the quarter	Decide on district funding. Assist monitoring of policy implementation and standards compliance. National report to CBoH and partners.

Time Frame for Submission of Annual Reports and Action

<i>Level</i>	<i>time required from the end of year to report</i>	<i>Action</i>
District Health Office	eight weeks after the end of the year	Discuss with DHMT and DHB. Adjust current year's plan
Regional Health Office	ten weeks after the end of the year	District performance audits. Adjust support for programmes for current year
HMIS unit CBoH	twelve weeks after the end of the year	Annual report to CBoH and partners. Trends detection to assist monitoring of policy implementation and standards compliance.

4.5. Characteristics of Data Interpretation and Decision Making Tools

The HMIS is a routine reporting system with the objective of providing managers with the information they require to make decisions and take action. It is not a tool for policy development or for research. Furthermore, the HMIS does not tell managers which decision or action to take. Its function is to alert managers that something unexpected is happening in one of three spheres.

- The health status or disease patterns of the population are changing. For example, a measles outbreak has begun. The manager responds by redirecting resources to respond to the emerging situation; in this example, by initiating outbreak investigation and containment procedures. The specific remedial actions are not determined by the HMIS. The manager's own skills, coupled with established protocols for dealing with the problem, determine the response to the information presented by the HMIS.

- Service delivery is not proceeding according to plan. For example, immunisation coverage targets are not being met. The manager may respond by reviewing potential constraints faced by the immunisation teams and devising a strategy to relieve the problem. Is the issue communication with communities? Have children been brought to immunisation sessions? Or is there a problem with resources? Have vaccines, cold chain equipment, and transport been available? Problems detected in service delivery may emanate from the third sphere of information provided by the HMIS, resources and infrastructure.

- Resources to support service delivery are unavailable or in short supply. The HMIS includes indicators to alert managers to potential resource problems before they have a negative impact on the delivery of care. For example, the HMIS reports outages of basic drugs. Repeated outages may indicate that supplies are received more slowly than expected, and stock reorder procedures should be revised.

The indicators included in the HMIS are listed in Annex 6 of this report, along with expected and cut-off values and general suggestions of responses when the indicator falls outside the expected range of values. Interpretation of the indicators often requires observation of trends over time or comparison between different areas to determine what an expected value is. Calibration of the HMIS requires observation to establish baseline, or expected, values of the indicators. Some of these values may also vary from area to area. It is to be expected that managers' skill in using the information generated by the HMIS will improve over time. These skills will develop much more rapidly if the indicators are reviewed, and interpretive techniques shared, at regular meetings of management teams.

4.6. Enabling Factors

Several factors must be in place to enable the institutionalization and sustainability of the HMIS: trained personnel with well-defined spheres of responsibility and authority; appropriate equipment and supporting infrastructure; and a commitment of financial and other resources.

4.6.1. Organisation and human resources

An organisational structure that is built upon clear definitions of responsibilities and staffed by persons well trained and motivated creates the foundation upon which an action-oriented HMIS should be based.

4.6.1.1. Organisational Structure and Inter-communication

Within the District Health Office, the Regional Health Office and the Central Board of Health the HMIS unit is the focal point for receiving and transmitting information. Close coordination with other units in the health office is required, because supporting information from these units may be required to interpret the information. In addition, data analysis and interpretation often need to be done by specialists. For example, the relation between FAMS and HMIS is especially close. Financial data processing and reporting has to be done by accountants specialised in this field. The HMIS unit then combines the accounting data with the data from other HMIS subsystems. Correlating the information from the various HMIS subsystems is the function of the Health Systems Performance subsystem.

With regard to the subsystems for drugs and supplies, for human resources and for assets, the HMIS unit can serve as a support unit for automated data processing if these subsystems are too small to have separate computer systems. If the subsystems have their own computer systems, harmonization of the software is required in order to get the necessary information for the Health Systems Performance subsystem.

The staffing in the HMIS units at all levels is of utmost importance, as stated earlier in this report. In a number of provinces an inventory of available staff at the different levels has been made, including their current capacities and training needs. It is recommended that the same exercise be undertaken in other provinces.

The HMIS unit within the Central Board of Health has begun to define the tasks for the HMIS units at each level and has also begun to prepare specific job descriptions. Hopefully the process of getting the right people at the right place can commence by the end of 1996.

4.6.1.2. Capacity and Human Resources

The current Health Information Unit within the MOH has 42 staff members, of whom 27 are stationed in the Ministry of Health Headquarters. The others are stationed in Provincial Medical Offices and in level II and level III hospitals. Many of these officers have no training at all or very basic training, sometimes not even in medical statistics. These officers are on secondment, under contract to the Central Statistics Office. In general the capacity of such officers to perform a critical analysis of the data they aggregate is very limited. In many districts and district hospitals data aggregation officers are more active and have some medical qualifications than at the more central levels. District health information officers, who are in charge of reporting, often have a paramedical background. However, they often have other responsibilities, and this limits the time they can spend on HMIS tasks. These officers have received no training in data analysis, or very limited training. Very few are computer literate.

Staffing and capacity building of HMIS units in the health institutions and health management boards are critical conditions for establishing a viable HMIS. The job descriptions prepared by the HMIS unit should help in selecting personnel as information officers. Training in the preparation and interpretation of HMIS information has been proposed, as well as basic computer literacy training for district and regional officers. The training schedule is described in Section 5.2 of this report.

Institutional support from the Ministry and the Central Board of Health is also essential to keep these officers in their posts and allot the time necessary for conducting HMIS activities. There is no clear career path for the advancement of health information officers, particularly at the district level. Some of these officers are qualified clinical officers, who watch their clinical colleagues advance along a path to more responsible positions with higher pay. It is recommended that the CBoH establish a career path for information officers as it revises the staffing patterns for health professionals and defines qualifications and experience in job descriptions. Attendance at workshops, and successful completion of training, should be accompanied by a certificate so that information officers have evidence of their qualifications in their dossiers.

In addition to training, a very clear manual is required to guide the health workers in how to use the HMIS forms. During the development phase of the HMIS, consultations with users will reveal weaknesses in forms and procedures, and will guide preparation of the manual.

4.6.2. Automation and supporting infrastructure

The situation analysis that preceded the HMIS design proposed in this document revealed a number of potential constraints in automating the system. The design and implementation strategy proposed have addressed these issues.

4.6.2.1. Where to introduce computers?

The HRIT Monitoring and Evaluation Directorate has determined that introduction of computers will be cost-effective at district, region, and headquarters levels, as well as at hospitals, particularly the Level II and III hospitals.

Community and Health Post

In the HMIS proposed in this design, data are processed and analyzed manually at community and health post level. The aggregated information is sent to the HMIS desk in the health centre.

Health Centre

Similarly data are processed and analyzed manually at health centre level and the aggregated information forwarded to the HMIS desk in the district health office.

District Health Office

At the district level it becomes feasible to introduce computers. The costs of providing equipment at each of the 62 (and perhaps 70 in the future) district offices is not outside the realm of possibility, and most district offices have the basic physical infrastructure computers require. Moreover, automating the data processing at the district level would likely reduce the time required for data aggregation, and would certainly provide greater flexibility and in-depth analysis. The health status subsystem alone requires substantial data aggregation for the data arriving from some 12 to 40 health centres. Automation would reduce the work of manual transcription and addition. With a fairly simple software system, the computer could generate certain indicators automatically and graphs could easily be produced.

Computer assisted accounting would also assist in improving financial reporting. For example, at present it is impossible to keep a manual ledger card to track each datum used in FAMS. Reconciliation of accounts would become much easier with automation. In addition, databases for personnel and for the management of drug stores could be created and updated easily.

It goes without saying that first the training and infrastructure conditions for computer management need to be put in place. (These preconditions are described in more detail in Sections 4.6.2.2 and 4.6.2.3 which follow.) Appropriate software programmes must be selected and HMIS and FAMS staff have to be trained in their use. It is advisable to have software which can be used in a modular way for different subsystems, e.g., accounting, human resources management and drugs management. The computer programmes must function independently, but linkage should be possible. It is better to choose simple independent software programmes for each subsystem and then link the subsystems with a separate programme. This allows independent development and evolution of the subsystems and reduces dependence on a complex software programme that must be retooled each time a minor adjustment is required.

District Hospital

Introduction of computers in district hospitals where patient movements, staff activities, etc. are much greater than in health centres is also likely to be cost-effective. However, this is not an immediate priority. This year the mine hospitals are introducing a computer-based hospital management system called Medline. Experience gained by the mine hospitals can be used to guide the introduction of computers in district hospitals.

Level II and Level III Hospitals

There is a definite need for the introduction of computers in level II and level III hospitals where patient movements, staff activities, pharmacy, stores and financial transactions are much more complex than in level I hospitals. In the view of the HMIS development team, this is an immediate priority, and the introduction of computers could be coordinated with activities at the mine hospitals. Further contacts with the mine hospital service and with the ODA project for hospital support in the Copperbelt is recommended.

Regions

Regional Health Offices are already computerized, although the utilisation is still very minimal in most regions. Training and systems development are required.

Central Board of Health

In most departments computers can be found, but the utilisation varies widely. Training and systems development are required and should begin with the new Directorate of Monitoring and Evaluation.

Electronic data transmission

In the HMIS, timely reporting is crucial. Much time can be gained and much work of transcribing data can be eliminated if electronic data transmission can be established between districts, regions and headquarters. If appropriate software is used, aggregation and analysis of data at regional level and in headquarters become very easy. Zamnet provides telecommunications support throughout the country, and virtually all district centers have telephones. Hence, electronic data transmission is a feasible, and is recommended as an option.

It is clearly inappropriate to simply supply information technology to locations where personnel do not know how to use it. Introduction of computer equipment will require training in its use. Section 5.3, below, proposes training requirements and a training schedule.

4.6.2.2. Experiences in automation

In the Provincial Medical Office at the Copperbelt Province the following slogan is tacked to the bulletin board "Computers do not work on their own; they need skilled people to operate them". Given the experiences with computers in the Ministry of Health, this caution should be heeded.

The MOH's experience with computers to date gives reason for some reservations with regard to including computer support for the HMIS:

- There are very few people in the MOH who are able to operate computers skillfully. Most of the computers in the MOH, both at headquarters and districts, are used only for word processing. Few staff members know how to use spreadsheet programmes or how to produce graphics with these programmes. The number of people in the MOH who know how to operate a database programme is probably less than ten. Nonetheless, a database programme is the most appropriate technical platform for implementation of the HMIS. Lack of more advanced skills, coupled with

a desire to use computers, drives the use of spreadsheet programmes for huge databases, or word processing programmes for statistics. The output of such efforts usually produces less quality, with more effort, than manual processing.

- Breakdowns of computers are a real problem. During the preliminary assessment many computers were reported to be (or had recently been) out of order. In part this is caused by lack of protection for the equipment. Computers may be housed in inappropriate locations, where there is too much dust. There may be insufficient protection against fluctuations in electric current, and modem connections may not be protected against lightning.

Breakdowns are not necessarily caused by hardware problems. Even minor problems in the software configuration or basic misunderstanding of software functions can effectively paralyze the use of computers. The level of computer knowledge is generally very low, just enough to operate them, but not sufficient for installation of software or use of simple utility programmes, let alone for discovery of the problem and troubleshooting.

In the HRIT one system operator started work some months ago, and he has been able to get computers working in headquarters. But one person alone cannot tackle computer problems in the regions or districts. In several provinces computers donated by the Netherlands more than one year ago are not yet installed.

- There is no standard software in use. Back up procedures are not maintained, even if computers are equipped with tape-streamers. Much of the software is installed illegally. Viruses appear frequently and destroy software and data. Despite bad experiences with viruses, there is no discipline with regard to their detection or to the use of potentially infected programmes and diskettes. Virus scanning software is not used systematically and not updated regularly to provide protection against new strains. Continuation of such practices will result in further losses of data or and has the potential to damage hardware.
- There is no standardization with regard to computers or printers procurement, and often the technical requirements of the application are not analyzed. This may result in the purchase of outdated equipment or computers that are not powerful enough for the tasks.

Most of these problems have been identified by the HMIS unit in the CBoH. Remedial actions have been proposed, but adoption of these recommendations has been delayed for a variety of reasons. The training given to officers from the Regional Health Office apparently was inappropriate, and has not resulted in better utilisation of computers.

4.6.2.3. Introduction of computers

In order to make computers useful tools in the health services, and to address the constraints identified in the preceding section the following recommendations have been included in the Implementation Strategy proposed in this document.

1. A computer literacy training programme for staff members at all levels who will be using computers, in use of word processing, spreadsheets, and communication software. Training in the use of HMIS software will also be provided as automation is introduced.
2. Preparation of a procedures manual for computer operation and maintenance. This should include
 - instructions for protection of computers: a burglar proof, dust-free air-conditioned room, UPS, and lighting protector, and
 - procedures for day-to-day computer management: back up procedures, virus scanning, software installation, etc.

51

In each department where computers are used, one person should be made responsible for computer supervision.

3. Standards for hardware requirements should be set and communicated to all institutions within the health sector (computer type, processor, memory etc., modem, backup device, uninterruptible power supply, lightning protector, etc.). Hardware maintenance contracts should be made with commercial vendors. Similarly standards for software programmes need to be set, and contracts with software suppliers should be made up, in order to legalize the use of software. Bulk contracts negotiated centrally will make software and hardware procurement and maintenance much cheaper. Annex 3 recommends specific hardware and software for use within the MOH.
4. Establishment of a computer system support unit both in headquarters and in the Regional Offices, with system engineers who can solve problems, improve systems, provide technical support; and contribute to advanced training in automated health information applications.

Ideally, headquarters should have the following capacities: to maintain and upgrade all subsystems in the HMIS; to develop simple databases and analytic software programmes to support central M&E functions; to provide technical support in the use of spreadsheets and word processors to headquarters staff; to administer the Local Area Network (LAN) installed at headquarters; to troubleshoot hardware problems; and to provide technical backup to Regional computer support units. The minimum staff required for headquarters would be two software engineers and one hardware engineer.

Regional offices should have the following capacities: to develop simple databases and analytic software programmes to support District M&E functions, including special studies; to provide technical support in the use of spreadsheets and word processors to District staff; to troubleshoot hardware problems; and to provide general technical support in hardware and software to District offices. The minimum staff required at each Region would be two computer engineers with experience in software and hardware support.

Establishment of these computer support units presents special problems for the Ministry. The Ministry's ability to attract experienced computer engineers is severely limited by public sector pay scales, which are considerably lower than private sector wages, particularly for computer specialists. Ministry staff, particularly those with experience in using health information could be trained to assume the responsibilities of the computer support units. The risk is that these staff might be attracted to private sector opportunities after acquiring training and skill.

Given the investment in computer equipment and training, it is clearly essential to find a mechanism for the Ministry to establish in-house technical expertise and support for automation so that the computing equipment is used to its fullest capacity. Given the crucial importance of this issue, it is strongly recommended that the Ministry work closely with donor agencies to develop a funding strategy so that computer support units can be instituted and maintained.

4.6.3. Finances and sustainability

Introduction of the HMIS will require investment of several millions of dollars US, primarily in training and purchase of computer equipment. (Details of projected startup costs are included in Annex 4). While it is anticipated that the bulk of the initial investment will be supported through donor funding, recurrent costs will need budget allocations. In addition, investment will be required to develop the portions of the system whose design will receive more attention in 1998, viz. the comprehensive Monitoring and Evaluation System, more elaborate functions in the HMIS at headquarters and regional offices, and integration of the community-based aspects of the system. It is premature to estimate development costs for the complete system, and only recurrent costs are discussed in this section. However, it is important to anticipate that additional financial support for development will be necessary to realize the Ministry's vision of a comprehensive information system that extends from the community to the central level.

The recurrent costs for the HMIS proposed in this document fall into four categories: supervision and on-site training; forms and supplies for the manual system; maintenance, replacement parts, and supplies for the automated system; and systems operation. The details of who is responsible for paying for which items have not been completely worked out in the decentralised model, where districts assume responsibility for allocating their own operational budgets. In the context of a system that is standardized throughout the country, considerable savings can be achieved through centralized, bulk procurement. Centralized procurement is recommended for the HMIS, and particularly for expenses associated with automation, since equipment and support are not likely to be available at most district offices. If the centralized procurement is used, then presumably a mechanism must be devised to distribute these costs among the districts. Annex 5 includes estimates for recurrent HMIS costs.

Supervision and on-site training. Ongoing supervision is required for successful operation of any system, and more frequent and intensive supervision will be required during the first year after introducing the new HMIS. Budget allocations for staff time and for transport are necessary. In addition, on-site training, and sometimes off-site training in computer literacy, will be necessary as new staff assume positions of responsibility for the HMIS.

Manual system forms and supplies. Lack of forms is known to be a problem in routine operations, especially in rural settings. The proposed HMIS consolidates reporting in a single set of forms, and an absence of these forms has the potential to disrupt smooth operations in all programmes. The expenses involved in printing and distributing the forms, as well as guidelines for their use, need to be budgeted.

Automated system support. It is recommended that a service and maintenance contract be negotiated with a commercial vendor for all computer equipment in the Ministry, including that placed in regional and district offices. In addition, budget must be allocated for parts replacement, which is not included in the standard service contracts. Budget allocations will also be necessary for supplies like diskettes, backup storage media (tapes or cartridges), printer cartridges, ribbons, and paper.

Systems operation. Ongoing operation of the system will require investment of staff time for completing the reports and analyzing the results. Some transportation costs for delivering the data to health centres and districts and telecommunications costs for telephone charges and Zamnet services will also be incurred.

4.7. Data Quality Assurance

The assessment that preceded this design identified several problems with accuracy, completeness, and timeliness of information in the current information system. While the system proposed here addresses the causes of these problems, it is essential to have periodic independent verification of the data in order to assure the quality of the information generated by the system.

Accuracy

Surveys may be used to corroborate the information in the system. The Demographic and Health Survey (DHS) rounds, currently scheduled for every four years, provide one comparison for information at the regional and national levels. However, the DHS sampling frame is not usually designed for statistical confidence at the district level. While the sampling frame can be adjusted to give reliable information on subpopulations of interest, it would be prohibitively expensive to do this for each district.

It is to be expected that incidental surveys will be performed to investigate problems of particular concern to health care. Whenever possible, the survey designed should include information that can be used for comparison with results obtained through the routine system. WHO's global Expanded Programme on Immunisation (EPI) recommends regular annual spot check surveys using the WHO cluster survey methodology in order to ascertain immunisation coverage. When these surveys are performed the results should be compared with the information in the HMIS.

The Lot Quality Assurance Sampling (LQAS) methodology mentioned in Section 2.5 could be incorporated into performance audits and provide an independent check on the data reported through the HMIS.

Vital events

Accurate records of vital events is known to be a problem in Zambia. While there is a legal requirement for a birth and death certificates, this regulation is not enforced and there appears to be no public system of capturing these events. Most births and deaths occur outside medical facilities, at least in rural areas, so facility-based reporting of vital events results in substantial underreporting.

Moreover, a highly mobile population with substantial migration from rural to urban areas, causes census counts to become quickly outdated. The experience during the National Immunisation Days indicates that population estimates may be substantially lower than the actual population, particularly in urban areas. Coverage was calculated based on population estimates derived from the 1990 census and the number of children receiving vaccine. In some cases, the calculations produced coverage estimates of several hundred per cent, and this is attributed to underestimates of the catchment populations.

In the HMIS, vital event and census counts will be reported through the Community Based Health Management Information System (CBHMIS). The initial implementation of the HMIS does not include information from these sources, since the Neighbourhood Health Committees are not yet operating in all areas. Even when these Boards are in place, the Community Health Workers (CHWs) and trained Traditional Birth Attendants (TBAs) who will collect the vital events will require special training. Both Zambian and worldwide experience indicate that well trained and highly motivated community volunteers can report on vital events fairly reliably, especially in rural areas with cohesive communities. Follow-up and sensitive supervision by trained professionals are known to be preconditions for successful operation of this type of reporting, and providing the community workers with incentives considerably improves the quality of their efforts and their ability to collect accurate data. Zambian and worldwide experience also indicate that community volunteer programs in urban areas, particularly among the poor, present special problems: a shifting population base; the absence of continuity and cohesiveness in the community; and the lack of free time among wage earners.

Until the CBHMIS is in place, vital events will need to be estimated outside the HMIS. Various techniques may be used to estimate populations. WHO has published a methodology for estimating population based on the results of the cluster surveys for immunisation and counts of vaccines administered. A sample survey to estimate average household size, coupled with a count of dwellings can also provide population estimates. In some areas health workers claim to have more reliable estimates of their catchment populations than are provided by the census. Chapter 8: Data Interpretation and Decision Making Tools describes additional options for estimating population. Even after the CBHMIS begins operating some of these techniques should be used to verify the results, at least at the beginning of operations.

Timeliness and Completeness

Indicators of timeliness and completeness of reporting should be an integral part of the reports produced through the HMIS.

5

Implementation Strategy

5.1. Priorities and Phases

The implementation strategy and timetable have been guided by the general parameters set out by the health reforms process:

- Districts have urgent need of appropriate procedures for self-assessment and reporting in order to improve their management capacities and assume full responsibility for their activities in the reformed and decentralised model of health care.
- The Central Board of Health needs proper tools to assess districts' performance in order to guarantee cost-effective use of Government grants.
- The Central Board of Health needs timely and appropriate information for communication with the collaborating agencies that contribute to basket funding.
- A mechanism to meet these information requirements must be in place as promptly as possible, and no later than the beginning of 1998.

In response to these guidelines, the design and implementation strategy concentrate on the HMIS, which provides the routine information required for effective management of service delivery. Elaboration of a comprehensive MES has been deferred to focus on providing the information required for operational management. In order to meet the requirement of having a system in place by January, 1998, the implementation plan includes only those institutions that are currently established; in particular, integration of the activities of Neighbourhood Health Committees, CHWs, and TBAs awaits institutionalization of this level of the system.

Three phases are proposed for initial implementation of the manual system: development, pretest, and roll out. The automation phase will begin after the manual system is functioning correctly. Follow-up and supervision form the final, ongoing phase of implementation. When districts begin using the proposed HMIS, they will discontinue use of current reporting forms. During the development and pretest phases, the HMIS will operate for a full quarterly reporting cycle. By the beginning of 1998, a manual HMIS will be in place in all medical facilities, in all districts throughout the country. Computers will be placed in all District Health Offices, and personnel trained in basic computer skills, and an experimental computer programme to support the HMIS will be in place in development and at least some pretest sites.

5.2. Time Frame

The implementation time frame is extremely ambitious and allows for no slippage in the schedule. The HMIS development team recognizes that meeting this schedule requires an enormous commitment of resources by the Ministry and collaborating agencies. The importance of institutional will to support this effort cannot be underestimated; the schedule cannot be met unless all of the participating partners agree and follow through on their commitments. If milestones in the time frame are not met, the reporting system may well be in disarray at regional and headquarters offices, with some districts using the current reporting system and some the new HMIS. This is an extremely undesirable outcome.

Development

During the first quarter of 1997, field-based development of the system will proceed in two districts of the former Western Province, Kaoma and Mongu. These districts have been selected because the staff has had considerable experience in using data to guide management. The forms and procedures designed by the HMIS development team will provide a starting point; it is expected that collaboration with district and health centre personnel will improve the proposed forms and procedures. At the end of the development phase forms and procedures will be reviewed and revised, and an HMIS manual of operations will be prepared.

The HMIS development will be integrated with the development of new stores procedures in the Health Management Boards. In September, 1996, a draft of stores procedures was prepared, along with a manual to be used by district store keepers and in-charges in the Health Centres. In January, 1997 Kaoma and Mongu will also be involved in the development of stores procedures. The integration is very appropriate for the drugs and supplies subsystem and for the assets subsystem because the HMIS will use the new procedures for store keeping.

Pretest

Ten pretest sites have been selected: one urban and one rural district in Ndola, to test operation of the system in an urban setting; two districts in the former Eastern Province that have had less experience in using data for management; and the remaining six districts in the former Western Province. These districts will receive training during May, 1997, and use the HMIS between June and August, 1997 (a "virtual quarter"). At the end of the pretest phase, the results will be reviewed and the system revised as necessary.

In addition to the ten pretest districts selected by the HMIS development team, other interested districts will be invited to participate in this phase. At present a number of districts have shown interest in switching to the new HMIS even before 1998. During the first quarter of 1997 the pretest will be announced, and districts will be free to subscribe if they feel they are ready for it. The condition for joining the pretest is that districts have gone through the Quality Assurance Training Programme, and have a trained District Health Information Officer in place. The District Health Office should also make a commitment to frequent supportive supervision to the Health Centres joining the pretest phase. It is expected that between 10 and 20 districts will join the pretest phase in addition to the agreed on 10 districts.

Roll out

Between October and December, 1997, all of the remaining districts in the country (approximately 60) and their associated health centres will be trained in using the HMIS. On 1 January, 1998, nationwide use of the manual HMIS will commence.

It can be expected that Health Centres and Districts will need support from the HMIS unit as they begin to use the revised HMIS in 1998. The need for support and follow-up will likely be most intensive in the first two quarters of 1998. Use of the HMIS to support planning, particularly at the District level in September of 1998.

when annual plans are prepared, will reflect both the usefulness of the HMIS as well as managers' skills in using the information.

The following table outlines the implementation milestones. The Gantt chart included in Annex 4 details the activities in each phase.

Implementation Time Frame

Deadline	Milestone
15 October 1996	Meeting with representatives of basic health programmes and heads of CBoH departments
1 November 1996	HMIS development team's final report on HMIS design and implementation
1 December 1996	Approval of HMIS design and implementation strategy by MOH and partners. Approval of indicators included in HMIS.
31 December 1996	Completion of forms and procedures to be used in development phase.
1 April 1997	Completion of development phase.
1 September 1997	Completion of pretest phase.
1 January 1998	Completion of roll out phase. Manual HMIS used nationwide.
September, 1998	Information from HMIS used by Districts to formulate the annual plan for 1999.
November, 1998	Evaluation of HMIS

5.3. Capacity Building

The training will incorporate components on HMIS, stores procedures and the six main thrusts (malaria, reproductive health, etc.). The rationale behind this is twofold:

- It allows for more efficient use of human and financial resources (for both trainers and trainees), particularly since all three training programmes target the same staff in the health centres.
- It facilitates a synergy between HMIS, FAMS and the basic health programmes. The training in HMIS will not only concentrate on filling in forms, but also train in the use of data analysis and decision making tools (see Chapter 8 of this document.) In the integrated training HMIS will not only be taught in theory, but also in practice. The meaning of normal values and cut-off points of indicators will be made clear. For example, the question "How should an increasing Case Fatality Rate for Acute Respiratory Infections be interpreted?" can be answered by the MCH experts on the spot. The link between data collection and decision making directed towards action will become much clearer to health centres staff.

The training programme will take two weeks. Training for district, regional and CBoH staff will also include training of trainers (ToT) component so that they can train staff at more peripheral levels.

Staff at each health center, district, region, and headquarters will be trained. At the health center level, two staff members will be trained: the officer in charge and the officer responsible for MCH services. At the

district level three staff members will be trained: the Deputy for Programme, the Deputy for Planning, and the Information Officer. At the regional level, three staff members will be trained. At the central level, eight staff members will be trained. Central staff members should be selected from members of the M&E Directorate, as well as representatives of programme staff. Regional and central staff will form part of the training teams for regional and district staff.

Training will take place at locations where staff from several districts and health centres can conveniently assemble: venues have not yet been selected. The training plan proposes a student to teacher ratio of 3 to 1. Training will use current data from the offices of the trainees, who will be asked to bring a selection of data to the training.

Training will require the greatest commitment of resources, both financial and human. During the last quarter of 1997, three members of each district and regional health office, as well as eight central staff will spend between 6 and 8 weeks receiving and giving training. Two members of each health centre will spend 2 weeks in training. Drawing staff away from their regular responsibilities for this period of time also has implications for the level of effort required from staff who are not involved in the training, since they will need to cover the essential duties of those attending and giving training. District and regional offices will be most affected since three staff will spend half to two-thirds of their time in training activities during the last quarter of 1998. However, there appears to be no alternative if the HMIS is to be operational nationwide by the beginning of 1998.

5.4. Strategy for Introduction of Computers

The HMIS has been designed so that it can be operated manually or with computer support. It is essential that the automated system not be viewed as a "black box", with data fed into one end, manipulated by mysterious processes, and results spat out the other end. Staff must be confident that they understand and can perform the calculations just as well as the computer, albeit more slowly. To establish ownership of the system, automation will be introduced only after the manual system has operated successfully for at least one quarterly reporting cycle.

Automated support for the health status and health performance subsystems will be tested in two or three of the development and pretest sites after the system review that follows the pretest phase. Roll out of the automated system will not begin before April, 1998.

Even though automated support for the HMIS will not be introduced at most locations until April, 1998, computers should be procured and installed as soon as possible. Staff should be comfortable operating computers well before HMIS automated support begins. It is strongly recommended that computers be procured for district offices by the end of the first quarter in 1997 so that district staff can receive training and acquire competence in their use before attention focuses on intensive training in the HMIS. There is no reason to delay the use of computers, since they can be used for word processing, spreadsheets, and electronic communication immediately.

It is proposed to place two computers at districts and regional offices and at level II and III hospitals and one at level I hospitals. One computer should be a "high end, state of the art" PC, to be used for data processing of the HMIS subsystems. The second should be a standard business machine, to be used for word processing and spreadsheet applications. It is also proposed that the standard set of software be based on the Windows 95 operating system and the Microsoft Office Professional suite of programmes, which includes Word (for word processing), Excel (for spreadsheets), PowerPoint (for graphics and presentations), and Access (for databases). Computer programmes to support the health status and health performance subsystems will be implemented using Access. Detailed specifications for the information technology, including power backup and protection are included in Annex 3. A manual detailing the procedures for safe operation and maintenance of the equipment at district offices will be prepared and will be available when the computers are installed.

Computer literacy is a precondition for operating computers properly. Training in basic computer operations, word processing, spreadsheets, and telecommunications software should start as soon as the computers arrive in the country. It is recommended that this training be contracted to a commercial firm and be provided to four members from the district and regional offices, the three staff members who receive the HMIS training and the Data Aggregation officer. It is anticipated that this training will require one week. The training should take place at locations where several districts can be conveniently assembled. The district's own computers should be delivered to the training location and used for the training. After the training, the attendees should repack the equipment in their original shipping containers for transport to the district office where they will be installed.

Development of special purpose software to support the HMIS presents issues of ongoing maintenance and upgrade for the Ministry. In the past, external consultants have been contracted to develop special purpose software, since Ministry staff do not have the requisite training and experience for software development, and the same mechanism is proposed for the HMIS software. The importance of establishing in-house computer support units has been discussed previously, in Section 4.6.2.3. Ideally development of the HMIS software would proceed as a collaborative effort between external consultants and Ministry personnel, so that the Ministry would then have the in-house capacity to maintain the HMIS software.

5.5. Financial Issues

Implementation of the HMIS requires a substantial startup investment in training and equipment procurement. Cost estimates have not been completed, but rough estimates place the total somewhere between \$2.2 and 2.5 million US between January, 1997, and April, 1998. This sum does not include external technical assistance. It seems clear that these costs must be shared between the Ministry and other partners. Commitments to provide the full amount of financial support will be required before implementation begins, since lack of funds could delay the process.

The cost of training in the manual HMIS alone is estimated at \$1.3 million US. (See Annex 4 for details.) Cost of computer hardware and software will depend on the responses to tenders. One can estimate an average cost of \$3500 US per machine delivered in Lusaka. Roughly 254 computers will be required, for a total cost of \$890,000 US. (3 computers for 70 districts: 2 for the DHO and 1 for a level I hospital; 2 computers each for 12 level II hospitals and 4 level III hospitals, and 8 networked computers at headquarters.)

6

Related Issues

6.1. Other Issues related to HMIS

“Garbage in is garbage out” is a frequently used expression when discussing validity of information. In the development of a new HMIS, a number of critical issues have to be tackled in order to make the system reliable. During the assessment the following issues were mentioned:

6.1.1. Population and target groups

During the field visits assessing the existing HMIS forms, all districts claimed that the actual population figures deviated a lot from the figures used in the National Immunisation Days campaign. The population projections based on the 1990 census appear to be very unreliable. Nevertheless, target populations should be known for proper programme management. Even for allocation of grants population figures are critical.

Some districts have made efforts to come up with more reliable figures, either based on a community register, or based on a yearly census. A proper system must be put in place to get more reliable population figures.

Possible action: Use systems currently under development by the community participation initiatives, like community-based registers or annual community census.

6.1.2. Catchment area

Some health institutions use the radius of 12 km (three hours walking) from the institution to define their catchment area. This leaves more remote populations uncovered. In urban and peri-urban areas health institutions may have overlapping catchment areas. There is a need to define catchment areas of health institutions, assuring full geographical coverage of the district and excluding overlaps. Also, for neighbourhood health committees catchment areas need to be defined.

There may be some difference between the geographical and the functional catchment area, especially when health institutions attract patients from neighbouring districts. In such cases negotiations between neighbouring districts are required to adjust figures of catchment areas.

Possible action: Investigate possibilities of establishing Geographic Information System. The Ministry of Agriculture and CSO are experimenting with this technology.

6.1.3. Handling of patient cards

In the present system many patient cards get lost, because they are not well kept in health institutions. Some districts have opted to introduce a home based patient card or booklet. Patients bring the card whenever they come for treatment (and carry when referred). Other districts, with Neighbourhood Health Committees in place have given each neighbourhood, each household in the neighbourhood and each family member a unique number. Cards are kept in a filing system, using the number codes, facilitating retrieval. Whatever option is chosen, proper retrieval of information on previous treatments is essential.

6.1.4. Diagnosis

Standards in diagnosis are required to realize uniform reporting. At present there may be considerable under or over reporting of diseases. For example, fever with headache is quickly diagnosed as malaria. Guidelines on proper diagnosis such as Standard Case Management are required. Training in Standard Case Management has been undertaken in Lusaka Province. A draft manual for standard diagnosis and treatment in the field of MCH was developed last year, but was never published.

There is an urgent need to improve the diagnostic skills of health workers, as a precondition for improved health information.

Possible action: Introduction of Manual of Standard Diagnosis and Treatment (see examples in Zimbabwe and Tanzania).

6.1.5. Recording of diagnoses

The present OPD procedure is to record only one main diagnosis per patient, for example malaria, even if a child is diagnosed with malaria and anemia. Similarly, inpatient records generally contain only one diagnosis. Women having vaginal deliveries are recorded as "normal deliveries" even if there was a post partum hemorrhage. Many diagnoses therefore are missed. In the exercise of refining the essential health packages, this inability to capture all diagnoses and conditions could cause misunderstanding of the problems that require action. Control of utilisation of drugs using the recorded diagnoses as a reference is difficult. (On the other hand, the number of diagnoses now equals the number of patients attended, which fits other purposes like calculating utilisation rates.)

Possible action: change system to allow multiple diagnoses per patient, and record attendances separately.

6.1.6. Case definitions used on forms

Some case definitions presently used on reporting forms are very vague, e.g., "continuing acceptor" in family planning. Different interpretations are used by various providers. Some descriptions of diseases, e.g., "other gastrointestinal diseases" or "ill defined cases" on forms are unclear. The CHW's diagnoses like "cough" and "headache" need clearer definition in order to have any meaning in disease statistics.

Unambiguous case definitions are required and should be communicated to all health workers, when starting up the HMIS.

Possible action: Convene a small working group to produce a list of case definitions.

61

6.1.7. Registers

Tallying next to entries in patient registers produces mistakes. Often tallying is forgotten and done "later." In the present system there is nearly always a discrepancy between the tally sheet and the register. It is better to make a balance sheet of diagnoses and treatments at the end of the day. Tallying should only be used when no register is used at the same time.

Possible action: Produce working sheets for HMIS and a procedures manual in their use for all health institutions.

6.1.8. Arithmetic

Presently, many forms contain arithmetic errors, especially when many columns or rows are being added. The layout of new forms must be clear and allow an overview.

Some forms are incomplete, for example have no possibility for reporting on drug wastage (expiration) and thus confuse the health workers who are supposed to fill in the forms.

Possible action: Pretest and adjust forms to district needs.

6.1.9. Aggregation

If data are aggregated from different sheets, procedures should be clear, for example distinguishing between static and outreach MCH activities, and between figures from the health posts and the health centre. If figures are missing, it should be clearly indicated. For example, district consolidation of health centre forms should show the number of returns included as a proportion of the total number of health centres. Procedures for handling delayed submissions also should be put in place.

Possible action: Clear manual on procedures.

The topics listed above are simply a number of the issues brought up during consultations with district and programme managers. Problems with regard to stock control or reporting on human resources were not thoroughly discussed during the assessment, but are known to exist. Under the FAMS programme financial reporting formats have been established. They might serve as a model for the stores and procurement procedures that are currently being developed.

6.2. Hospital MIS

The HMIS will be implemented at all hospitals following the schedule proposed for 1997, with hospital staff included in trainings and hospitals receiving computers. In the elaboration of a new HMIS, concentration has been placed on the district level and first line hospitals. Most of the proposed system can be used for referral hospitals as well. But additional information requirements for internal management of Level II and III hospitals can be identified. Automated support for hospital management systems is a priority for Level II and III hospitals; it is important for Level I hospitals, but not considered a priority at this time. The mine hospitals have developed a management information system which is being automated, and ODA has a management support programme for hospital management. A task force might work on the further development of a hospital management information system.

6.3. Participation of Private Providers

Private and NGO facilities currently report on their activities through regular government channels. During the HMIS assessment in August, 1996, the Nursing Council and the Medical Council were identified as organisations which collect useful information with regard to human resources in health.

The participation of private practitioners should be solicited, especially in the notifiable disease reporting system. This could be done through the Churches Medical Association of Zambia and through collaboration with the Nursing Council and the Medical Council. The Medical Council could also be a partner in developing a reporting system for private health providers.

Private and NGO providers will be included in HMIS training.

6.4. Development Strategy for Complete M&E System

During the assessment some programme managers expressed their need for more detailed information, sometimes following donor requirements. Chapter 2 of this document outlines the salient components of a complete Monitoring and Evaluation System and also provides a detailed discussion of the various mechanisms available to programmes for obtaining information outside of the routine HMIS. A task group should be formed to work out modalities for realizing alternative data collection methods which do not overburden the peripheral health services.

6.5 Legal Requirements

The HMIS is partly based on official government forms. The legal unit in the Ministry should look into legal requirements for changing the system, so that the new HMIS can be formalized after the pretest phase.

63

7

Data Elements and Core Indicators

7.1. Introduction

The proposed HMIS is decentralised, action-oriented, responsive and aims at creating transparency. In the design of the data sets, new indicators and forms developed with these guiding principles are being proposed. Therefore the streamlining of the existing system was not considered as an option, as it would focus again on the needs of the centre (Ministry of Health and Central Board of Health). The new system is geared towards district needs.

For policy development, there are a lot of information needs which will not be covered by the new HMIS, for example, detailed age breakdowns of AIDS incidence or side effects of TB drugs. Most of the disaggregation of data on gender will not be included in the system. The HMIS development team acknowledges the legitimacy of such information requirements, including these requirements in the new HMIS, however, would lead to an overburdening of the peripheral health workers and thus would lead to unreliable data, defeating again the aim of getting appropriate information. The HMIS development team strongly advocates the inclusion of sentinel surveillance and surveys (e.g. LQAS) in the Monitoring and Evaluation System of the Central Board of Health.

Another important issue in the approach of HMIS is flexibility. In the first years, the amount of data collected and processed will be reduced greatly in order to make the system produce results again. Once routines have been established, new elements can be added. Automation can facilitate the use of more complex data sets and more sophisticated analysis, especially at hospital level.

7.2. Data Sets and Indicators

Through the institution of autonomous Health Management Boards, the Ministry of Health has shifted the responsibility of planning and implementing health services to these boards. Neither the Ministry nor the Central Board of Health will produce plans of operation for the Health Management Boards. It is the task of the central level to produce policy guidelines and to set standards. Policy guidelines are given in the *Essential Health Care Packages* and the *District Planning Guidelines 1997* (including the six main thrusts of health care). Standards have been set in the document *Quality Assurance Standards* (1995).

As a logical consequence of decentralisation, activities in districts will focus on the most urgent needs in the district. With regard to curative care, there will not be considerable divergence between districts, as health problems in most parts of the country are similar. But some differences will be observed. For example, the dry

Southern and Western areas of the country will have much more trachoma than other parts. Urban areas are much more vulnerable to cholera epidemics and have to maintain a high level of vigilance. This flexibility will produce a broader monitoring of disease trends outside the six thrust areas and impact on future prioritisation of specific areas of health.

With the new HMIS, districts are encouraged to formulate a number of data specifically relevant for their information requirements next to the core set of data. The design of the forms will allow for such additions. In addition, each level of health facility will have the ability to collect detailed data on disease diagnoses and other areas relevant to the internal management of the facility but which may not be required for reporting to the District. The frequency of this data collection will vary by facility.

Activities differ between districts and even between health institutions within the district. The year plans produced by districts show a wide variety of planned interventions. With regard to malaria prevention, for example, the interventions range from bed net impregnation to spraying and school health theatre plays. It is impossible to set centrally developed indicators for such interventions. The centre requires that each district pay attention to the six main thrusts, but leaves it to the districts to plan for the most appropriate interventions. In line with this policy, the HMIS will not set operational indicators, but will require the districts to design and apply such indicators. For each of the main thrusts the districts will have to design and monitor one indicator, and districts will be encouraged to stimulate individual health institutions within the district to do the same for specific activities. As part of the performance audit, the Regional Health Office will follow-up the use of local indicators developed by districts and health personnel, and discuss the produced results.

The introduction of locally formulated indicators is not new in the Zambian Health Reforms; it has been introduced in the Quality Assurance training programme for districts and health institutions. The QA programme will become an integrated part of Monitoring and Evaluation.

The HMIS development team has collected all lists of National indicators produced in the Ministry of Health over the last years. The total number of indicators listed is 245. Many of the formulated indicators (e.g. the list "Monitoring the Essential Health Packages") can only be followed up through community surveys. From the different lists circulating in the Ministry of Health, indicators have been drawn which appear to the HMIS development team most feasible for inclusion in the HMIS routine reporting. In total 70 National indicators have been selected, some to be applied quarterly, others to be applied annually.

National Indicators Incorporated in the Health Management Information System	
Subsystem	Total
Health	37
Finances	5
Human Resources	5
Drugs and Supplies	4
Assets	5
System Performance	14
Total	70

The detailed list of proposed indicators can be found in Annex 6.

65

BEST AVAILABLE COPY

7.3. Health Subsystem

The routine collection of data with regard to the health subsystem will concentrate in the coming years on the six major thrusts, and will be geared towards decision making. Thus, in quarterly reports details may be excluded with regard to areas outside the 6 thrusts, for example psychiatric diagnoses or oral health problems. In the reporting format for annual reports, specific reporting with regard to medical specialties and paramedical departments like X-ray and laboratory will be introduced to capture information on such activities. Examples of these forms are currently being developed by the HMIS development team.

Several issues remain to be clarified for making information accurate and consistent. Case definitions for diseases need to be updated and made relevant to each reporting level, e.g. Health Centre and Hospitals. Also, greater consideration must be given to the issue of how reporting will be performed from hospital out-patient departments which are serving as health centres.

7.4. Finances Subsystem

The reporting formats have been developed under FAMS and will not change. Indicators were formulated in the document *District Health Plan, Guidelines for 1997*.

7.5. Human Resources Subsystem

The information requirements for districts with regard to Human Resources will change in the coming years with the increasing decentralisation of the management of human resources. A number of key issues have been formulated for the time being.

7.5.1. Staffing situation

Table A. Staffing per 31 December Year

Post	Hospital		Health Centres			District Health Office			
	establ	actual	balance	establ	actual	balance	establ	actual	balance
details									
staff									
categ.									

Indicator: No. of health centre with sufficient staffing according to establishment register (x100)/ total no. of health centres

7.5.2. Staff attrition

Table B. Movements in the year

Moved Out	To Health Service outside DHB	Retired/Fired/Resigned	Death
Details staff categories			

Indicator: Staff attrition rate: Total No of staff moved out (x 100) / total staff end of year

7.5.3. Management of personnel

Table C. Individual Staff Assessment per year

Total qualified staff in district		Total of qualified workers* for whom annual confidential report has been filled in and discussed	
Total untrained staff		Total untrained staff** with whom performance has been discussed	
Total staff in district		Total staff with whom performance has been discussed	

*indicates personnel with a degree, diploma or certificate.

**Classified Daily Employees (sweepers, drivers, clerks, etc.)

Indicator: Individual performance assessment rate: Total staff with whom performance has been discussed (x 100) / total district staff

7.5.4. Training efforts

Table D. Training Conducted Annually

Total No of Trainings in clinical/nursing care		Attended by how many people	
Total No. of Trainings in preventive/promotive health		Attended by how many people	
Total No. of Trainings for untrained staff		Attended by how many people	
Total No. of Trainings in management/general issues		Attended by how many people	
Total of all Training		Total attendance	

Indicator: Average training ratio: Total attendances to training/ total number of staff in the district

67

7.6. Drugs and Supplies Subsystem

7.6.1. Introduction

The introduction of the new HMIS coincides with the introduction of decentralised drug budgets and the start-up of the Essential Drugs Store. At the same time, new stores procedures are being introduced for management of stores in districts and hospitals.

Basically the distribution system changes from a push system to a pull system. The central level no longer determines drug needs of districts and hospital: this is done by the peripheral bodies involved in the operational management of the health services. It is the task of the Central Board of Health to make provisions for sufficient stocking of the Essential Drugs Store. The Central Board of Health also has a task (especially through the Regional Health Offices) to give technical support to the districts and improve quality of the operations.

This new set-up reduces the CBoH's need for quantitative figures on drug stocks in districts and health institutions. In the view of the HMIS development team, the Central Board of Health does not need to know exact stock levels in the districts. Instead, a number of indicators will function as warning signals for the Central Board of Health to detect problems at an early stage. The warning signals will prompt for further investigations and action by the CBoH. The warning signals on depletion of the budget and on stock-outs suffice as indicators on district management of drugs.

In a pull system the Essential Drugs Store has the role of supplying to the districts and health institutions drugs as ordered based on a trust in existing procedures of good management, and reliance on supportive supervision for performance audit. A quantitative HMIS cannot replace supervision. There is an apprehension that the Essential Drugs Store will at some moment in time not have sufficient drugs to supply the districts as ordered. Mechanisms have to be put in place to guarantee equitable distribution to the districts. Additional information may be required from districts on stock levels of those drugs ordered. This can be done by adding to the ordering form PH-81 the stock level of the specific drug, under the column "item required", e.g. Chloroquine 250 mg tablet (11).

7.6.2. Reporting on drugs by health centres to district per quarter:

The management of drugs concentrates on the kits and a number of essential drugs.

A. Number of health centre kits opened during the quarter: (in order to get this information, a separate page in the stock record book must be created for the kit as a whole)

Indicator: Number of health centre kits opened during the quarter/ number of patients attended over the quarter.

This indicator serves as a proxy for utilisation of essential drugs.

B. Reporting on stock-outs for three health centre indicator drugs, namely Chloroquine tablets, paracetamol tablets, Penicillin V tablets (use stock control book, column, "present physical count", check for each month of that quarter for each of the three drugs, if a "0" appears. If so tick, add the total number of stock outs.)

Indicator: No of stock-outs of chloroquine and/or paracetamol and/or Penicillin V, per quarter.

7.6.3. Reporting on drugs by hospitals to districts per quarter

A. Utilisation of 20/80 drugs during the quarter and budget utilisation. These drugs are the drugs which constitute 80% of the drugs budget. The procedure for identifying these drugs is explained in the Stores Procedure document. Use yearly forecast made for ongoing year. (Use column issued/returned/withdrawn in stock book; add the three monthly figures for each of the drugs. Get unit price for each of the drugs. Multiply for each drug number of units issued time cost price per unit. Add total amount.)

Indicator: Money spent on 20/80 drugs during the quarter/ total drug budget for the year.

NB. For the first year the 20/80 drugs cannot be known, as no proper estimate can be made based on consumption. During this year the 10 indicator drugs can be used:

- Paracetamol tablets 500 mg
- Aspirin tablet 300 mg
- Cotrimoxazole tablet 480 mg
- Amoxicillin tablet/capsule 250 mg
- Chloroquine tablet 250 mg (150 mg base)
- Oral Rehydration Salts (WHO formula) sachets
- Phenoxymethyl Penicillin tablet 250 mg
- Ferrous sulphate tablet 200 mg
- Benzyl Penicillin injection 5 MU
- Mebendazole tablet 100 mg

(Use column issued/returned/withdrawn in stock book; add the three monthly figures for each of the drugs. Get unit price for each of the drugs. Multiply for each drug number of units issued time cost price per unit. Add total amount.)

Indicator: Money spent on indicator drugs ordered during the quarter/ total annual drug budget
Data will be reported cumulatively to assess trends.

B. Reporting on stock-outs for three hospital indicator drugs, namely chloroquine tablets, amoxicillin tablets or capsules, Benzyl Penicillin injections (use stock control book, column "present physical count", check for each month of that quarter for each of the three drugs, if a "0" appears. If so tick, add the total number of stock outs.)

Indicator: Number of stock-outs of chloroquine and/or amoxicillin and/or Benzyl Penicillin inj. per quarter.

C. Antibiotic prescribing habits in the out patient department (use the OPD patient register of the last quarter, check the entry of the second patient of each even day (e.g. 2 January), tally total numbers and tally separately when antibiotics were prescribed. Stop when total sample reaches 40. Add total number of antibiotic prescriptions.

Indicator: Number of patient contacts in OPD when antibiotics were prescribed/ total number of prescriptions written.

D. Expiration of Drugs (use monthly stock balance register to find figures in column on drugs removed from stock because of expiration)

Indicator: Number of units of drugs expired during the quarter.

7.6.4. Reporting on drugs by District to the Central Board of Health

A. Utilisation of drug kits

Total number of drug kits opened by health centres (consolidated report from health centre quarterly reports) and total number of patients seen in the health centres (consolidated figure from HC's quarterly reports).

Indicator: total number of drug kits opened by all health centres in district during the quarter/
total number of patients seen by all HC's during the quarter.

Information will also be accumulated to produce an annual indicator.

B. Health Centre stock-outs

Total number of stock outs of one or more of the three HC indicator drugs during the quarter (consolidated figure from all HC reports).

C. Hospital stock outs

Total number of stock outs of one or more of the three Hospital indicator drugs during the quarter (figure from hospital report or consolidated if more than one hospital in the district)

D. Hospital drugs budget spent during the quarter on 20/80 drugs or 10 indicator drugs. (Get figure from hospital report or consolidated if more than one hospital in the district)

E. Hospital drugs removed from stock because expiration date was passed.

F. Percentage of prescriptions containing antibiotics during the quarter. (Get figure from hospital or calculate percentage from consolidated figures of hospitals if there are more hospitals in the district.)

Indicators for essential supplies (e.g. contraceptive devices, vaccine requirements--needles, syringes, etc.) have not yet been developed and will be formulated in conjunction with the Districts.

7.7. Assets Subsystem

7.7.1. Health Infrastructure

In the context of the IDA-supported programme for rehabilitation of the health services infrastructure, an elaborate computerized database has been established for all health centres in the country (See Annex 7 for example.) The database is used for selection of centres to be rehabilitated, for costing and planning of rehabilitation. The database should be updated regularly yearly to assess the situation of health centres still waiting for rehabilitation. Once health centres have been rehabilitated, the IDA-supported programme needs updates on the infrastructure for identifying needs for preventive maintenance.

However the HMIS development team considers it to be a very useful tool for district health offices, in order to update the database of the health infrastructure yearly. The CBoH will provide print-outs of status reports of all health centres (including the ones already rehabilitated) to the District Health Offices in 1997. The districts make a yearly assessment and keep records. As a matter of service by the CBoH, computer entries can be done for the districts in the M&E Directorate, as the computer programme is too complicated to be installed in all districts. The reports are used by districts for the annual planning exercise.

Minimum physical quality standards have been worked out for health centres (see *District Health Plan Guidelines for 1997*). The minimum physical standards can be updated yearly, and can later be differentiated to the different levels of health institutions (health post, health centre, hospital). These standards provide a

good reference for assessing the physical status of health institutions and provide a framework for regulation of development of new infrastructure. The indicator is related to full compliance of the standard.

Indicator: Number of Health Centres complying with minimum physical standards (including equipment) (x100)/ total number of health centres in the district.

Indicator: Number of health centres in operation complying with prototype standard to deliver package (x100)/ total # of health centres in the district.

7.7.2. Vehicles and Motorcycles

The Vehicle Service Centre of the Ministry of Health keeps records of the status of all MOH vehicles. The Provincial Vehicle Service Centres provide the necessary information. Future information requirements by the CBoH will depend on the foreseen involvement of the centre in replacement of vehicles owned by health management boards.

Districts should monitor the state of their fleet quarterly, and analyze existing problems.

Indicator: Number of running vehicles on the last day of the quarter (x 100)/ Total number of vehicles according to updated asset list of district.

Indicator: Number of running motorcycles on the last day of the quarter (x 100)/ Total number of motorcycles according to updated asset list of district.

7.7.3. Assets

The manual on Asset Registration gives clear guidelines on asset registration and annual recording. In the manual, an asset registration book is proposed. The information in the asset registration book should match with the annual physical stock inventory in all health institutions in the district.

Indicator: Number of health institutions with difference in annual physical stock taking compared to asset register (x 100) / Total number of health institutions.

Indicator: Number of items from all asset registers in the district recorded as stolen or lost during the previous year.

7.8. Subsystem Health Systems Performance

The subsystem Health System Performance contains a number of indicators concentrating on efficient use of resources. Initially, simple indicators have been chosen, but over time more specific indicators can be developed. The FAMS financial reporting format allows for very detailed reporting on expenditure for specific activities. Once computer based accounting has been introduced, the reporting can be implemented in a comprehensive way. Further linking of financial reporting to health status, service delivery and performance reporting will then be possible. This is similar for Human Resources Management; once districts manage human resources, including the budget for personal emoluments, further linkage of use of human resources to performance can be brought into place.

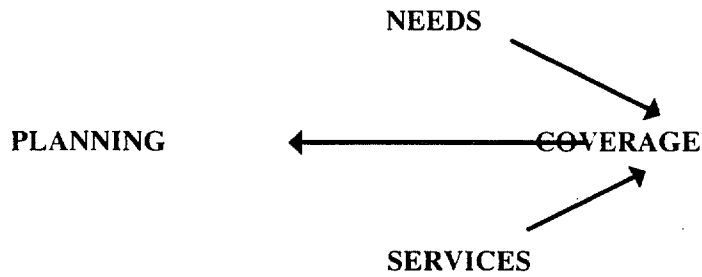
8

Data Interpretation and Decision Making Tools

8.1. Framework for Investigation

We can distinguish four cornerstones in the process of investigation that aims at bringing cost-effective quality care as close to the family as possible. This investigatory process leads from data collection to decision making.

1. **Needs assessment:** Where are the people we want to serve? How many are there? and What are their essential health problems? Answering these questions requires investigation into the catchment area, catchment population, and health issues perceived by the community.
2. **Service delivery:** What types of services does the health sector provide, including information on inputs, use of resources, costs, outputs, etc.
3. **Coverage:** The primary question is: What proportion of the community needs are we really covering? We can quantify this question by asking: What is the service delivery output in comparison with the community needs? Vaccination coverage is a familiar example of a coverage indicator. Service delivery coverage can also be calculated for maternal health, school health, water and sanitation, and other preventive and promotive activities. The health services' treatment coverage of diseases like malaria or diarrhoea can be calculated by estimating the expected cases, based on community surveys, and comparing this with the number of diseases treated.
4. **Planning for unmet needs:** In mathematical terms, the need minus coverage reveals the unmet need. The planning process has to give answers to the question of how to fill the gap between need and coverage.



The HIPPOPOC planning model used by the Ministry of Health considers problem analysis, for example, with problem trees or bubble charts, as an essential step in the planning process. Identifying the unmet needs in service delivery is part of the problem analysis. For the Essential Health Care Packages, a similar identification of unmet needs is required in order to plan implementation improvements, and to adjust the priorities that have been set. With community partnerships, the health needs perceived by the community should receive the same respect as priorities calculated from mathematical models like DALYs.

8.2. Tools within the Framework for Investigation

In the following diagram a number of tools for data analysis and decision making are presented, using the framework for investigation.

<i>tools to identify and analyze</i>				
<i>at Level</i>	<i>Needs</i>	<i>Services</i>	<i>Coverage</i>	<i>Planning Issues</i>
<i>Community</i>	Community Registers; Rapid Participatory Appraisal; Focus Group Discussion or Delphi Method; Mapping	Community-based HMIS implemented by CHWs and trained TBAs	Lot Quality Assurance Sampling; Health Flags and indicators	Neighbourhood Health Committee meetings; Health Flags analysis
<i>Health Post and Health Centre</i>	Mapping; Community Profiles	HMIS	HMIS self assessment; LQAS; EPI bar graphs; epidemiological graphs; Health Flags and indicators	Health Centre Advisory Committee meetings; Area Health Board meetings; Health Flags analysis
<i>Hospitals (Levels I, II, and III)</i>	Disease Profiles	HMIS	indicators; Medical Records Review; Health Systems Research	Hospital Management Team analysis; District Health Board review

75

<i>tools to identify and analyze</i>				
<i>at Level</i>	<i>Needs</i>	<i>Services</i>	<i>Coverage</i>	<i>Planning Issues</i>
<i>Districts</i>	District Health Profile	HMIS	Health Systems Research; Health flags and indicators; Contract Targets; Performance audit of health institutions	District Health Board meeting; Health Flags analysis; review contract targets
<i>Central Board of Health</i>	Sentinel surveillance; Demographic Health Survey	HMIS	Sentinel surveillance; Health Systems Research; Performance audit	Health Management Board contract review

8.3. Tools Used at the Community Level

8.3.1. Rapid Participatory Appraisal¹

The central purpose of Rapid Participatory Appraisal is to define a community's perspective on priority needs in order to influence policy making. Three elements can be distinguished:

- epidemiological data: including patterns of disease and disability, and use of resources
- cultural perspective of needs: individual and group views and their context
- consensus that respects both medical and cultural viewpoints.

A community profile is created with information on:

- community composition: demographic data
- community organisation: traditional, religious and political
- community capacity: available resources
- physical environment: geography
- socio-economic environment: poverty and vulnerable groups
- disease and disability: epidemiology
- health services: community and formal services
- social services
- education, housing, environmental services, including water and sanitation
- health policies: existing policies that target community health problems

From the side of the community a number of priorities emerge from the appraisal, as well as from the side of the professionals. Finally a methodology for reaching consensus in setting priorities is used.

8.3.2. Mapping

Mapping is a familiar tool that is often not sufficiently utilized. It is an essential first step in performing a household census. The location of families at risk can be flagged so that CHWs, TBAs, and Public Health Practitioners (PHPs) can more easily find them. Details can be filled in manually, like the locations of houses,

¹ From Bie Nio Ong "Rapid Appraisal and Health Policy". Chapman and Hall, London 1996.

water, sources, etc. Epidemiological data can also be added. While the process of creating handmade maps can be a very useful learning exercise for Neighbourhood Health Committees and community-based providers, there are several other sources of good maps. Modern technology can assist in producing very accurate maps. Several organisations outside the Ministry of Health, like the International Union for Conservation of Nature (IUCN), use a Geographic Information System (GIS). Detailed maps can be obtained from the Central Statistics Office (CSO) as well. Mapping techniques can also be used to define catchment areas of health institutions.

At the district level computer assisted mapping is possible using readily available software like Lotus 123-5 or EPI MAP software.

8.3.3. Community Registers

In some districts, Neighbourhood Health Committees keep registers for recording vital events in the community. Such registers can provide an ideal source of data for establishing exact counts of population, births, deaths etc. However, it appears to be very difficult for volunteers to maintain these registers without any incentive. A good relationship between health centre and community is a prerequisite for motivating the community to start up such a register. It is not realistic to expect that the community registers will be a reliable source of information nationwide.

Population may be estimated using several methodologies. The results of these methodologies can be triangulated to establish a more accurate population estimate than by relying on one methodology alone.

8.3.4. Focus Group Discussions or Delphi Panels

The classic approach of health workers who want to assess community need is to call a meeting through the traditional leader. At the end, it is discovered that neither women, nor youths, nor minority groups have expressed their views. Focus group discussions and Delphi panels are methods used to ensure that all views on all aspects are included in the "community diagnosis".

8.3.5. CHW and trained TBA reports

Some districts have established forms and procedures for reporting by CHWs and trained TBAs. These reports are most often used for issuing drug kits; the data is not integrated with the regular reporting system and hence does not contribute to the body of knowledge on community health problems. The MOH task group for development of the Community based HMIS (CBHMIS) has designed reporting formats and has proposed methods for integrating the community based reporting into the regular HMIS (see Chapter 9 and Annex 8 for detailed information).

8.3.6. Lot Quality Assurance Sampling²

Lot Quality Assurance Sampling (LQAS) is an example of a rapid assessment method for assessing coverage, service adequacy, and health workers' techniques. It is a method derived from industrial quality control, and adapted for health services in Middle America under the supervision of the Pan American Health Organization. LQAS can be introduced in decentralised health services as a regular monitoring tool for community based programmes. Small sample sizes can provide reliable information. Health Centre Staff can be trained in the methodology, which does not require high levels of knowledge of statistics. LQAS can even be used by the Central Board of Health to assess the performance of districts and hence reduce a substantial amount of the routine reporting burden.

² From Valadez J.J. "Assessing Child Survival Programs in Developing Countries. Testing LQAS". Boston: Harvard University Press, 1991.

75

8.3.7. Health Flags and Indicators

In the reform model Health Centres plan their activities in conjunction with the communities' representatives, the Neighbourhood Health Committees. As part of the planning process, Health Centres are supposed to develop indicators for their programmes. The Quality Assurance training programme has taught health staff how to develop indicators. (In the guidelines for planning for 1997, only general indicators are mentioned, and the requirement for developing Health Centre specific indicators is not mentioned explicitly. In the planning process for 1998 all health centres will have to design one specific operational indicator for each of the main thrusts.) Health Centres will follow up the indicator, and will have to design a format for collecting the data needed to calculate the indicator. For example when a health centre plans to impregnate 100 bed nets in the catchment area as part of its malaria programme, the indicator could be the number of bed nets impregnated as a percentage of the number planned for impregnation. The health centre would then have to record the actual number of bed nets impregnated.

The health flag is another important tool to be introduced. For each of the main thrusts the expected service requirement can be calculated, and the service delivered compared to the requirement. Diarrhoea can be used as an example. The service requirement is the expected number of cases of diarrhoea among under 5s that will require treatment with oral rehydration therapy (ORT). Initially these figures may be collected from literature, but later more exact and locally applicable figures can be obtained from rapid appraisals. In the health flag, the indicator actual service delivery / expected service delivery is used. From literature an annual average of 6 diarrhoeal episodes per under 5 child can be expected. The health flag indicator becomes *actual number of cases treated by the community health worker / (6x) number of under 5 children in the catchment area*.

The health flags offer the possibility to compare service coverage over time and between institutions. The health flags can be used at community level, health centre level and higher levels.

8.3.8. Neighbourhood Health Committee meetings: flags analysis

An essential step in the process of using data to make decisions is to discuss analysis of the flags and indicators in the neighbourhood health committees.

8.4. Tools used at Health Centre Level

8.4.1. Community Profiles

The community profiles made in rapid appraisals can be combined to create an aggregated community profile for the catchment area of a Health Centre. This profile can also be used as back ground information for the health flag.

8.4.2. Maps

Maps should be made in all health centres utilising the exact geographical information through GIS or CSO based maps. Epidemiological information should be fed into the maps. Linking information to existing information from other departments and organisations will result in "vulnerability mapping", which has been used by the Farm System Research Team in the Western Province. Information on agricultural production, cattle keeping, small industrial activities, etc. can be linked to health data and indicate vulnerable areas. The Western Province used this technique to map the linkage between cassava growing and malnutrition.

8.4.3. HMIS self assessment, health flags and indicators

Each Health Centre will have information from the HMIS and information from the community profiles. The Health Centre will also have operational indicators on programmes. The Health Centre should complete report forms quarterly and calculate health flags to analyze service coverage.

8.4.4. LQAS

The Lot Quality Assurance Sampling (LQAS) can be used to obtain additional information on the performance of programmes like hygiene or sanitation. In some cases routine reporting may be too cumbersome to be applied. The LQAS can be a useful tool to replace routine data collection.

8.4.5. EPI bar graphs, epidemiological graphs

Many health centres prepare the EPI cumulative bar graphs that compare the number of under 1s vaccinated to the monthly target. Graphs to show seasonal variance of disease prevalence also are common. All health institutions should use these graphs and followup when targets are not met or when disease levels are unexpectedly high.

8.4.6. Health Centre Advisory Committee, Area Health Board meetings flags analysis

By using the different tools mentioned above, unmet service delivery needs can be identified. The flags and self-assessment forms should be discussed quarterly in the Health Centre staff meeting and with the Health Centre advisory committee, in order to plan for further action, like making an annual plan or adjusting the action plan. The District Health Office can also use these tools to discuss performance with the Health Centre during a supervisory visit.

8.5. Tools Used at Hospital Level

8.5.1. Disease profiles

District disease profiles, based on the community profiles, can be made for a number of critical conditions that require hospital attendance. For example, the community data can be aggregated to estimate the percentage of diarrhoea cases that will be serious enough to require hospital treatment; the expected percentage of pregnancies complicated by obstructed labour can be calculated; and the expected percentage of referrals can be calculated, based on a register of actual referrals by Health Centres. The district disease profile also provides the background for calculating the health flags.

Initially literature references can provide raw data for the disease profile; as the hospital collects data about its catchment area, this data can be used to create disease profiles that reflect district realities more accurately.

8.5.2 Medical records review

The systematic review of medical records can be used to assess a variety of issues. In performance audits they indicate institutional and provider compliance with standards. They also provide insight into many other aspects of the service delivery system. For example, medical records can be used to assess rational use of drugs, or the utilisation of the referral system by people living in remote areas. Hospital staff need basic training in sampling techniques to use medical records for these types of studies.

8.5.3. Indicators

In the annual plan, the hospital will design indicators to follow specific activities. For example if the hospital plans to rehabilitate three staff houses, the indicator could be the number of staff houses actually rehabilitated in comparison to the number of staff houses planned for rehabilitation.

The hospital will calculate the indicators quarterly. The hospital will also calculate quarterly the actual diseases treated in comparison to the expected cases estimated in the disease profile.

8.5.4. Health systems research

The methodologies of health systems research can be used to increase understanding of the mechanisms affecting the disease profile of the catchment area.

8.5.5. Hospital Management Team analysis and District Health Board review

The indicators produced are used quarterly in Hospital Management Team meetings and in District Health Board meetings to plan for activities, like setting up, or adjusting, an annual plan.

8.6. Tools Used at District Level

8.6.1. District health profile

The health centre profiles and hospital disease profiles will be consolidated into a district profile with essential data on health issues. The profile can be expanded by incorporating data from other departments and organisations like agriculture, education, etc. An annual update should appear in the annual report, both as a basis for evaluating the previous year's activities and as a rationale for the activities planned for the coming year.

8.6.2. Health flags and indicators

In the annual plan, local indicators should be compared with national indicators. In addition, districts make sure that the basic data for local indicators are being collected and that the results are used in creating action plans. District Health Flags allow for comparison of performance between districts and for comparison of performance over time.

8.6.3. Contract targets

The contract between the District Health Board and the Central Board of Health contains a number of targets that the district should reach. The district should also design health flag that shows its own specific targets and performance.

8.6.4. Performance audit of health institutions

The performance audit of health institutions should concentrate on followup of indicators set locally and on the performance indicators associated with compliance with national standards.

8.6.5. District Health Board meeting: health flags analysis, review contract targets

The quarterly report of the district health office will contain a number of indicators and a health flag. It will be presented to the District Health Board. Together with management performance indicators from the Handbook for District Health Board Members, the quarterly report will provide good information for assessing performance of the district health services.

8.7. Tools Used by the Central Board of Health

8.7.1. Sentinel surveillance

Sentinel surveillance is highly recommended to collect information required for policy development or for scientific research. Currently only three programmes use sentinel surveillance: malaria, TB, and FHANIS. Other programmes should be strongly encouraged to investigate the use of sentinel surveillance for monitoring. In principle, all information that is not required for immediate action should be obtained through channels other than the routine HMIS.

Sentinel surveillance should be coordinated by the Directorate of Monitoring and Evaluation. Budget to finance sentinel surveillance must also be reserved.

8.7.2. Health systems research

The Health Systems Research Unit is part of the Monitoring and Evaluation Directorate. This Unit will coordinate HSR activities, organise training and facilitate the exchange of experiences.

8.7.3. Performance audit

The performance audit of District Health Boards should concentrate on follow-up of indicators set locally and on the performance indicators associated with compliance with national standards. The Regional Health Office should play a key role in this exercise.

8.7.4. Health Management Board contract review

The quarterly assessment of district performance should be based on both financial and performance indicators set nationally and on the Regional Health Office's performance audit. It is important to repeat here the guiding principle of monitoring and evaluation: indicators merely indicate; they are not answers. Indicators signal good or bad performance and require follow-up. They can never function as instruments of remote control and cannot replace dialogue between District Health Boards and Central Board of Health.

8.8. Capacity Building

One of the guiding principles of the new HMIS is that "whoever collects analyzes". The tools described above are all directed towards analysis for decision making. All management levels need to be trained to utilize them properly.

There are a number of training programmes that focus on some of the tools:

- The Quality Assurance training programme: use of indicators and standards
- The Health Systems Research training: use of appraisal, surveys and analysis

- The Diploma Course for District Directors of Health and deputies (via PAID-ESA), module 4, provides training in most of the tools mentioned above.

In addition to this training programme, the HMIS proposes to produce a manual on these tools for data analysis and decision making, which can serve as reference for health workers, board members and policy makers.

The implementation plan for introduction of the new HMIS in the districts proposes a two week training for key staff of all health institutions. During that training many of the tools for data analysis and decision making will be presented. Trainees will also practice using the tools with data from their own areas.

9

Community Based Health Management Information System

9.1. Introduction

Work on a Community Based Health Management Information System (CBHMIS) predates the HMIS design presented in the current document. In the absence of any National form, district health management teams, projects and others have developed elements of CBHMIS, operating independently.

The development of the National CBHMIS is spearheaded by a task force comprised of representatives from the districts and PMO's office in Western Province and the national HMIS coordinator. The task force has collected all forms, procedures, etc. in use in different parts of Zambia, and has compared them. Representatives from other areas in Copperbelt, Luapula and Southern Province have been invited to the task force's consultative workshop to exchange experiences and views on CBHMIS. At present there are no CBHMIS task force members from areas outside of the Western Province. The HMIS Development Team strongly recommends that the task force be enlarged to include representatives from other areas where community partnership initiatives have begun to develop information strategies.

The information presented in this chapter is drawn from the documentation and ongoing activities of the task force responsible for developing the CBHMIS. The HMIS Development Team attended the task force's consultative workshop on 17th-18th October, 1996. This chapter includes the recommendations from that meeting as well as the task force's earlier documentation.

9.1.1. Background information

Community health information is a necessary element of the Health Management Information System. The *Health Sector Support Program* document, which provides much of the conceptual framework that underlies the current redesign of the Ministry of Health's information system, outlines three major outputs of the Development of Uniform Health Management Information System. These outputs are:

1. Uniform Health Management Information System developed, introduced and in use in all districts.
2. Integration of the National Health Information System.
3. Development of the Uniform HMIS at neighbourhood and household levels.

81

The first output is addressed by earlier portions of the current document, viz., the design and implementation of the HMIS. The second output is addressed by integrating the proposed HMIS into the overall strategy of Monitoring and Evaluation. The third output, which is the subject of this chapter, has three major activities: a) identifying the information required according to the health packages; b) defining neighbourhood and household HMIS; and c) implementing the CBHMIS.

9.1.2. Preamble

The active participation of communities in identifying their own health needs and establishing priorities for health service is an essential part of health reform. *The District Health Plan Guidelines for 1997* states: "Good health starts with the household. Individual households and communities are key to better health."

With regard to the problem identification and analysis, communities generally approach health issues from another view point than health workers. In communities religion, tradition and social factors play an important role, while health workers tend to see things from a medical-technical view point. The health system may identify needs that the community may not recognize or consider important, and vice versa. In those cases some sort of negotiation between the community and the health system can be expected. It is of utmost importance that mutual respect exists when matching the view points of the communities and health system.

To enhance "ownership" problems or needs should be recognised by the community itself. Discovering problems in the community by the community itself and provision of appropriate interventions in the community by both the community itself and the health service system will require a good CBHMIS.

9.1.3. Rationale

The CBHMIS is a genuine test of the principle of health for all in that it embodies community participation to the level of decision making. The CBHMIS serves as the vehicle through which the community gathers data about itself and its health status and plans action to meet its own health service needs.

To carry out functions of planning and monitoring, communities need information that they can use. Without such information, communities have to depend on the health system to identify their needs, set their priorities and monitor progress.

It is also in the interest of the health system that communities take a larger role in planning and monitoring their own health services.

9.1.4. Principles

The following principles should be observed in developing the CBHMIS.

9.1.4.1. Although the health system staff may assist communities in designing, implementing and utilising a CBHMIS, the community must use the system to make its own decisions. Most communities can manage and utilise information because they have community members with experience in using information:

- Business people who manage financial and inventory information on a regular basis.
- School teachers and others who have some experience in collecting, recording and interpreting information.
- Community health workers (CHWs) and trained traditional birth attendants (TBAs) who are familiar with health activities and who have had some training in case finding, interviewing, recording and interpreting data.

9.1.4.2. The community must see a benefit to itself in operating a CBHMIS. That benefit may be an economic, health or power benefit. If the system helps the community in one or more of these ways, there will be a strong motivation to use the system.

Therefore, a CBHMIS may be more difficult for urban communities to manage because there is often less commitment to and interest in community affairs due to:

- less sense of community togetherness
- a mobile population characterized by high levels of in and out migration.

9.1.5. Assumptions

Development of a CBHMIS is predicated upon the following assumptions:

- a. The community is both willing and able to implement a simple CBHMIS
- b. The system will be simple, inexpensive, and require very limited data collection and analysis.
- c. The system will be manual, not computerised.
- d. Technical assistance will be available from a nearby health post or health centre
- e. The users will be community members and local health officials.
- f. The system will be a living and flexible system
- g. The system will not replace the MOH or NGO information system.

9.1.6. Organisational structure

An ideal CBHMIS responds to the needs of the following groups:

- Household
- Village
- Neighbourhood community

The neighbourhood community consists of several households and villages under the responsibility of a trained community based worker. The Community Health Worker (CHW) or trained Traditional Birth Attendant (TBA) provide basic promotive, preventive, and curative services. In some areas a Neighbourhood Health Committee (NHC) is formed with a minimum membership of five and a maximum of twelve; one-third of the members should be female. *The District Health Plan Guidelines for 1997* envisage 1997 as the year in which NHCs will be established in most areas.

In addition to guiding the community's own activities to improve its health, the NHC forms the linkage between the family and the health care institutions and facilitates dialogue between the community and the government health services. The committee members together with the CHW (who is often the Secretary of the NHC) and TBA participate in preparing duplicate reports of their activities. One copy remains with the CHW/TBA and the other is forwarded to the nearest health centre.

At the health centre, the reports are discussed by the Health Centre Committee (HCC). The HCC represents the catchment area of the Health Centre, and includes several NHCs. Members of the HCC include 1-2 representatives from each NHC in the catchment area.

Structures that can form a link between the community and the health service include the existing non-governmental organisations (NGOs) and NHCs. Therefore partnership between NHCs, NGOs and Health Centres should be encouraged.

The community may try to convince the health system that they need assistance in areas that are outside the normal bounds of the health system. Although the health system may not be willing or able to respond to some of these requests, that does not preclude the community pursuing them through other channels.

9.2. Model Community Based Health Information System

The CBHMIS task force continues its task of designing and testing the system. This section describes the current system design.

9.2.1. Objectives

The CBHMIS has the following objectives:

- 9.2.1.1 To enable the community determine, select and monitor its own health needs and select its own health programme priorities.
- 9.2.1.2 To enable the health system improve on its services of meeting community needs.

9.2.2. Users

Two major groups use the information from the CBHMIS.

- 9.2.2.1. Community members and leaders
- 9.2.2.2. Health system

9.2.3. Information needs

The CBHMIS supports three major information needs:

- 9.2.3.1. Baseline data on demography such as population, births, deaths, migrants (in areas with a significant amount of migration), and numbers of households and villages.
- 9.2.3.2. Individual / community health and health service status. What are the principal health problems (diarrhoea, malnutrition)? What are the principal health service needs (ORT, food supplements, health education)?

This information will be used to:

- Identify what action should be taken
- Determine if what was done has had any impact

Health services

- Have the needed services been provided by the government (e.g. immunisations)?
- Have the community members done what they needed to do (e.g. built latrines)?

- 9.2.3.3. Community initiatives or innovations

9.2.4. Indicators

No standard set of indicators can be prescribed for each community, since health needs and health programme activities will vary. However, to permit aggregation and comparison, it would be best if communities would select their indicators from a standard list prepared by the health system. Some sort of negotiation between the community and the health system can be expected.

From the health system point of view, the major concern of many programmes and communities is on the protection and promotion of the health of mothers and children, and so the suggested indicators would include the following:

Child care - immunisations, diarrhoea/ORT, growth monitoring, breastfeeding, nutrition, respiratory infections, malaria, AIDS/TB/STD.

Maternal care - prenatal care, safe delivery, tetanus toxoid, postpartum care, family planning.

Water and sanitation - potable drinking water, latrines, cleanliness.

From the community point of view, indicators reflecting community initiatives or innovative would be included.

9.2.5. Data collection instruments and personnel

The data collection will be done by community members. Therefore, it must be limited, both in quantity and in frequency. The procedures and forms used in the CBHMIS are still being designed. The information presented here is based on the designs presented and discussed at the CBHMIS Workshop in Senanga on 17-18 October, 1996.

The CBHMIS produces a health profile for community use from three primary sources:

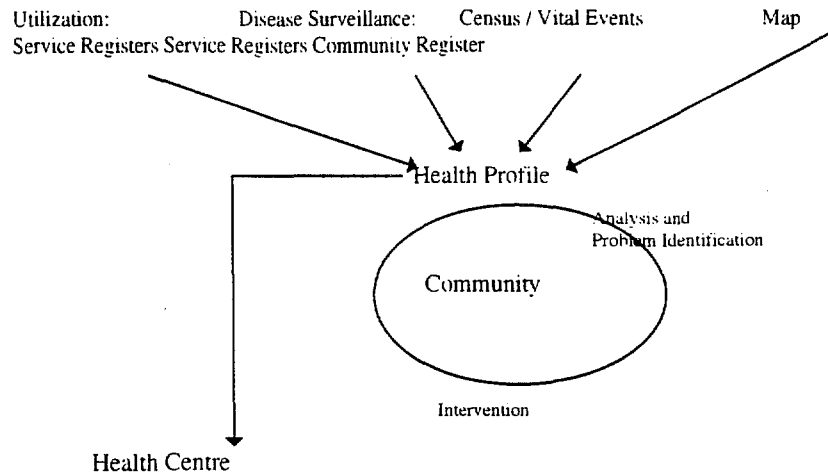
- a community register that records census and vital events, like births and deaths.
- disease and service delivery registers that record community based activities; and
- a community map that shows households, institutions, and water and sanitation facilities.

Information from these three sources can be augmented using more qualitative methods like community focus groups. Information from all of these sources combine to produce a health profile that can be used by the community to assess its health problems and service needs. The same data can also be forwarded to the Health Centre, where it can be aggregated and forwarded to district and central levels to inform planning at all levels.

The organisation, responsibilities, and personnel of community based health sector participation differ from location to location. The contents of the registers and the person responsible for maintenance will also depend on the type of organisation formed in the community. While some areas may not maintain the disease and service registers, it is anticipated that all will maintain the community register and map. In areas where community participation is most fully developed, it is envisaged that the CHW or tTBA will be responsible for supplying basic drugs for common diseases, supporting preventive and promotive services for maternal and child health, and providing some home-based care. In some areas, and particularly urban areas where institutional care is more accessible, community participation in service delivery may not be as extensive, and there may be no CHW or tTBA. In these areas, there may be no community-based disease and service registers, and the secretary of the NHC may keep the community register.

Regardless of the structure and extent of activities of the community based organisations, it is anticipated that each community will collect basic data about itself, analyze the information, and, through this process, create its own prioritised list of health needs and plan for meeting them. It is also anticipated that Health Centre staff will assist community groups in the process of analysis and interpretation of information. It is anticipated that this support from trained health personnel should be provided monthly when communities begin the process of self-assessment. As communities gain more experience in data interpretation and planning, support and feedback from trained health personnel may be reduced to a quarterly frequency.

The following diagram shows the information flow described above:



The three primary routine sources of quantitative information in the CBHMIS provide distinct types of information.

9.2.5.1 Community Register

The community register provides basic demographic information, like census counts, births and deaths. It also provides basic infrastructure information, like access to clean water and sanitary facilities. Some of the data in the register duplicates information found in the village register that is normally maintained by the headman. However, it was determined that the headman's register would be incomplete for use in health planning because it lacks some necessary health data. The community register collects the individual's name, sex, date of birth, date and cause of death, and chronic health conditions or disabilities. Marital status, nationality, and date of migration are optional and may be included in areas where these variables are important. The household's water source, latrine and refuse facilities, and food sufficiency are also recorded. (The Senanga workshop adopted the definition of a household as a group that eats from a shared pot.)

The community register is kept by the CHW or the secretary of the NHC. The initial registration enrolls everyone in the community. While the vital events and census counts are calculated annually, the CBHMIS Workshop recommended that the registration data be updated quarterly through a round of household visits to capture as many events as possible. Community enumerators, like the CHWs, know most people in their communities and are aware of births and deaths that occur within the community; enumerators record these vital events as they happen. Nonetheless, worldwide experience indicates that some events, particularly deaths of newborns, may go unreported, and these events may be missed if the household registration is verified only annually. Missing these events, especially neonatal deaths and their corresponding births, or maternal mortality, creates inaccurate impressions when this data is used to assess the need for, or effects of, a maternal and child health programme.

The CBHMIS workshop also recommended that maternal mortality, which is sometimes estimated to be 800 to 1200 per 100,000 live births in some rural areas, be considered a notifiable event in the community district. The response would be to follow-up quickly with an investigation, perhaps using a verbal autopsy, and an action plan to address the factors underlying maternal deaths.

81

The community workers will use a very simple set of case definitions, to be developed by an epidemiologist, to assign the cause of death. While these causes will clearly not be as definitive as those that might be determined by a trained health professional, their use can enable better understanding of the causes of mortality in the community.

9.2.5.2. Community Map

Communities will be encouraged to map the households in their communities, along with major landmarks like roads, paths, rivers, and other water sources. These maps serve several functions:

- They enable a professional health worker from outside the community to locate a family quickly, by associating a physical location with the family's household number in the community registration.
- They illustrate areas that have limited access to clean water or to other basic infrastructure facilities.
- They enable risk mapping, a technique in which families with known health risks can be identified with coloured flags. Families with the risks removed can be marked with a flag of another colour. The health risk may be defined by the community and may change over time. This provides a way for community members, even the illiterate, to prioritize their own problems and then observe a change in the situation. For example, the community may decide to encourage use of impregnated bed nets for malaria prevention. The spread of bed nets could be shown with risk mapping.

9.2.5.3. Disease Surveillance and Service Delivery Registers

The registers kept by CHWs and tTBAs will depend on the types of services that they support. While all registers are described here, all communities will not keep all registers.

a. Outpatient Register. This register records the name, date of birth, gender, date of service, complaint (according to simplified case definitions supplied by an epidemiologist), treatment, and referral for patients seen by a CHW/tTBA. This data can be used to analyze disease patterns for the community profile and action plan, and can be used at Health Centres and districts for similar purposes.

b. Under Fives Register. This register records the name, date of birth, and gender of children under five. It can record the immunizations given and the weights of the child if the CHW/tTBA supports these activities. This data can be used to assess immunisation coverage and malnutrition weights. The under fives register may also be used to record episodes of serious disease or death. Used in the way the register can serve as a valuable source of information regarding the health problems of children.

c. Maternal Register. This register records the name, date of birth, and parity of pregnant women. Antenatal services, and their dates, are recorded by the tTBA, as well as the pregnancy outcome and date, and any postnatal services and their dates. At-risk pregnancies are also noted in the register. This register provides a way for the tTBA to track clients, especially those with identified risk factors. The register also provides data on maternal care and health and can serve as a reference point for quality assurance follow-up and support from a trained health professional. Recording the date of delivery next to the antenatal service provides a way for the tTBA to track pregnancy outcomes, like miscarriages and maternal or neonatal deaths, that might otherwise go unrecorded.

d. Home Visit Register. This register records the name, date of birth, date of visit, complaint, and treatment of patients referred by the Health Centre or hospital to the CHW for home based treatment. The register provides a patient record, an indication of the CHW/tTBAs' activities,

and serves as a reference point for quality assurance follow-up and support from a trained health professional.

9.2.6. Data aggregation

- 9.2.6.1 Data on demography and individual household health status/health needs can be compiled at the household level. The household records would then need to be aggregated at the community level to identify health needs. CHWs, TBAs, the secretary of the NHC, or other community members could aggregate the data.
- 9.2.6.2 Data on health services and utilisation, community initiatives and activities should be aggregated by CHWs.

9.2.7. Data analysis and reporting

As noted above, in Section 9.2.2, there are two main users of CBHMIS information.

- 9.2.7.1 Community leaders and individual household members.
- 9.2.7.2 Health officials, who use the information to supplement or complement data collected from their own HMIS.

The Senanga consultative workshop recommended that priority disease case data, maternal care, services to under fives, and water and sanitation activities be aggregated and reviewed monthly, but reported to the Health Centre quarterly. The CHWs/TBAs may negotiate a monthly reporting regimen with the Health Centre. Population counts are recommended to be updated quarterly and reported annually. CHW and TBA forms for monthly /quarterly reporting were designed at the Senanga workshop and are included in Annex 8.

It is anticipated that communities will acquire the skills, that will enable them to analyze reports independently and plan for activities meeting local needs and priorities. The communities may need support and feedback from health service professionals, and perhaps from other sectoral extension workers, when they plan to improve their health status.

While the main aim of a CBHMIS is to provide tools for the community in improved analysis and planning, the second aim is to improve the understanding of the health system. Information coming from the communities, must result in more appropriate planning of health centre activities geared towards the community needs. Therefore reports from CHWs, TBAs and NHCs need to be analyzed and aggregated at health centre level, and should be discussed with the Health Centre Committee (where NHCs are represented).

9.2.8. Resource requirements

9.2.8.1. Personnel

- For design and analysis - Technical assistance from health staff
- For data collection - Household members, community health workers/TBA, village health committee members.
- For data tabulation / analysis - Teachers, shop owners, and other educated people

9.2.8.2. Materials

- Stationery - Paper, pencils and pens
- Equipment - Weighing scales / bags, delivery kits
- Transport - Bicycles

89

9.3. Implementation Schedule for CBHMIS

The CBHMIS task force is in the process of designing reporting procedures and forms, and is preparing manuals for their use. It is anticipated that these processes will be completed by March, 1997. A six month period of pretest in Western Province communities with active NHCs, CHWs, and tTBAs is projected for April-September, 1997. The pretest will be followed by an evaluation and system revision. It is anticipated that the system can then be implemented in areas where community partnership initiatives have already begun. The CBHMIS task force does plan for an initial roll out phase by September 1997 in the districts in the Western Province only. The HMIS Development Team strongly recommends that the late 1997 roll out phase include other areas of the country that have developed a strong community organisational infrastructure.

Experiences from many different places in Zambia show that a strong partnership between health services and communities is a prerequisite for introducing a CBHMIS. Communities must experience a benefit when embarking in this work. A sustainable CBHMIS can only exist when there is a good community organisation, and when the health services indeed respond to community needs. The HMIS Development Team is in favour of a gradual introduction of a National programme for CBHMIS offering to districts, health facilities and communities a good set of forms, tools and procedures which can be applied whenever it is felt appropriate by the users. As with the (institution based) HMIS, a core system will be offered and adaptations to the local needs are welcome.

9.4. Interface with HMIS

For better understanding of the health services needs, community data are required. The essential health packages developed in Zambia are based on DALYs, calculated using mainly institutional data. DALYs based on community data would reflect much better the burden of diseases in Zambia. However, it is appropriate at this moment in time to warn against too high expectations of a CBHMIS. Experiences show that even in Districts with high coverage of NHCs and CHWs, not more than 75% of the population is covered. CBHMIS will provide figures for local use, and will provide additional information for national use, but will not replace community surveys, sentinel surveillance or a national census.

The indicators proposed for inclusion in the HMIS, listed in Annex 6, presume several data elements will be available from the CBHMIS, like the population numbers of target groups and incidence of diseases in communities. Implementation of the CBHMIS will also permit the collection of information on vital events, and the calculation of birth and death rates. In areas that do not have a CBHMIS, the national census, and the Central Statistics Office's (CSO) inter-census growth estimates, can be used for population counts. Cases of disease detected through the facility-based data in the HMIS can be used as indicators of the disease burden, in lieu of incidence rates. Data required for health flags, such as disease incidence estimates, will also rely on alternative data sources, such as the CSO and estimates from literature, until the CBHMIS is in place. Comparison of figures from a CBHMIS with figures from extrapolation of census or surveys will lead to a more comprehensive understanding of the real health status in the country.

In conclusion the CBHMIS will be of great value for local problem analysis and planning of local interventions. It can be used as an additional source of information for detection of national trends in diseases and health. Introduction of the CBHMIS should be planned locally by DHMTs, using the proposed forms and tools as a core system, adapted to local needs.

References

- Campbell, B et al. *From Data to Decision Making in Health: The Evolution of a Health Management Information System* (1996)
- DANIDA and Ministry of Health. *Health Sector Support Program* (1995)
- Data for Decision Making Project. *Summary of Results from the June 1996 Consensus Conference* (August 1996)
- Human Resource Development and Policy Unit. *Staffing Situation Survey for Ministry of Health 1995* (August 1996)
- Koot, J.A.R. *Health Management Information System Progress Report Formulation of a DART-HMIS* (August 1996)
- M&E Group Assessment Report. *Strengthening Disease Surveillance. Reviewing M & E Indicators. and Transition to the New HMIS* (April 1996)
- Ministry of Health. Health Reforms Implementation Team. *Quality Assurance Standards* (January 1995)
- Monitoring and Evaluation Group. *Health Sector Monitoring and Evaluation* (May 1995)
- Monitoring and Evaluation Group. *Proposal Report on Establishment of a Monitoring and Evaluation Office for the Health Sector* (May 1996).
- Pembamoto, B.G. and HRIT. *Systems Requirements' Document for the Development of the Ministry of Health's Health Management Information System* (September 1995)
- Republic of Zambia. Ministry of Health. *District Health Plan Guidelines for 1997* (June 1996)
- Republic of Zambia. Ministry of Health. *Monitoring the Essential Health Package* (1995)
- Republic of Zambia. Ministry of Health. *Handbook for District Health Board Members* (June 1996)
- Republic of Zambia. Ministry of Health. *National Strategic Health Plan* (July, 1996)
- Stefanini, A. et al., *Evaluation of the Pilot Health Management Information System in Uganda* (July 1995)
- Zambia Child Health Project. *Draft Project Paper* (April 1995)

91

BEST AVAILABLE COPY

**Annex 1:
Notifiable Diseases: Form Submitted by Health Institutions to the District
Health Office**

**Republic of Zambia
Central Board of Health**

**Notification of Communicable Disease
by Health Institutions to District Health Office ofDistrict**

Diagnosis..... suspected/confirmed by laboratory

Full Name of patient..... age.....sex.....

Address where sickened.....

Residential Address.....

Occupation

Date of onset Death no/yes, date

Probable place and source of infection.....

.....

In case of disease which could be prevented by vaccination.
was the patient vaccinated? Yes/No

Are relatives or other persons in environment suffering from the same disease? Yes/No

Action taken.....

.....

Support needed from DHO.....

.....

Disease notified by: Name Designation

Name of health institution Date

*NB: Notifiable diseases are: cholera, dysentery, meningitis, measles, plague, acute flaccid paralysis (suspected poliomyelitis), rabies, neonatal tetanus, typhoid fever.
For each patient notification form has to be filled in and sent to the District Health Office as soon as possible.*

**Annex 2:
Notifiable Diseases: Form submitted by the District Health Office to the Central Board of Health**

Republic of Zambia
Central Board of Health

Notification of Communicable Disease
by District Health Office ofDistrict to Central Board of Health

Weekly Report Form: Week..... From: (dd/mm/yr)..... to

Notifiable Disease:

Newly diagnosed cases during the week:

Age	Neonatal	0-11 months	1-4 years	5-15 years	Adults	Total
Cases Male						
Cases Female						
Cases Total						

Source of infection: probably one source / multiple sources of infection

In case of disease preventable by vaccination:

Age	Neonatal	0-11 months	1-4 years	5-15 years	Adults	Total
Vaccinated:						
Not vaccinated:						
Cases Total:						

Actions taken to limit epidemic:

.....
.....
.....

Support requested from CBoH:

.....
.....

Reported by: Name Designation.....

AB

Annex 3:

Hardware and Software Recommendations for Automated Support of HMIS

Four criteria have been used in recommending the hardware and software to be used for the Zambia Health Management Information System (HMIS):

1. Data storage and processing capacity commensurate with anticipated application.
2. Hardware longevity (potential to support common business applications for word processing, spreadsheets, and data analysis for coming 3-5 years).
3. Availability of local technical support and training.
4. Electronic protection against power surges and lightening.

At the District and Regional Offices, two computers with the following configurations:

1. For operation of the HMIS and other database applications like stock inventory, human resources, etc:

CPU: Pentium Pro 200 MHz
Memory: 32 Megabytes
Hard Disk: 1.6 Gigabytes minimum
Floppy Disk: 3.5 inch 1.4 Megabytes
CD-ROM
Mouse
Internal Modem: 28800
High density cartridge backup (Iomega Jazz or Zip: Syquest) with 4 cartridges
Monitor: 14-15" color SVGA with 1-2 Megabyte graphic card
Printer: Bubblejet with 4 extra ink cartridges
printer switch box with 2 printer, 2 computer capacity
Power: 220v
Dust covers for monitor, CPU, keyboard and printer

2. For office applications like word processing and spreadsheets, and backup for data processing:

CPU: Pentium 90 MHz
Memory: 16 Megabytes
Hard Disk: 1.2 Gigabytes minimum
Floppy Disk: 3.5 inch 1.4 Megabytes
CD-ROM
Mouse
High density cartridge backup (Iomega Jazz or Zip: Syquest) with 4 cartridges
Monitor: 14-15" color SVGA with 1-2 Megabyte graphic card
Printer: dot matrix, wide carriage with 2 extra ribbons
Power: 220v
Dust covers

3. Software: Windows 95

Microsoft Office Suite Professional for Windows 95 (includes Word, Excel, PowerPoint, and Access)
McAfee Antivirus
Norton Utilities for Windows 95
Eudora Pro email software
accounting software, to be determined by FAMS project
EpiInfo and EpiMap

4. Power backup and protection: 2 sets, one for each computer.

Power backup: 220v Uninterruptible Power Supply (UPS), providing 600 watts of power, with sine or stepped sine wave output.

Surge protector: 220v, with telephone cable connections and lightning protection, or

Surge protector: 220v and Telephone line lightning protector for electrical socket

At each first line hospital: one computer with configuration as specified in 1.. above (Pentium Pro 200 Mherz, etc). One set of power backup equipment, and one set of software.

At each second and third line hospital: two computers with configuration as specified in 1.. above (Pentium Pro 200 Mherz, etc). Two sets of power backup equipment, and two sets of software. (One computer to be used for HMIS, one for accounting.)

The M&E Directorate at the central level will likely need a server with workstations in order to store all of the data that is collected and analyzed through surveillance, surveys, special purpose studies, etc. Specification of the hardware and software for this need can be completed when the structure, staffing, and mandate of the directorate has been confirmed.

At this point, to operate the HMIS only, a minimum of: two computers with configuration as specified in 1.. above (Pentium Pro 200 Mherz, etc). Two sets of power backup equipment, and two sets of software.

Total equipment requirements:

70 District Offices (2 computers each)

70 Level I Hospitals (1 computer each)

12 Level II Hospitals (2 computers each)

4 Level III Hospitals (2 computers each)

4 Regional Offices (2 computers each)

CBoH M&E Directorate (8 networked computers)

95

APPENDIX B

**Requirements for International Tender Document for Computer Hardware,
Software, Installation, Maintenance, and Training at Districts, Regions, and Levels
I, II, and III Hospitals**

Requirements for International Tender Document for Computer Hardware, Software, Installation, Maintenance, and Training at Districts, Regions, and Levels I, II, and III Hospitals

Central Board of Health

I. Summary

The Central Board of Health is preparing to publish an international tender for supply of information technology to be installed at its District and Regional offices and at the Level I, II, and III hospitals. The purpose of this background document is to provide technical specifications for the technology to be purchased and the requirements for installation, ongoing equipment maintenance, and training, which will also be included in this tender. The specifications in this memorandum conform to the specifications in the *Health Management Information System Design and Implementation Plan: Annex 3*, recently published by the Central Board of Health (CBoH).

II. Information Technology Requirements

Four criteria have been used in specifying the information technology to be used for the Zambia Health Management Information System (HMIS):

1. Data storage and processing capacity commensurate with anticipated application.
2. Hardware longevity (potential to support common business applications for word processing, spreadsheets, and data analysis for coming 3-5 years).
3. Availability of local technical support and training.
4. Electronic protection against power surges and lightening.

97

At the District and Regional Offices, two computers with the following configurations:

A. Hardware: Highend. For operation of the HMIS and other database applications like stock inventory, human resources, etc:

CPU: Pentium Pro 200 Mherz, upgradeable chip emplacement

Memory: 32 Megabytes EDO RAM, upgradeable to 128 Megabytes, PCI Local Bus, 1 MB second level cache

Hard Disk: 1.6 Gigabytes minimum EIDE

Floppy Disk: 3.5 inch 1.4 Megabytes

Keyboard 105, English

CD-ROM, quadruple speed

PS/2 Mouse

Internal Fax/Modem: at least 14400 baud fax / 28800 baud modem

High density cartridge backup (Iomega Jazz or Zip; Syquest) with 4 cartridges

Monitor: 14-15" color SVGA with minimum 2 Megabyte VRAM graphic card

Parallel and 2 serial ports

EtherNet Card

Printer: Bubblejet with 4 extra ink cartridges

printer switch box with 2 printer, 2 computer capacity

Power: 220v, 60 cycle

Dust covers for monitor, CPU, keyboard and printer

B. Hardware: Standard. For office applications like word processing and spreadsheets, and backup for data processing:

CPU: Pentium 90 MHerz, upgradeable chip emplacement

Memory: 32 Megabytes EDO RAM, upgradeable to 128 Megabytes, PCI Local Bus, 1 MB second level cache

Hard Disk: 1.2 Gigabytes minimum EIDE

Floppy Disk: 3.5 inch 1.4 Megabytes

Keyboard 105, English

CD-ROM, quadruple speed

PS/2 Mouse

Internal Fax/Modem: at least 14400 baud fax / 28800 baud modem

High density cartridge backup (Iomega Jazz or Zip; Syquest) with 4 cartridges

Monitor: 14-15" color SVGA with minimum 2 Megabyte VRAM graphic card

Parallel and 2 serial ports, 16600 UART chip

EtherNet Card

Printer: dot matrix, wide carriage with 2 extra ribbons

Power: 220v, 60 cycle

Dust covers for monitor, CPU, keyboard and printer

C. Software. 2 sets, one for each computer.

Windows 95

Microsoft Office Suite Professional for Windows 95 (includes Word, Excel, PowerPoint, and Access)

McAfee Antivirus for Windows 95

Norton Utilities for Windows 95

Eudora Pro email software

Optical Character Recognition (OCR) fax utility

accounting software, to be determined by FAMS project

EpiInfo and EpiMap

6 copies of Atlas Geographic Information System (GIS); 1 for use at the centre and 5 to be distributed to selected districts where potential application of GIS can be tested.

D. Power backup and protection. 2 sets, one for each computer.

Power backup: 220v Uninterruptible Power Supply (UPS), providing 600 watts of power, with sine or stepped sine wave output at 60 cycles.

Surge protector: 220v, with telephone cable connections and lightening protection, or

Surge protector: 220v and Telephone line lightening protector for electrical socket

At each first line hospital: one computer with configuration as specified in 1., above (Pentium Pro 200 Mherz, etc; printer switchbox not required). One set of power backup equipment, and one set of software.

At each second and third line hospital: two computers with configuration as specified in 1., above (Pentium Pro 200 Mherz, etc). Two sets of power backup equipment, and two sets of software. (One computer to be used for HMIS, one for accounting.)

100

Total equipment requirements:

70 District Offices (2 computers each)

70 Level I Hospitals (1 computer each)

12 Level II Hospitals (2 computers each)

4 Level III Hospitals (2 computers each)

4 Regional Offices (2 computers each)

Total number of type 1 (Pentium Pro 200 Mherz, etc) computers: 160

Total number of type 2 (Pentium 90 Mherz, etc) computers: 90

Total number of computers, power backup, and software sets: 250

Notes:

a. Software procurement.

International Copyright regulations require that each computer have its own set of software. (EpiInfo and EpiMap may be distributed as diskette copies. However, each site, viz, each district, region, and hospital should have a complete set of documentation. Hence only one copy of EpiMap and EpiInfo need to be purchased for each site: a total of 90 copies.) Software sets should include complete documentation in English and original diskettes. Any factory installed software, including Windows 95, should be accompanied by original diskettes and complete documentation in English.

b. Power backup.

The power backup system should not require plug adapters on the input or output ends. The UPS unit should be fitted with the 3 flat prong plugs standard in Zambia, and the computer, monitor, and printer should be fitted with the plug type that is accepted by the UPS.

c. Hardware documentation.

All hardware, including computers, printers, and UPSs, should be accompanied by the manufacturer's original documentation in English.

III. Receipt of Equipment and Installation at Final Destination.

The receipt and installation clauses in the tender document should support the following objectives:

1. The bidder should be responsible for all actions necessary to receive the technology and transport and install it in its final locations at district and regional offices and at the hospitals.
2. Any expenses incurred because of equipment loss or damage or malfunction at the time of installation should be borne by the bidder.

The bidder is responsible for receiving the equipment at the port of entry and clearing it through customs. The bidder is responsible for arranging transport to the final destination and for installing the equipment at its final destination in the district and regional offices and in the hospitals. The bidder is responsible for coordinating with the firm contracted for training so that the equipment can be used during the training and then installed in its final location (see below). The bidder is responsible for any intermediate storage required during this process.

The term "installation" includes putting all software procured through this tender on each computer, as well as setting up the equipment. After setup at the final destination the bidder is required to run the manufacturer's standard suite of hardware diagnostics on both computers and printers, as well as telecommunications devices, and to open and exercise each piece of software to ensure that the technology is in proper working order. The bidder is responsible for any and all repairs and replacements required to put the equipment in proper working order at the final destination.

IV. Maintenance of Equipment.

The maintenance clauses in the tender document should support the following objectives:

1. Ongoing, on-site, support for the equipment, including spare parts, for a warranty period of one year after installation, with clear guidelines for acceptable equipment downtime.
2. Delivery of technical support should not require CBoH, MoH, district, or hospital resources or intervention after the notification of a problem. Specifically, any transport of equipment or personnel is the responsibility of the technical support organization.
3. The bidder should be able to provide ongoing technical support after the warranty period, and estimate these costs, so that the Ministry can budget for recurrent costs.

102

The bidder is responsible for providing on-site service and spare parts for all equipment supplied for the warranty period guaranteed by the manufacturer. At a minimum, this period should extend for one year from the installation of the equipment at its final destination or 18 months after the arrival of the equipment in Zambia, whichever is shorter. The service technician must arrive on-site within one day after notification of a problem if the location is within two hours by road of Lusaka. The service technician must arrive on-site within two days if the location is more than two hours distance by road from Lusaka. If the equipment is not repaired within one day after the arrival of the service technician, a replacement machine must be supplied until the equipment can be repaired. The replacement machine must be the same model as the equipment in need of repair, and, in the case of computers, must have the same software installed. Failure to provide this support will result in penalty. The bidder should provide evidence that the organization responsible for the service within Zambia has adequately trained technicians and an adequate supply of spare parts to complete this portion of the contractual obligation, along with reasonable assurance that the company will continue to be able to provide a maintenance contract for a period of five years after the installation of the equipment.

All expenses incurred in on-site repair during the warranty period, including transport of equipment and personnel, per diem expenses for personnel, and replacement parts, are to be borne by the bidder.

The bidder should prepare a draft maintenance contract for ongoing support of the technology supplied after the warranty period ends, including services to be provided under the contract. The ongoing support will be subject to the equipment downtime guidelines mentioned above. The bidder should also supply an estimate for the amount to be budgeted for replacement of spare parts.

V. Training.

The training clauses in the tender document should support the following objectives:

1. Staff who will use the equipment supplied should be trained in basic computer literacy skills, including operation of the hardware, word processing, spreadsheet, and email.
2. Training should be done on the equipment that will be installed at the trainee's work location, and the ratio of trainees to equipment and ratio of trainers to trainees should ensure that each student receives hands on time and individual attention.

Upon completion of the training program the trainees should have the following skills:

- format and copy a disk and run a virus check program on both hard and floppy disks;

- write a letter or memo and print it out;
- prepare a spreadsheet that includes the basic arithmetic operations of addition, subtraction, multiplication, division, and calculation of proportions; prepare a graph using this calculated data; print the table and associated graph;
- send and retrieve an email message with an attached file.

The trainers should check each trainee's work to ensure that the trainees have acquired the prescribed skills. A certificate of competency should be signed by the trainer and presented to each trainee who acquires these skills; the certificate should not be presented to trainees who do not acquire the skills.

Four participants for training will be invited from each site: the Deputy for Planning, the Quality Assurance focal point, the Health Information Officer, and the Data Aggregation Officer. (Find out corresponding positions from hospitals.) The training period is estimated to be 6 days; the trainer to trainee ratio is projected to be 1 to 4. Using the equipment that will be installed at the final destinations, the ratio of computers to trainees is 1 to 2.

There are several training strategies that could be used to accomplish objective 2, above.

- a. All trainees could be assembled in Lusaka and trained at one time. This is probably not realistic because of the expense of bringing staff to Lusaka; the need to have a large number of trainers; and the difficulty of finding a suitable venue. In this model the training and installation at final destinations could probably be accomplished in 4-6 weeks.
- b. The other extreme alternative is to train each group at their work locations. This is probably infeasible because of the large number of trainers required to accomplish the task in a reasonable time. This alternative also eliminates the opportunity for trainees from different locations to learn from each other. In this model the training and installation at final destinations could take take 14-20 weeks. (This method would require at least 70 separate training sites, assuming hospital and regional training could be conducted with district training.)
- c. The option that lies between a. and b. is to train in groups, perhaps by province. This could be staged in two or three phases. In this model the training and installation at final destinations could take take 6-10 weeks.

The bidders are invited to present a strategy for accomplishing the training objectives. The strategy should include an estimate of the time required to complete the training as well as a cost estimate.

VII. CBoH Preparations for Equipment and Internal Technical Support.

While the activities described in this section do not form part of the tender offer, the information is included to document the CBoH efforts that will complement and support the investment made through the tender. The objectives of the CBoH activities described in this section are:

1. Ensure that the final destinations for installation of the information technology meet the minimum standards.
2. Provide ongoing support and followup to ensure that the technology is used.

Employment of an 8 person team to support institutionalization of information technology has already been projected by the HMIS development team in its Task List of 23 October, 1996. This team will pursue objectives 1 and 2, above, from site preparation beginning in February, 1997, through the first use of the automated HMIS to support the district annual planning exercise in September-October, 1998. Team members will have the following qualifications:

1. Experience in managing computer operations at an organization in Zambia or comparable setting for at least two years. This experience should include troubleshooting.
2. Substantial experience and skill in using wordprocessors and spreadsheets, preferably the Microsoft Office Suite.

Team members will spend 80-90% of their time in the field, providing support to locations where the equipment has been installed.

The following schedule of tasks projects a date of 1 April, 1997, for arrival of the technology in Zambia:

- 1 Dec '96 - 15 Jan '97: Recruitment of team members.
- 15 Jan - 1 Feb '97: Team members develop checklist for site preparation and prepare description of site requirements for review with officers at final destinations. (Site preparation does not include construction; it denotes provision of a clean environment with electrical and telephone connections, desk, and cabinet space.) CBoH informs final destinations of projected training and technology installation, and of preparatory visits of support team members in February and March.
- 1 Feb - 31 Mar '97: Team members visit each site to identify locations within the existing offices that have necessary electrical and telephone connections in an appropriate environment. Team members document each visit in writing, with one copy to the District Medical Officer and one copy to the CBoH HMIS team leader. This documentation will include the agreements reached on technology placement as well as any potential problems at the site.
- 1 Apr - 31 May '97: Team members assist bidder with training and installation of equipment.

105

- 1 Jun - 31 Aug '97: Team members visit each final destination, spending 1-3 days at each site, providing followup support and training as necessary. Team members document each visit in writing, with one copy to the District Medical Officer and one copy to the CBoH HMIS team leader. This documentation will include examples of how the equipment is being used, as well as any problems observed in institutionalizing its utilization.
- 1 Sep - 31 Dec '97: Team members provide followup visits to sites with problems identified in the previous quarter, documented as described in Jun-Aug round; attend HMIS training for district officers; and assist in pretest development of automated HMIS.
- 1 Jan - 30 Apr '98: Team members perform second round of visits to each site, to provide followup support and prepare for training in automated HMIS in the second quarter of 1998, with documentation as described in Jun-Aug '97 support round.
- 1 May - 30 Jun '98: Training in automated HMIS.
- 1 Jul - 31 Sep '98: Followup visits to each site for support in use of automated HMIS, with documentation as described in Jun-Aug '97 support round.
- 1 Oct - 15 Nov '98: Followup visits as necessary to support use of automated HMIS in preparing annual district plans, with documentation as described in Jun-Aug '97 support round.

106