ADDIS ABABA UNIVERSITY

SCHOOL OF GRADUATE STUDIES

DEPARTMENT OF INFORMATION SCIENCE AND SCHOOL OF PUBLIC HEALTH

ASSESSMENT OF THE NEW HEALTH MANAGEMENT INFORMATION SYSTEM IMPLEMENTATION IN PUBLIC HEALTH FACILITIES AND INSTITUTIONS IN ADDIS ABABA.

By

TILAHUN ALEMU

ADVISOR: MESFIN ADDISSE (MD, MPH)

A Thesis submitted to The School of Graduate Studies, Addis Ababa University in Partial Fulfilment of the Requirement for the Degree of Masters Of Science in Health Informatics

June 2010
Addis Ababa

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Name and signature of members of the examining Board

_____ _____

Chairman, Examining Board

Dr. Mesfin Addisse _____

Advisor

_____ _____

Examiner

Dedication

This work is dedicated to sons: Abdulhafiz Tilahun and Abdulfethah Tilahun who didn't have their father's follow-up and care during my study.

ACKNOWLEDGEMENT

Above all, my success is totally attributable to God. Given this, there are many individuals from whom I have been greatly indebted.

First of all, I would like to express my gratitude to my advisor, Dr. Mesfin Addisse for his unfailing patience, unreserved and valuable advice without whom this thesis would not have been a reality.

I am also indebted to Ato Feleke and sister Million from Tullen University Technical support agency for Ethiopian HMIS and W/ro Fantu acting head of Addis Ababa regional health bureau giving me an idea when selecting research topic and Ato Lemma from Informatics faculty and Dr. Adamu from School of public Health, Addis Ababa University for their invaluable comment on final draft.

Special thanks go to all respondents in hospitals, health centres, sub cities and regional health bureau for their kind support and interest to scarify their time fill the questionnaire and conduct interview.

I am thankful to Biya Abafia, Temesgen, Adem, Mebrahatu, Dr. Girma, Shemsedin, all of my teachers and other staffs of the informatics faculty and school of public health Addis Ababa University and colleagues in Kirkos Sub City for their encouragement and other necessary support during the whole research process.

The most important acknowledgement, by far, is to my best-half Fethiya Sunka, for her relentless effort being responsible for the whole family matters besides her priceless support, encouragement and care during my study.

Finally, I must thank Kirkos sub city for sponsoring my study.

ABSTRACT

Background: Health Management Information System (HMIS) supports informed strategic decision making through the production of quality data and information for action that helps mangers and health workers plan and manage the health service system. HMIS is one of the major 'core' activities given due attention even though the ongoing 'business-process re-engineering' in HMIS program has resulted several measures to be taken.

Objective: To assess the new HMIS implementation status in Addis Ababa.

Methods: A cross–sectional, descriptive study was conducted. Purposive sampling was used. Structured questionnaire, in-depth interview and observation were made between March and April 2010. Both HMN and PRISM frameworks were used to evaluate the results.

Result: There were 220 respondents and among them, 80% were clinician health workers. The majority of respondents (94.5%) did not participate in the designing efforts of the new HMIS and one hundred fifty one (68.6%) respondents are currently involving in the HMIS activities. There is no incentive (93.6%).Two hundred and eleven (95.9%) respondents use HMIS for reporting purpose. Implementation lacks ownership (91.4%), coordination and leadership (85%), strategy and policy (63.3%), motivation (92.7%), shared responsibility among stack holders (57.7%) and not considered as the extension of the previous HIS(92.%).

Conclusion: large numbers of respondents currently participate in the manual based HMIS activities through a well designed data collection and reporting formats. A short period on job-training, absence of incentive, motivation and lack of management support lead to poor information use culture that is limited mainly for a send-report purpose. HMIS Implementation suffered from ownership, follow-up, communication and leadership.

Recommendation: HMIS should be a core activity furnished with appropriate human, material and financial resources. Improved data processing and management should be accompanied by Skilled and trained health workers with appropriate ICT use. Management shall support, facilitate and motivate information use culture. HMIS implementation in Addis Ababa should have ownership, follow up, coordination, cooperation and communication among stack holders.

Key words: HMIS, HIS, Data Quality, Information Use, Implementation status.

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LIST OF ACRONYMS

AAU	Addis Ababa University
AARHB	Addis Ababa Regional Health Bureau
AIDS	Acquired Immune Deficiency Syndrome
BPME	Budget, Planning, Monitoring and Evaluation
BPR	Business process re-engineering
CHeSS	Country Health System Surveillance platform
DHIS	District Health Information System
DHMIS	District Health Management Information System
Epinfo	Epidemiological Information Software
HIV	Human Immune Deficiency Virus
FMIS	Financial Management Information System.
FMOH	Federal Ministry of Health
HC	Health Centre
HIS	Health Information System
HMIS	Health Management Information System
HMN	Health Metric Network
HMNF	Health Metric Network Framework
HRMIS	Human Resource Management Information System
HSDP III	Health Sector Development Program III
HSIS	Health Service Information System
HSMIS	Health Service Management Information System
ICD	International Classification of Disease
ICT	Information and Communication Technology
IDS	Integrated Disease Surveillance

IPD	In Patient Department
LMIS	Logistic Management Information System
LQAS	Lot Quality Assurance Sampling
M&E	Monitoring and Evaluation
MCH	Maternal and Child Health
MDG	Millennium Development Goal
MPI Box	Master Patient Index Box
NGO	Non Government Organization
OPD	Out Patient Department
PAMIS	Physical Assets Management Information System
PHC	Primary Health Care
PICT	Provider Initiated Counselling and Testing
PRISM	Performance Routine Information System Management
SPSS	Statistical Package for Social Sciences
TB	Tuberculosis Bacilli
WHO	World Health Organization

CHAPTER ONE

INTRODUCTION

1.1. Background

The digital age is transforming our world at a dramatic speed (1). New technologies as well as new way of doing things have been developed in the use and development of information as a vital resource where countries development status is being measured on the capability of production and usage of this resource for different strategic purpose (2). Information that is presented in the form and format convenient to the potential users at the right time and place is needed in every walk of life (3). Health Management Information System is even more vital in developing countries where the trends of disease are severed and resources are limited (4). It is in these countries that the need for HMIS is given more attention where most of the health interventions are financed and technically assisted by donors (5).

Health System is a set of all interrelated resources, organizations and actors that are involved in the regulation, financing, and provision of actions whose primary intent is to protect, promote or improve Health (6). Health Information System (HIS) is the component part of the health system that integrates data collection, processing, reporting, and use of the information necessary for improving health service effectiveness and efficiency through better management at all levels of health services (7). These systems in general transforms raw facts or figures (data) into information by adding order, context, and purpose and then into a body of health knowledge by attaching meaning to this transformed data (information)(8).

Health Information System therefore plays an important role of providing information about past and current health status and conditions of health at all level of the service structures, which further helps to formulate health strategies to improve health care services (9). The effective use of HIS is possible only when the data it provides reflects, more or less, the reality about health indicators, i.e. it must be timely, complete , and accurate; more importantly, this data should be used(10). Thus, health Information Systems are increasingly important for measuring and improving the quality and coverage of health services (11).

The Health Information System (HIS), therefore, generates and provides timely, relevant and appropriate information to the health seekers, planners and decision makers on the status of health care system. Health Management Information System (HMIS) is concerned with the provision of information for effective health management at individual facilities and societal level. An effective HMIS is necessary for managerial improvement. It helps to plan health services and evaluate health programmes, monitor health status, service needs and set priorities for the allocation of health care resources based on timely and accurate information (12).

The World Health Organization (WHO) has emphasized the major obstacle for the achievement of health for all in the year 2000 was due to the lack of improved HMIS that support effective health management (13). The primary aim of HMIS is to support informed strategic decision-making by providing quality data that help managers and health workers plan and manage the health service system. HMIS promotes the utilization of health data and information for decision making at all level from the routine day to day health care services to the highest policy making (6). It is, therefore, vital for timely generation, analysis and dissemination of information for public health decision making. and insure use of health information in decision making at federal, regional, district and health facility levels (7).

Ethiopia has signed an agreement to monitor and report its progress towards MDG with the WHO and the United Nations (UN). For this purpose, the HMIS/M&E strategic plan aims to a shared monitoring and evaluation system in Ethiopia. The ministry of health (MOH) has, therefore, given more emphasis to HMIS for successful implementation of Ethiopian Health Sector Development Program III (HSDP) (14).

HSDP III has considers HMIS as one of the seven core process of the health sector that promotes one plan one budget and one report through the provision and use of information that can evaluate and monitor the progress of the country towards better health delivery (15). The specific objective of Ethiopian HMIS is 'to increase the quality of management of the health system by developing a functional HMIS which provides quality information that can be used at all levels of the health system for planning, managing, monitoring and evaluating their respective activities (16).'

Despite the fact that HMIS has the purpose 'to support informed strategic decision-making by providing quality data which help managers and health workers in planning and managing

the health services; monitoring disease trends and control epidemics; provide periodic evaluation towards agreed targets,' health information in Ethiopia is rarely used for management decision making since data is collected and reported in multiple formats characterized by incomplete, untimely reporting and poor quality (15, 16). These lead to the new HMIS reform to start from June 2004 onward focusing on the design of reporting formats, training of staffs and computerization of the system using localized DHIS (13).

'Strengthening the Ethiopian HMIS project' was carried out by John Snow Inc. (JSI) with the objective to review, design and implements a cascaded national HMIS & ME strategy and system. It was carried out based on performance-based approach with rationalized use of ICT with a view to successfully implement, monitor and evaluate the HSDP III, SDPRP II and the Health MDGs (17).

HMIS process re-engineering assessment report of 2006 showed that the existing HMIS is one of the major problems of the health sector and evaluates its performance capacity, efficiency and effectiveness at national level (18).

The new Ethiopian HMIS is launched on June 8, 2007 with the goal of 'creating comprehensive and standardized national HMIS for evidence based planning and management of health services as well as decision making at all levels-community, health facility, woreda, regional and federal levels (18,19). The new HMIS program focuses on information use, data quality, data burden, human resources, Information and Communication Technologies (ICT) and financial resources. It is believed to improve health system efficiency and effectiveness through the following guiding principles: standardizing, recording & reporting forms, integration, simplification, human resource development and ICT application (19).

Implementation process began with pilot running on selected facilities and implementation scale-up is now operational in four of smaller regions and is aimed at to roll out to all regions including Addis Ababa (18).

1. 2 Statement of the problem

The national health information systems of Ethiopia focuses on the promotion and prevention of disease targeting on primary heath care (PHC) services through the provision of information for planning and managing the health care system (16). Health promotion and prevention of disease is facilitated with decentralized administration in which Woredas have the mandate to decide on their budget. Thus, districts becomes the most appropriate level for coordinating top-down and bottom-up planning and coordinating stakeholders efforts through improved health information system (13).

The major problems that contribute HMIS not serve its purposes and met its objectives are lack of attention given to HMIS, shortage of resource and lack of strategic direction (15) as well as lack of integration, absence of standards and guidelines, inadequate staffing and poor ownership(16).

On the other hand, the ongoing 'business-process re-engineering' in the health sector and HMIS program in particular has resulted several measures to be taken. There is still considerable lack of clarity around the role of specific technical support agencies in roll-out of the HMIS, especially Tullen University which has been leading this work in the past two years (10).

It is, there for, essential to assess the effectiveness as well as the challenges and prospects of the new HMIS implementation.

This study, tries to assess the nature and problems related to the new HMIS implementation program supported by Tullen University at facility, sub city and regional level. It tried to assess the implementation process interms of weakness and strength in data capturing and reporting design, maintaining data (information) quality, encouraging information utilization for action, assess the contribution of technical support to strengthen HMIS units at facility, sub city and regional levels to accommodate and fully implement the program on all facilities and sub cities in Addis Ababa.

1.3 Research Questions

This research is mainly aimed at answering the question ‘’to what extent is the new HMIS implementation program is successful?’’More specifically, this study is designed to assess and give answers for the following questions:

- How recording and reporting is designed in the new HMIS?
- What were the characteristics of the previous HMIS and how the new HMIS tries to transform the existing health information system*?*
- How best of the new system in data capturing, and reporting, maintaining data (information) quality, utilization information for action?
- What are some common steps and reforms planned in the new HMIS implementation?
- What are critical success factors in HMIS implementation?
- What other issues need to be settled if any? And finally tries to suggest possible solutions for success and sustainability of the new HMIS as well as the betterment of the health system in general.

1.4. Objective

1.4.1. General objective

General objective of this study is to assess the status of new Tullen University Supported HMIS implementation program in public hospitals, health centres, sub cities and regional bureau level in Addis Ababa.

1.4.2. Specific objectives

The specific objectives of this study are:

- ✓ To assess the data capturing, reporting and information utilization,
- ✓ To identify the strengths and weaknesses of the new HMIS implementation,
- ✓ To describe factors affecting the implementation of the program;
- ✓ To propose possible solutions for the effective implementation of the new HMIS.

1.5. Significance of the study

This research is primarily aimed at fulfilling the academic requirement. It can also serve as a starting point for assessment of the current HMIS based on the situation in public facilities, sub cities and regional bureau in Addis Ababa to identify the strength and weakness of the system at national level to make appropriate measure at infantile stage of implementation. The research can therefore serve to understand ideal and practical situation of the new HMIS in Ethiopia through this work on the current trends in Addis Ababa Health Bureau. This assessment is therefore significant

- ✓ To Addis Ababa Health Bureau take corrective measures on areas functioning least in the new HMIS.
- ✓ To serve as a spring board for those who wish to adopt and extend it further in wider and deeper scale at national level.
- ✓ It can be an addition to the existing literatures and to the efforts in this regard.

1.6. The Scope of study

This study is focused on the assessment of the new HMIS practice based on the Performance of Routine Information System Management (PRISM) and Health Metric Network (HMN) frameworks that emphasize the production of quality data and the continuous use of information for action along with adequate human, material and financial resources. This study is, therefore, limited to routine health services of health facilities and health institutions in Addis Ababa implementing the new Ethiopian HMIS.

1.6. Organization of the Study

This paper is divided into six chapters. The first chapter deals with introduction, statement of the problem and justifications for the study, research questions, objectives of the study and limitation of the study.

Chapter two deals with review of relevant literatures on HMIS, Health sector reform, HMIS and Health service management, HMIS Re-design and International effort, sustainability of HMIS reform, HMN and PRISM frameworks, HIS reform practice in Africa and evaluation researches on HMIS.

Chapter three deals with methodology of the study. It covers study area and its design, source and study population, sampling and sampling procedures, quantitative and qualitative study, data collection techniques: questionnaire, in-depth interview, observation), data analysis, data quality management, ethical consideration and operational definitions.

Chapter four deals with the presentation and analysis of data collected through questionnaire, in-depth interview and observation

Chapter five deals with the discussion of the findings.

In the last chapter, the conclusions and recommendations of the research based on the research findings is included.

A bibliography of available writings cited is attached to indicate sources consulted while conducting the study.

The questionnaire and interview structure is also attached under the annexes as last part of the research paper.

CHAPTER TWO
REVIEW OF LITRATURES

2.1. Introduction

Relevant literatures that are hoped to be useful for this assessment study on the implementation status of the 'New' Ethiopian HMIS implementation program are reviewed as follow.

2.2. Health Management Information System

Health Management Information System (HMIS) is used to refer to the predominant concept of a formal and structured health information system set up to support and facilitate health management decision-making at different levels of any health system. It is designed to carry both epidemiological information (health prevalence, incidence, mortality, and morbidity statistics) and administrative information (resource inputs and service utilization). Effective and efficient HMIS would provide district health managers with the information required to make effective strategic decisions that are the vehicle for district performance and sustainability in these decentralized health systems (20).

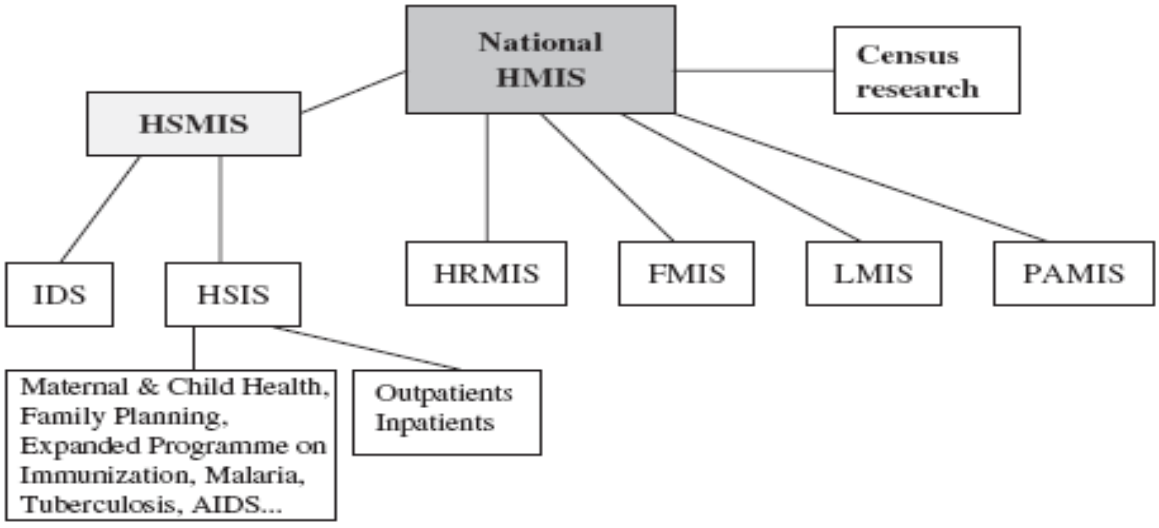


Figure 2.1: Integration model of the national health management information system (40).

It can be said that HMIS has different sub components including HSMIS that is mostly concerned with report generation from routine service activities and use information for evidence based management decision making. However, for the purpose of this study, HMIS, HSMIS and HIS are used interchangeably.

2.3. The Health Sector Reform

The world health organization has defined health broadly and positively as state of complete physical, mental, social and psychological wellbeing; not merely the absence of infirmity and diseases (7). This suggests that clear understanding of the concept and definition of health from societal perspective is important for the better management of health sectors since health is viewed not simply as a problem of disease but of all factors contributing to lower the quality of life that the poor experience (21).

The global public health reform emphasise societal effort for the betterment of the health system at large. This public health reform is characterized by the shift from curative to preventive care, from individual and hospital care to community and public health care, from centralized to decentralized health care, from a specific project approach to a comprehensive sectoral approach. This reform inturn has necessitated the restructuring of fragmented health information systems into single comprehensive health management information systems. The restructuring of health information systems has become an important trend in the entire developing world since the adoption of primary health care as a global strategy for achieving the 'health for all' goals (9). In addition to this, effective public health practice requires timely, accurate and authoritative information from a wide variety of integrated sources (22).

In line with this public health reform, governments, states and international organization are now introducing many reforms such as decentralization, integration of different health programs, strengthening of management practices, and the introduction of Information and communication technologies (ICTs) to strengthen the health sector (23). ICTs are considered as enabler and as key factors in achieving administration reform based on decentralization through the diffusion of information to local areas in developing countries (24).

2.4. HMIS and Health Service Management

Health care is the total societal effort, undertaken in the private and public sectors, focused on pursuing health. Health service, on the other hand, is specific activities undertaken to maintain or improve health or to prevent decrement of health. It can be preventive, curative, rehabilitative, or palliative in nature. Health care and health service provision now a day is dependent on well functioning health information system. The establishment of well co-ordinated information systems at the various levels of the health care system in developing countries, using appropriate staff could contribute greatly to improvements in health care delivery (25).

The world health organization (WHO) has long identified health information systems as critical for achieving health for all. A report of a WHO meeting (1987) clearly links improved health management to improved health information systems. Health information systems (HIS) generate information in order to inform health planners and decision-makers on what is happening at health delivery facilities. In this way, health management information systems improve health management and health management is a pre-requisite for good health delivery services (26). HMIS, therefore, fills the gap between disease occurrence (health problems) and the response of the health service providers. This health information that come usually from routine data sources and sometimes collected from large population studies or from community surveys is believed to be an indispensable resource for effective health management by enabling decision-makers at all levels of the health system, identify health related problems and needs, make evidence-based decisions, make optimal allocation of scarce resources. To meet these objectives, HMIS has to generate meaningful, reliable, accurate and timely information to the health managers (13).

2.5. Health Information System Redesign

Integrating all societal efforts, health services as well as different health programs such as integrating Malaria, Tuberculosis, STD/AIDS programmes that impose their unilateral data requirement recall HIS redesign and integration since they follow diverse reporting and monitoring systems. Such reforms within the multiple separate health related efforts, services and programmes on the other hand is very challenging since multiple actors, agendas, organisational culture, particularities of the disease and technology involved (27).

Health services, on the other hand, are heavily dependent on foreign financial and technical support from aid agencies; being vulnerable to donor's policy. This trend limit the scope of national decision-making, leading to duplication of efforts, lack of coordination, wastage of resources and outcomes are controversial (28).

This clearly indicates that redesign of HIS in most cases is initiated and operated by those foreign agencies who provide the financial and technical support with no or limited local intervention.

2.6. Components of Health Information System

The HIS or HMIS is a "system" which has an organised set of interrelating components that can be grouped under two entities: the information process and the health information system management structure (11).

Through the information process raw data (inputs) are transformed into information in a "usable" form for management decision-making (outputs). The information process can be broken down into the following components: (i) data collection, (ii) data transmission, (iii) data processing, (iv) data analyses and (v) presentation for use in planning and management of the health services.

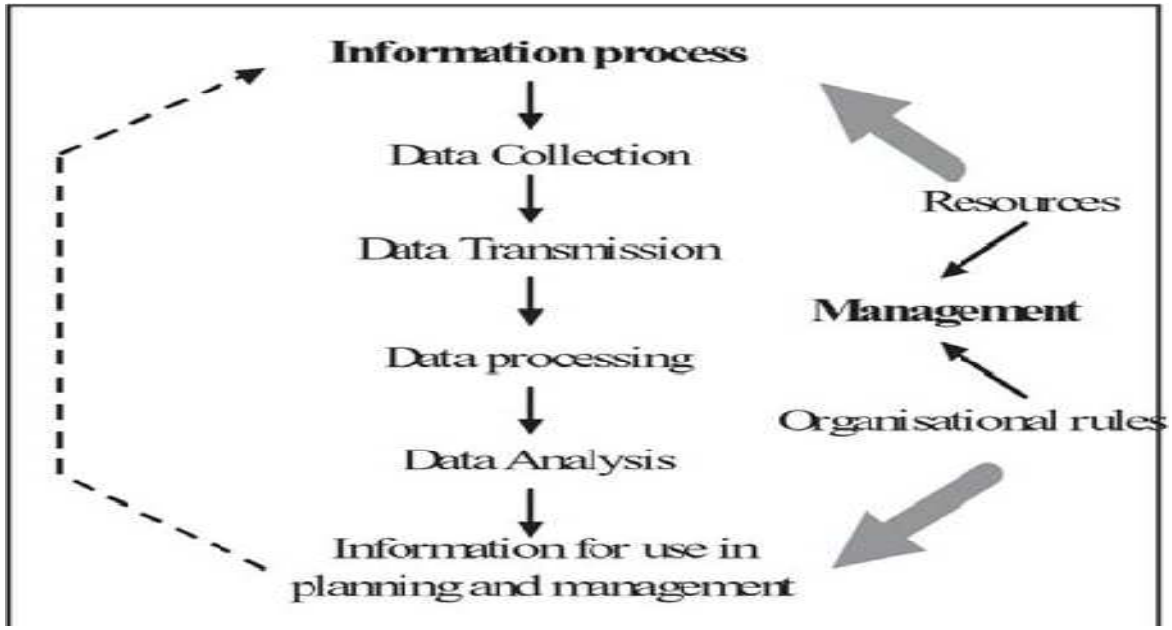


Figure2. 2: Components of Health Information System and ideal Data and Information Flow (WHO 99362)

The above figure 2.2. Shows that five steps of the information process represent a set of critical pre-requisites for a well functioning HMIS. A critical review of these steps may therefore help us to understand what is still lacking to establish a fully operational HMIS and Health Service Management (29**).**

The management structure of a HIS/HMIS includes both planning for the required health information system resources, and developing a set of organizational rules for health information system management.

According to Smith, information system can be seen as a set of elements working interactively to gather and process input data and to disseminate and distribute output information. Information system is composed of five components: hardware, software, data, process, and people (30).

2.7. International Efforts in HMIS Redesign and Implementation

It is widely recognised that interventions in the activity of HMIS redesign and implementation are "a very cost effective technical and financial investment'' (31).Donors are key vehicle in the coordinated and sustainable health information system redesign. Hence, global development organizations along with national and local governments are investing efforts to support and improve the management of the health sector through building sustainable HIS by empowering local capacity through exchange of experts in the field, education programs, and skills as well as investing funds (32).

WHO has taken a lead in helping low-income countries develop HIS by providing technical and financial support to assess, design and develop such systems. No standard development strategy for WHO support is used, but specific principles for guiding HIS development and technical cooperation are encouraged (33).
WHO has recommended that successful Health Information System Redesign should meet the following guiding principles (GP) (7):

GP1.Do not destroys existing systems; build on the strength and learn from the weakness of what already exists

GP2.Different administrative levels in the health system have different roles, and therefore have different data needs. Not all data needs should be generated through the routine system of data collection. Data that are not frequently needed or are required only for certain subsets of the population can be generated through special studies and sample surveys.

GP3. Not all the data collected at a certain level need to be submitted to higher levels. The most detailed data should be kept at the source, and reporting requirements to higher levels should be kept at a minimum

GP4. The capability of the staff who will be tasked with filling out the forms must be taken into consideration in designing them. The most effective data collection and reporting tools are simple and short.

GP5. The way the HMIS data is processed should be consistent with the objectives for data collection and the plans for data analysis and utilization.

GP6. Training programmes should be designed according to the needs and level of the target groups.

GP7. The system should be pre-tested in conditions that reflect as much as possible the actual conditions prevailing during its implementation.

GP8. The goal of monitoring and evaluation is not to focus on what is wrong and condemn it; rather, it is to highlight the positive aspects of the system that make it work, as well as to identify what went wrong as a basis for improving the system.

GP9. An effective way of motivating data producers is to constantly provide them with both positive and negative feedback on the status of the data they produce.

GP10. The development of the HMIS is always a work in progress. It is a dynamic endeavour where managers and workers strive for constant improvement.

Health Information System Program (HISP) is an international program which encourages the governments of developing countries to develop Health Information Systems adapted to their needs in an effort to bring them up to par with developed countries. HISP started in South Africa in 1994 with a mission to put in place sustainable and flexible Health Information Systems that meet the needs of the local populations in such a way that many developing countries can learn from the experience of sustainable and flexible health systems introduced elsewhere. It is also necessary for developing countries to explore the roles, influences, and relations between the global, the local, and the field levels. The resources of HISP (ICT) solutions, materials, and experiences) are shared based on Free and Open Source Software principles (34).

The District Health Information System (DHIS) software was first developed in 1998 and has been customized into national needs in several countries and translated into many languages, such as, Portuguese, Swahili, Spanish, Telugu, Russian, Mongolian, French, Chinese, and Vietnamese. The main mission of HISP has been maintained Since DHIS has been expanded to many other countries in Africa and Asia and about 70% of HISP activities are training for health workers and health managers since large scale training and support schemes in the use and management of health information consume 70-80% of the resources allocated to system development (35).

The HISP program in Ethiopia was started with team of Ethiopian and foreign experts by providing consultancy, coordinating HISP tasks including arranging and conducting trainings, meetings with the ministry of Health and developing tools that facilitate the use of DHIS at woreda level (34).

With such international efforts, a functional HMIS is using a break through ICT tools in data collection, processing, analysis and information use whenever returns are high and risks are low compared to the paper based data management tools. Kimaro and Nhampossa have said that “the creative use of microcomputer technology is one of the most promising means of improving the quality, timeliness, clarity, presentation, and use of relevant information for primary health care … and in health information systems in general…”(35).

2.8. Sustainability of Health Information System Reform

Sustainability can be seen as a process, starting from the inception of the system, to the various processes around design, development, support and implementation. Sustainability concerns the longevity of these processes and how they co-exist over time, especially once external support is withdrawn. It means that no external support is needed to continue its existence (36)

Poor focus on the development of local expertise on the part of donor initiated projects and the tendencies of neglecting of social and organizational issues are cited as factors contributing to the problem of ineffective implementation and sustainability of IS in developing countries (11). Heeks points out what is transferred is not only machines, hardware, software, skill and knowledge but also the attitudes, the value systems together with the social, political, and cultural structures (37).

Specifically, Health information systems are complex social systems that tend to be deeply embedded in social working practices. Scholars argue that "the success of a health information systems reform depends not only on technical improvements but also on in-depth understanding of political, socio-cultural, and administrative factors" (38). No matter how good the design of an information system, it will not be effective unless there is internal desire, dedication and commitment of leadership to have an effective and efficient health service management system" (39)

According to Land, the aforementioned determinant factors for the successful adoption of new HIS can be regrouped into six as- motivation for introducing the new system, commitment to the system, organizational culture, the management of the implementation process, the 'distance' between the existing system and the replacement system and the technology itself (40).

2.9. Health Information System Reform Practices in Africa

Assessment of health information system reform practice in Africa show that the process of HIS redesign and introducing a final version demands continued and collaborative efforts of all stack holders in the health care industry.

HIS in Uganda was started before 1985 and was focused on vertical reporting system on narrow and specific communicable diseases. A first revision in1992 introduced an integrated horizontal approach whereby more information on management aspects could also be collected and analysed. The second revision in 1997 comprised data on human and financial resources, drugs and medical equipment in addition to the routine disease and activity reports. The third revision in 2000 brought about the application of ICT along with computerised database and databanks the Ministry of Health with major contributions from the donor community. Another revision process, in which the Private not-for-Profit (PNFP) sector has been heavily involved, started in the year 2004 and is in its final stages (41).

The process of fine-tuning and introducing a final version shows Uganda has been successful in implementing the national "Health Management Information System" (HMIS). This is attributed to the combined efforts of different providers operating jointly in the health system, the use of information for monitoring performance indicators and for management/ decision making purposes at each level, improved use of ICT for a sound implementation and use of a national HMIS such as an e-mail network system for improved connectivity and data management using a computer based HMIS that improve the data entry, data processing and data analysis mechanisms. This Excel based HMIS programme is built using multiple sheets and multiple links that auto-generate reports, graphs and charts, beside the main HMIS utilisation indicators. A snapshot at given point in time of what is done by the unit and observation of trends to assess performance of the health institutions is possible. This helps the management to develop a critical approach in response to sudden or apparently unjustified patterns changes over time both to monitor disease's trends and offers a major impact on management processes (41).

The Health Management Information System (HMIS) of Tanzania before 1989 was a paper based system designed as the routine reporting system for data and health indicators covering

all public, private and Non Governmental Organisation (NGO) health facilities. It was evaluated as being fragmented providing limited useful feedback and unreliable data. The goal of the new HMIS was to address the problems of the previous HIS through integration of the parallel systems, ensuring a regular flow of reliable information within and between different levels and to support the agenda of reform through decentralization. It was converted into Swahili in April 1991 with the involvement of top level health management professionals assisted by external consultants with financial support coming from various donors and the local government would take full responsibility for financing after the first implementation (42).

Egyptian health information system (HIS) was started before 1989. It was a core process designed from the bottom up and covering only facilities operated by the Ministry lacking the capacity to incorporate data from other health care providers. The new information system is designed from the top down to incorporate some programs such as urban and rural health care systems based on their information demand (43).

2.10. Evaluation Researches on HMIS

Assessment studies conducted in Ethiopia and in Africa is reviewed in order to examine the current practice of the new HMIS.

Assessment of the Ethiopian Health Sector Development Program (HSDP III) shows that HMIS is rarely used for management decision making. Data is collected and reported in multiple formats characterized by incomplete, untimely reporting and poor quality. According to HSDP III, the major problems are lack of attention given to HMIS, shortage of resource and lack of strategic direction (15).

Assessment study of HMIS in Addis Ababa by Alganesh in 2005 Showed that the existence of significant awareness on data generation and timely reporting, effective use of the adopted DHIS showing a good start to expand it in the long run. The study recommended a short-term and long-term action that Addis Ababa Health Bureau should take. As a short-term task, capacity building activities at sub city level is necessary to play pivotal role of grasping report generated at health centres, to perform a Varity of analysis and reduce load on regional HMIS. As a long-term task, adequate ICT infrastructure, trained staff, computer skill,

improved staff commitment, information utilization for decision making, improved and persistent follow up insure success and sustainable change in the HMIS. The progress of the system and utilization of generated information, supportive role of physicians and political commitment of all management levels are minimal and reports coming from the private health institutions are not incorporated in the analysis of reports at the sub-city level (13).

HMIS process re-engineering assessment report of 2006 showed that HMIS should focus on performance of the system in terms of information use and data quality by advocating the need for fundamental rethinking and redesigning such as non value adding recording-reporting steps, low accuracy of data collected and reported, lack of complete reporting at all levels, absence of standardized and uniform formats and lack of skilled human resource (18).

An assessment study on information Utilization related to HIV/AIDS program in 2006 by Gashaw showed that data and information were generated at the health institution and district level from routine reports, vertical programs and disease surveillance activities, collected using manually filled formats and finally communicated to the next higher level using non-electronic media. Data quality was poor and information utilization rate was very low. He recommended the needs for standardized data collection and reporting formats, identification of important indicators, feedback, supervision, adequate training and creating sense of ownership for individual working in those information units/departments (44).

The Ethiopian National Health Information system assessment report of 2007 also identified that HMIS is among the major problems of the health sector. It is characterised by inadequate staff skill, burdensome and fragmented information flow and characterized by parallel reporting system with no integration among the various subsystems. This resulted in redundant and conflicting reports and poor quality of data in terms of accuracy and timelines, preventing information users from effective utilization of information for decision-making and research (45).

A study Conducted by Azeb on factors affecting HIS use in Private and Public facilities in Addis Ababa revealed that the necessary inputs to HIS such as legislatives and planning framework, unit, personnel, budget, equipments, trainings and coordination mechanisms among other subcomponents were not sufficiently allocated on the facilities in Addis Abba. HIS process in these facilities focused on data collection and a sending-report preparation. It

does not produce information for decision making, nor disseminate the information. The study also identified the following main factors that contribute to the low performance of HIS: lack of appropriate inputs to the system, lack of HIS manipulations skill, lack of incentives, lack of feedback, lack of technical support, low attitude of health workers, lack of management commitment and awareness, centralized decision making, absence of information culture, and non participation of HIS staffs in the planning process (14).

Assessment study of HMIS at public hospitals by Meseret also pointed out that the processes of data collection, analysis, storage and dissemination on the supply side and provision of resource, regular supervision and feedback on the demand side are weak. These had resulted due to the organizational, technical and behavioural determinants. There is low commitment of the decision making bodies in allocating resources (human, material, financial), developing human skill and infrastructure. The study also reveals that there are technical problems such as inappropriate data collection and complexity in reporting formats, lack of standardized data collection formats as well as insufficient skill of staff to perform the required task. There is no established periodic monitoring and feedback mechanisms. Confidence, incentive and motivation to the staff are found to be insufficient. Despite all these prevailing limitations and constraints, the study showed encouraging tendency and good practice of utilising HMIS for planning and decision making at hospital level. Distributing computers, using new formats and providing training on the new HMIS is a good sign of organizational commitment for the improvement of HMIS (12).

E-Health readiness assessment survey on government health care institutions by Damtew showed that DHIS, telemedicine, Electronic Health Record ,e-HMIS, Pharmacy tracking software (ARV registration) along with its new version(IHMS) are ICT related projects being applied at different levels of implementation in Addis Ababa government health facilities. According to the study, prioritization has not been set as to which technology is to be implemented first and which one to follow since health care institutions have shown low level of e-Health readiness for these projects. DHIS which has been in use in most of the institutions in Addis Ababa to facilitate the vertical health service reporting from facility level to sub-city health offices and finally to Addis Ababa City Administration Health Bureau is reported to be satisfactory for completeness and most data managers are satisfied with the reporting facilities that the software provides (46). DHIS had also proved to have positive

impact on HMIS since Addis Ababa, Tigray, Amhara and SNNP regions have achieved >95% end of year completeness along with woreda and above with high consistency (19, 45).

A Study conducted by Bradley and Wong on the impact of introducing computer assisted new system on medical record accessibility and completeness as well as changes in physicians' satisfaction showed that this simple and inexpensive set of intervention in medical records and patient registration processes at the hospital significantly improves the management and system operations, patient medical information accessibility and physician satisfaction due to the completeness of medical records even if there is resource limitation to support clinical work(47). This is a break through an ICT intervention survey for HMIS in Ethiopia since ICT in health sector has been confined to office works only (48)

Another study on scaling of health information systems in Nigeria and Ethiopia showed the need for cultivation process that emphasize, develop, facilitate and motivate increased information use, local champions' commitment and ownership (49)

Assessment of Rwandan HMIS remarked the need for clarity of rules and responsibility of each stack holders, re-establish monthly coordination meetings that serves a forum for discussing feedback on all changes and implementation process, determine the champions to mobilize and raise awareness of technical realities, required capacities and benefits of strengthened systems, emphasize and use feedback, support data analysis and utilization (50).

Assessment study on the Nigerian HMIS showed that HMIS re-design was based on the four components of the information cycle: Collection, Processing, Analysis and Presentation and Use (self-assessment and feedback). It uses paper-based collection tools at facility level since health workers directly collect and report while health service is rendered. The study key results includes a fully functional Localized DHIS software called HIFA in data management activities since DHIS is practical in several African countries (e.g. South Africa, Ethiopia, and Zambia) and in other countries (e.g. Norway, India and Vietnam). Training manuals with effective and practical teaching methods, HMIS explanatory package developed for advocacy purpose, indicators and data analysis tools, a cross-state data analysis that was completed in 2006-2008 and annual data review workshops are among the success of HMIS efforts (51).

An assessment study on the design and implementation of HMIS in Malawi pointed out that it is taking full advantage of lessons learned by pioneers around the world and others who had

recent experience of HMIS reform, Malawi conceptualized, designed and implemented a simple, decentralized, action-oriented HMIS. Though the achievements made in 4 years are quite remarkable, the main aim of optimizing data quality and use have not yet been fully achieved. The support for further strengthening must be continued until a culture of information is created in the entire health sector (39).

Comparative study on the challenge of sustainability of information system in developing countries with particular emphasis on Mozambique and Tanzania had identified that major factors that contributes for un-sustainability are the misalignment of the interests, roles and responsibilities of the actors involved in the process (the donors, developers and MOH). Effective collaboration between these actors is fundamental to sustain the changes achieved in the long run. These interests of the actors should be aligned in a common network to address the long term users' and organizational needs. These needs should build sustainable users skill and conducive working environment that can retain human capacity through better workers' benefits, incentives and work procedures created by the involved actors in response to performing their responsibilities (35).

2.11. Frameworks for Evaluation

Health Metric Network (HMN) is an international partnership that develops its own framework based on the premise that better health information means better decision making and therefore better health for all. HMN Framework is one of the several framework that is used as guidelines for assessing, strengthening and monitoring health information systems (HIS) development and management by defining key health information standards, data and analytic capacities, and guidelines for information use at country-level, HIS development and local/ regional/global access and comparability (52).

The HMN Framework has two parts: the normative and an implementation portion. The normative components describe the standards and assessment criteria relating to the inputs, processes, outputs, and outcomes of the health information system and comprise six major domains: HIS resource, indicators, data source, data management, information products, dissemination and use. The implementation component outlines a roadmap for strengthening health information systems and includes, a tool to guide assessment of health information

system, thus enabling countries to establish a baseline and monitor progress of health information system development. The Framework is not intended to replace existing manuals, guidelines and other documents that provide detailed information on specific elements of HIS. HMN targets its framework to be the universally accepted standard for guiding the collection, reporting and use of health information by all developing countries and global agencies (53).

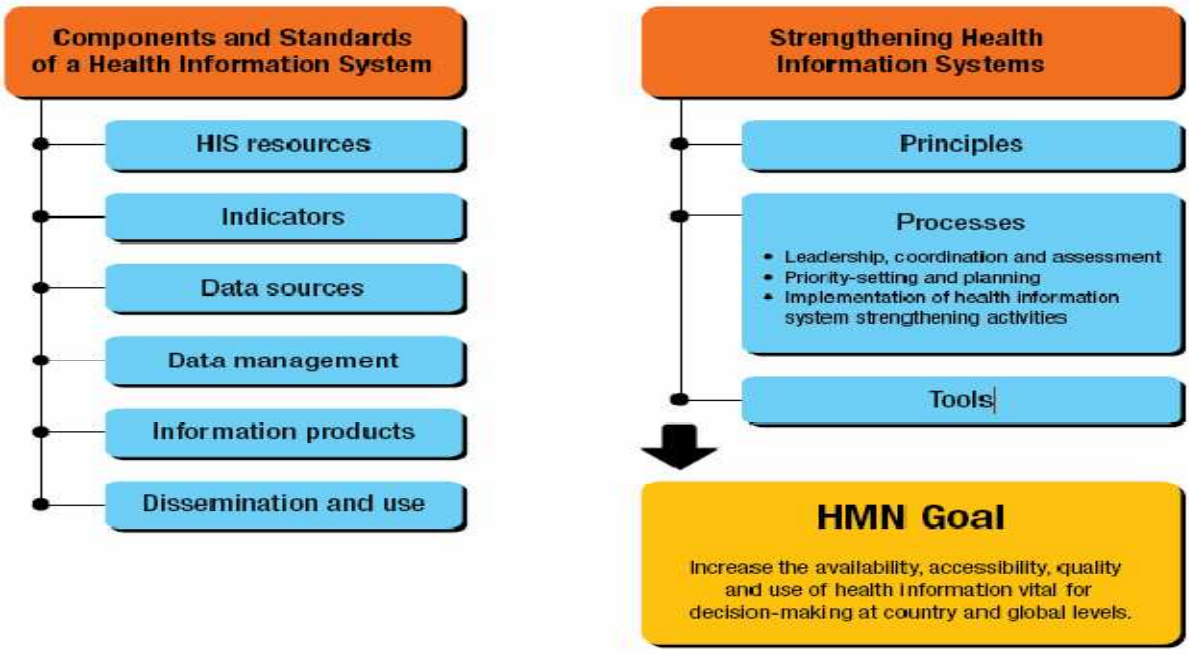


Figure 2.3: Health Metric Network Framework (6, 53, 55)

The Performance of Routine Information System Management (PRISM) framework is another framework that helps to measure the performance of health information system. It is a conceptual framework developed by MEASURE Evaluation and John Snow, Inc., and is being used to define HMIS performance as the production of quality data as well as the continuous use of information (54).

This framework proposes the analysis of three key factors to analyse routine health information systems. These includes a set of technical, organizational, and behavioural determinants which influence the HMIS processes, with the objective of improving HMIS performance. The behavioural determinants refer the knowledge/skills, attitudes, values and motivation of the people who collect and use the data. The technical determinants implies

data collection forms, processes systems and methods while the organizational determinants involves information culture, structure, resources, and roles and responsibilities of key contributors at each level (55). The three determinants often connected one another to have a good performance of routine health information system (12, 55). For example, if a trained health worker feels he/she has not really mastered the necessary skills, then the required action to be performed will be reduced. On the other hand, achieving competency in action such as collecting and using health information requires not just knowledge and skill but also a supportive environment

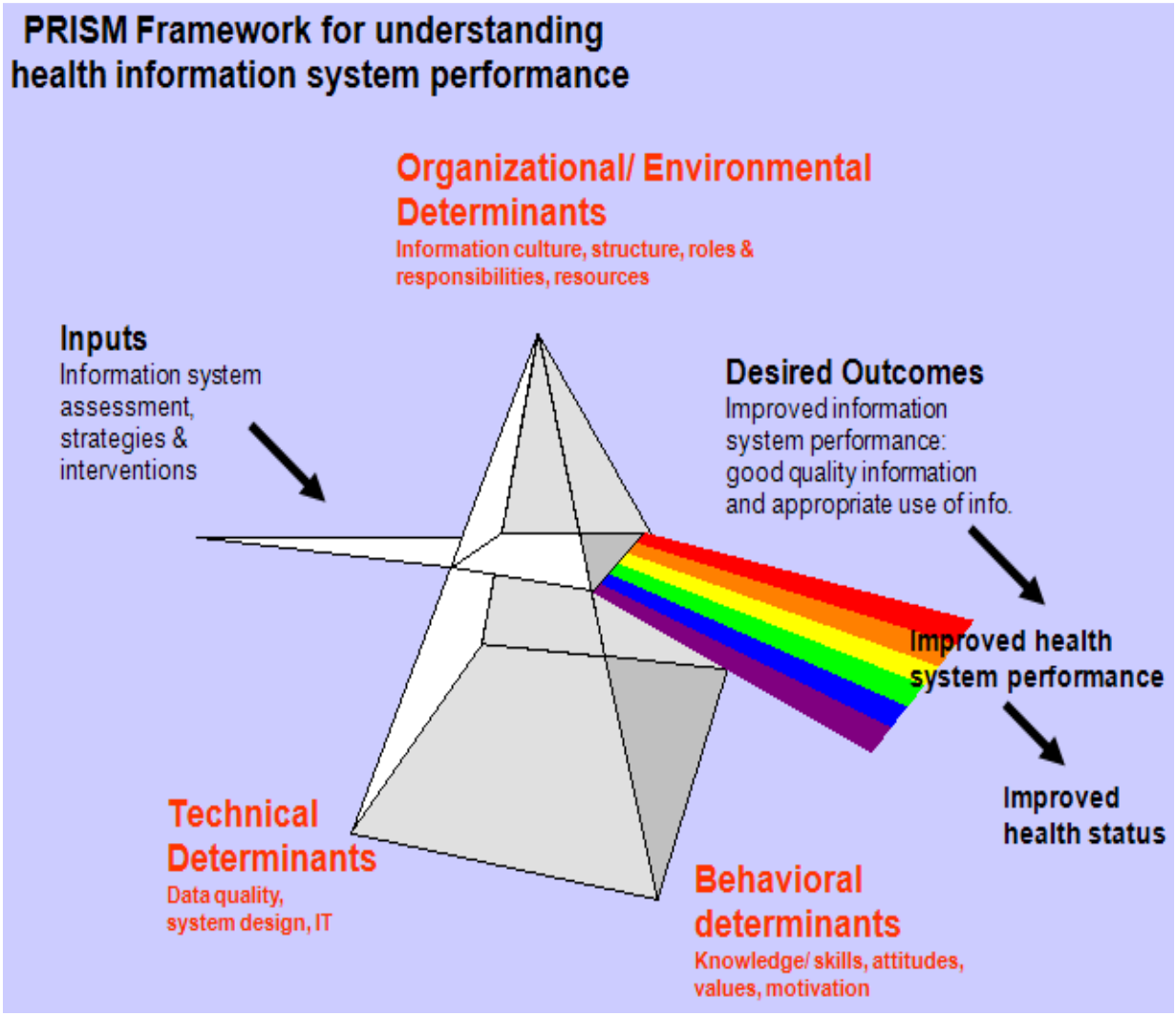


Figure 2.4: PRISM frame work (12, 54).

CHAPTER THREE

METHODOLOGY

3.1. Study Area

The study was conducted in Addis Ababa, a capital city of the Federal Republic of Ethiopia. The city is divided for administrative purpose into 10 sub cities and 99 kebeles in which about 2.7 millions residents dwell.

There are about 500 health facilities in Addis Ababa which range from government specialized hospitals to privately owned ones, from higher clinics to lower clinics and from health centres to health posts. There are 30 hospitals, 26 health centres, 94 special clinics, 99 higher clinics, 146 medium clinics, and 103 lower clinics. Among these health facilities, five hospitals and all the 26 health centres are administered by Addis Ababa City Government (9). The study area of this research is all Addis Ababa city administered health facilities and health management units at sub cities and regional levels.

3.2. Study Design

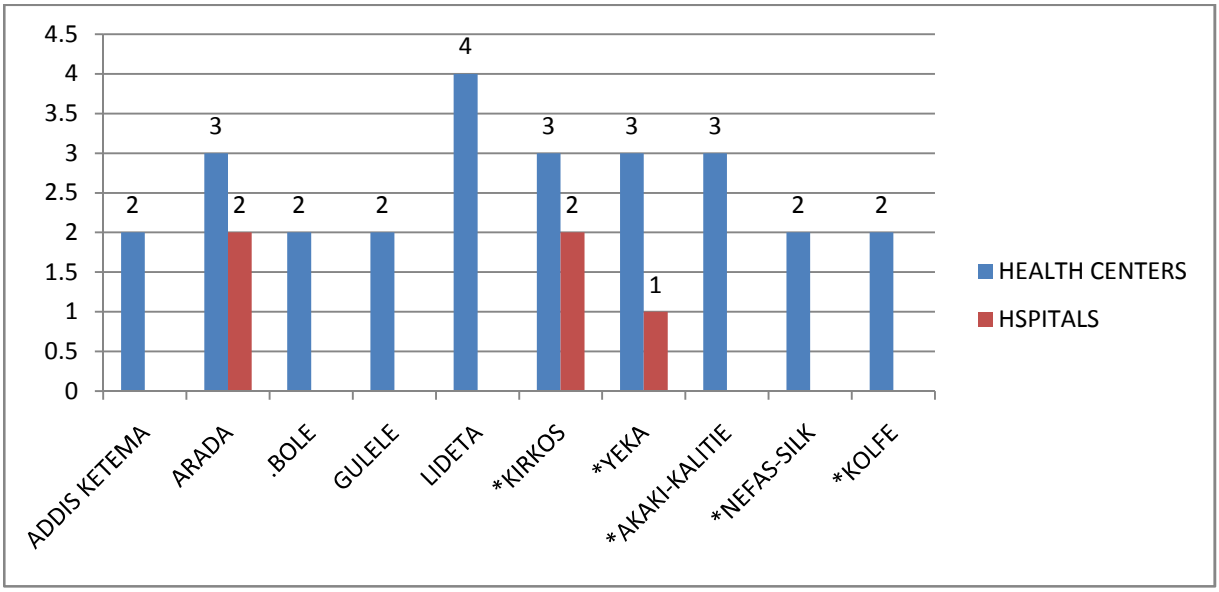
A Cross-sectional descriptive study design, utilizing quantitative and qualitative study methods, was employed to describe the status of the new HMIS implementation program.

3.3. Duration of the Study

The study was conducted between October, 2009 and June, 2010. The data collection through questionnaires, interviews and observation was conducted between March, 2010 and April, 2010. Data analysis, interpretation and write up were done between May, 2010 and June, 2010.

3.4. Source and Sample Population

All Addis Ababa city government administered health facilities, sub city health offices and regional health bureau were source population while all health service departments of health facilities, sub cities (districts) and regional level where the new HMIS is implemented were the sample or study population.



* Sub Cities and Health Centers under them implementing new HMIS

Figure 3.1: Number of Public Health facilities in Sub Cities in Addis Ababa, 2010 (19)

Inclusion and Exclusion criteria

- **Inclusion criteria** – health professional who take training and directly involve in health care service delivery or treats patients or clients at facilities, head of core process or case team, HMIS focal persons or those BPME staff working on behalf, medical directors, officers or head of sub cities who are expected to use data for decision making and reporting are included in the study
- **Exclusion criteria** –Healthcare provider or officers who do not satisfy the above criteria are excluded from the study.

3.5. Sample Size and Sampling Procedures

Since purposive sampling is chosen, service departments in each health facility and sub cities where the new HMIS is implementing were taken. The new HMIS is currently implemented in all five hospitals, thirteen health centres, five sub cities and at regional health bureau. Two health care providers or officer from each case or core process in these organizations who satisfy inclusion criteria were selected using purposive sampling to respond for both qualitative as well as quantitative data.

3.6 Quantitative study

The respondents in the study population were chosen based on a purposive sampling size and procedure stated above. There are on the average eight big departments known as case teams at hospitals and four at health centres as well as four core processes under each sub cities and regional health bureau. This study purposely took only two respondents in eight case teams in five hospitals (=80), two in four case teams in thirteen health centre (=104) and two from each four core processes in each sub cities and regional bureau (=48). Hence, a total of two hundred thirty two people working in/responsible for HMIS related activities were participated for the qualitative study.

3.7. Qualitative study

All health institutions in the study population were covered and there record rooms and HMIS unit or BPME teams, their reporting system and experience of respondents on HMIS activities were observed and interviewed. An in depth interview was conducted with 18 candidates which were 7 from hospitals, 5 from health centres, 5 from sub cities and 1 from region. The interviewees were 7 medical directors two from hospitals and five from health centres, 5 HMIS focal persons all from hospitals and 5 BPME officers who work on behalf at sub cities since there was no focal person assigned as HMIS officer for each health centres.

3.8. Data collection Techniques

Three methods were employed. The quantitative method was used for assessment part by using a self administered questionnaire. Qualitative methods were used to further explore the results found from the quantitative study using in depth semi-structured interview with selected participants and observation on card rooms and BPME sub core processes using check list as well as HMIS related activities and resources. Data collection methods used in this study were:

Questionnaire

The questionnaire includes questions that help to assess current practice in the new HMIS implementation. Both open and close ended questions were included in the questionnaire. The questionnaire was self constructed and prepared in English based on standard HMN guideline for HMIS. The questionnaire used contains a 49-item of closed and open ended questions, organized into five parts. Most items were presented as statements to which respondents answered yes or no type with a third category ‘’don not know’’ or requested to indicate their agreement from the choice of strongly disagree, disagree, neutral, agree and strongly agree.

In the first part, 6 questions were asked about the socio-demographic information of the respondents which include name of their institution, department they were working in, position they hold, their sex, educational status and field of specialization. In the second part, there were 9 questions used to assess HMIS inputs. The third part contains 7 questions deals with process of HMIS and the fourth part contains 7 questions that was used to assess HMIS output. The fifth part of the questionnaire contains 3 sets of questions about technical, organizational and behavioural determinants that possibly affect positively or negatively the HMIS implementation status as well as open-ended questions that respondents possibly comments on the strength (success) or weakness (failure) of the implementation and suggestions for improved implementation of the HMIS. (Annex 1)

The questionnaire was pre tested at Zewditu hospital, Kazanchis health centre and Kirkos sub city with four respondents in each of these health institutions prior to the actual study period and appropriate accommodations were made.

Six data collectors were hired to orient, distribute and guide the respondents while filling questionnaire. A total of three supervisors were assigned so that they advised data collectors whenever the need arise. The data collectors and supervisors were given training on how to help respondents while filling the form. They were also responsible for collecting back the questionnaires they distributed. Each of them had a list of facilities they were assigned which had increased the response rate.

In-depth interview

In-depth Interviews had helped to further dig out findings for the research and to explain the result of the questionnaire. Hence, interviews were conducted face to face using semi-structured and open ended interview guide line. The interview was recorded and transcribed for the purpose of analysis. Eighteen interviews were conducted. Thematic analysis technique was used to analyse the interviews. (Annex 2).

Observation

The researcher conducted systematic observation on data capturing and reporting formats, implementation progress reports, minutes of important HMIS related meetings, official letters, quarterly HMIS reports, visits of card rooms and BPME sub core processes, checking for the structure, activities, patterns of information flow, working environment, availability of equipments and indicators. Checklists were used for recording of information obtained from personal observation (Annex 3).

3.9. Study Variables

Dependent (Outcome) Variables

. Implementation Status of the new HMIS

Independent Variables

. Health facilities, Institutions (HC, HP, Sub cities, Regional Bureau)

. Respondent Category(Head, Health Working Staff, HMIS focal persons)

. Data Element

. Set of Indicators

. Standardized formats

. Data Quality

. Information Use

. Determinants of Implementation

- Technical
- Organizational
- Behavioural

3.10. Operational Definitions

Case team or core process – work department or unit in the new civil service reform context in Ethiopia

Data - a collection of facts that an information systems can transform into useful information

Health Information System – a system that integrates data collection, processing, reporting and use of information necessary for improving health service effectiveness through better management at all levels of health services.

Health Management Information System- an information system specially designed to assist in the management of health services.

Health Working staffs - Clinicians delivering service to patients or clients in health facilities and responsible to capture HMIS data on every clinical visit.

Information- an organized set of data that gives meaning

Integration in HMIS – data or information collected and recorded to and reported from one central HMIS unit.

ICT use - Computer and related infrastructure used for HMIS activities. Implementation

Success factors - the use of data quality assurance tools, monitoring performances, existence of skilled staff, well designed formats, standardized set of indicators, budget for HMIS, ICT use, coordination, cooperation, communication, shared responsibility among stack holders,

Information System – a system that provides information support to the decision- making at each level of an organization

Ownership - to consider, accept and priotize HMIS as core activity or as part and parcel of professional duty.

Simplification – the reform in HMIS requires reporting only data elements needed by indicators.

Skilled and trained staffs – the experience and know-how of health professionals for HMIS activities .

Standardization – provision of uniform recording and reporting formats, registers and tally sheets, set of indicators and their definitions, disease list for reporting and their case definitions, as well as data elements

System – a collection of components that work together to achieve a common objective

Technical Committee – A group of experts organized to provide guidance, oversight and involve HMIS activities

Utilization of Information - use of information for different purpose (planning, decision making, to take action, to provide information) at all levels of health sector.

3.11. Data Analysis

The data from the questioner was entered in Epinfo version 3.3.2 then exported to SPSS version 15 by the principal investigator to be analysed. The assessment of new HMIS components has been described using tables, figures and graphs.

After the interviews held, the results from the questionnaire added with the interview were compared and possible explanations concerning the issue at hand were discussed on the discussion part.

According to PRISM framework, factors influencing the implementation status are classified into technical, organizational and behavioural determinants. The response to question on each sets of determinants are organised in five categories (strongly agree, agree, neutral, disagree and strongly disagree). During the analysis, these likert type categories of choices was further regrouped and recoded into three categories by dichotomizing strongly agree and agree into 'agree' as a positive rating and strongly disagree and disagree into 'disagree' as a negative rating. Neutral response is believed to be equidistant to the adjacent ratings in both directions and is ignored as a non response for this study purpose (46).

3.12. Data Quality Management

The researcher attempted to carefully enter and analyse the data collected. Data quality was assured using different techniques such as:

• Training given to data collectors for two days about the contents of the questionnaire and frequent supervision were done. The qualitative data collection was conducted by the principal investigator.

• Personal supervision during the process of data collection was made. In addition, Problems encountered at the time of data collection was reported immediately and appropriate actions were taken.

• Properly designed questionnaires and interview guidelines were prepared; moreover pre test was done prior to final distribution and interview of the study and appropriate corrections was made. Data collectors assisted the respondents in case of difficulties. Completeness and legibility of the questioners filled was checked on spot

• The questionnaires were checked for missing values and inconsistency, Completeness and legibility. Questionnaires that were found to have lots of missing values and inconsistencies were excluded.

• The data entry and cleaning was made by the principal investigator. Notes were taken on issues demanding further clarification by revisiting the study area.

Interviews were conducted by the principal investigator to avoid any miss understanding.

3.13. Ethical Considerations

The study work was carried out after getting approval from the ethical clearance committee of Addis Ababa University, Medical Faculty through Health Informatics Program/School of Public Health. Data was collected after getting written Ethical Clearance from Addis Ababa City Administration Health Bureau. Information sheet and written consent forms were delivered along with each questionnaire and all the subjects were asked if they were willing to participate in the study; and those who refused to participate was excluded. Informed verbal consent was obtained from all interviewed subjects. Objective of the study was discussed with each participants and privacy was maintained during interview. All the interviews were transcribed after the respondents consent.

3.14. Dissemination of Results

The findings of the study will be disseminated to the school of public health/ health informatics program, Addis Ababa regional health bureau, MOH, and to the government and non government organization that potentially could benefit from the study.

CHAPTER FOUR

PRESENTATION AND ANALYSIS OF DATA

This chapter presents the results, analysis and interpretation of data collected through questionnaire, in-depth interview and observation from Five hospitals, thirteen health centres, five sub cities and regional health bureau where the new HMIS is implemented.

4.1. Results of Quantitative Study

4.1.1. Characteristics of the respondents

Two hundred thirty two questionnaires were distributed and two hundred twenty four were returned. Among returned questioners, four were discarded because of inconsistent and missed values. Thus, the remaining two hundred twenty which gave the response rate of 94.8% is used for the analysis purpose for this study. According to table 4.1.bellow, one hundred fourteen were females (51.8%) and one hundred six were males (48.2%). The respondents were 80 from five hospitals (36.4%), 104 from thirteen health Centres (47.3%), 30 from five sub City health offices (13.6%) and 6 from regional health bureau (2.7%).

Table 4.1: Socio-Demographic Characteristics of Respondents, their qualification and position in their respective Institutions in Addis Ababa, 2010.

Respondents' profile	Classification	Frequency	Percentage
Sex	Male	106	48.2%
	Female	114	51.8%
Qualification	Diploma	84	38.2%
	First degree (BSC)	117	53.2%
	Doctorate degree (MD)	10	4.5%
	Masters (MSC, MPH)	9	4.1%
	Specialization	-	-
Institution	Hospitals	80	36.4%
	Health Centres	104	47.3%
	Sub City	30	13.6%
	Region	6	2.7%
Institutional Position	Head	44	20%
	Health Working staff	176	80%

The education level of respondents who are working in the different departments of health institutes constitute from diploma to specialized doctors as shown in the table 1 above. About 136 respondents (62%) are degree holders and above. Among them, 44 respondents (20%) are health workers who are heads of Case Teams and Core processes entitled as 'process owners' while 176 respondents (80%) are health workers who directly involve in the health care provision to clients or patients and is entitled for the this study purpose as 'health working staffs.'

4.1.2. Assessment of HMIS Inputs

Concerning the existence of guide lines, regulatory or planning frame work as a standard to HMIS, more than 114 health workers (50%) reported that they did not know the existence of physical and technical, logistic, personnel as well as budget requirements. However, 67 respondents (30.0%), only claim the existence of reporting requirements. Let alone these standards, 137 respondents (62.3%) do not even know the existence of HMIS Units or related departments in their institutions.

Health workers were asked about HMIS related assistance received from sub cities, regional health bureau, ministry of health and donors. 167(75.9%) and above respondents didn't get feedback, supervision as well as consultancy for HMIS related activities.

Table 4.2: HMIS Related Assistance Received during Implementation, Addis Ababa 2010.

Assistance Received	Never	Rarely	Sometimes	Often	Always
Training	29(13.2%)	160(72.7%)	30(13.6)	1(0.5%)	-
Feed back	167(75.9%)	52(23.6%)	1(0.5%)	-	-
Supervision	167(75.9%)	50(22.7%)	1(0.5%)	-	-
Consultancy	171(77.7%)	43(19.5)	5(2.3%)	1(0.5%)	-
Logistics	78(35.5%)	113(51.4%)	27(12.3%)	-	2(0.9%)
Financial	149(67.7%)	61(27.7%)	10(4.5%)	-	-

As shown in table 4.2 above, there is a logistic provision according to 140 respondents (51.4%+12.3%). Different forms, registers, tally sheets, and medical card folders were

supplied by technical supporting agency, Tullen University. Currently, stationeries are also available according to 149 respondents (67%).

About 149 respondents (67.7%) claim that there is no budget allocated for well functioning of HMIS at any of the facility surveyed. Respondents from regional health bureau, however, said that they have redistributed the money they received from ministry of health to renovate integrated central card room system for each health facilities. Since the new HMIS demands integrated card system organized centrally in one room before launching HMIS implementation.

As indicated in table 4.1.2, 29 health workers (13.2%) claimed that they did not take any training about HMIS for different reasons such as being new recruits, at annual leave, being at work, or other personal reasons. 190 respondents (72.7%+13.6%) assured that they have taken five days on job training. They suggested also that this training and a two day orientation for some of them was not enough to cover the module. Even 156 (70.9%) of them claimed that some issues and questions raised during the training was not neither better explained nor referred to the next decision level who are expected to respond.

Concerning availability of IT equipment and communication technology in the BPME sub core process (equivalent to department) which is responsible for managing the new HMIS activities, computers are claimed to be available only by 65 respondents, printers by 62 respondents, telephone line by 51 respondents and internet or any kind of network by 40 respondents. There are no computer and fax machines in any of BPME acting unit in health centres and sub cities covered by the study.

4.1.3. Assessment of HMIS Process

4.1.3.1. Data capturing

According to table 4.3.bellow, one hundred and fifty one respondents (68.6%) are currently involving in the data collection, analysing, interpreting and reporting activities. Only twenty five health workers in head position (56.8%) involve in these HMIS core activities. While 68 respondents (30.9%) consider themselves that they did not know nor had any role because of their work load, specialization or high ranking management positions. Two hundred and eight

respondents (94.5%) reported that they did not participate in the designing efforts of the new HMIS.

Table 4.3: The Role of Health Workers in HMIS, Addis Ababa, 2010

Staff Position	Data collection…	Data Encoding	DK
Head	25(56.8%)	0	19(43.2%)
Staff	126(71.6%)	1(0.6%)	49(27.8%)

Health workers were also asked whether they have used forms, tally sheets and registers as a common tool for data collection and reporting or not. According to table 4.4 bellow, 193 respondents indicates that they have used these tools However, 152 respondents only suggest that they filled ,counted or coded immediately after each clinical visit or other HMIS related works. 46 health workers feel pain from work overload and unable to fill count or code these tools just after each clinical visit rather they usually did these routines at the end of each working days and 22 respondent did not consider these activities as part of their duty rather nurses assist them in recording and reporting activities.

Health workers were also asked to point challenges they face during data collection and reporting. These problems are summarized as follow:

-Common diseases are not included in the new HMIS disease classification (HMIS-DC), major hospital diagnosis are missed because of these limited HMIS-DC,

-Controversy to collect data from admission & discharge services, new and repeat cases in family planning services,

-HIV <15 years is not reportable,

-Many forms and registers to be filled in the Out patient and Emergency services is against BPR principle which demands many clients to be served within a short period of time,

-logistic provisions were not made before implementation is launched,

-HMIS needs more stationery, needs its own budget,

- Card room workers are incapable and not interested to retrieve missing cards, to help users when they lost their service card id, they give two or more medical record number (MRN) to one person or single MRN to many individuals which in one way or another our client lose his medical history,

- Repeated manual recording and reporting activities as well as retrieving cards are boring and let them be computerized,

-lack of awareness of the community, HMIS focus on data collection than improving service quality or patient satisfaction, it does not consider patient load in the health facilities,

Table 4.4: Process Variables of the new HMIS in Addis Ababa, 2010

HMIS Process variables	Response	Frequency	Percentage
Usage of HMIS tools	Yes	193	87.7%
	No	19	8.6%
	DK*	8	3.6%
HMIS tools used for every clinical visit	Yes	152	69.19%
	No	46	20.99%
	DK	22	10.9%
Usage of IT in recording and reporting	Yes	3	1.4%
	No	213	96.8%
	DK	4	1.8%
Collecting/Recording data just on every clinical visit	Yes	168	76.4%
	No	44	20.0%
	DK	8	3.6%
Existence of minimum period maintenance & processing of HMIS data	Yes	11	5.0%
	No	202	91.8%
	DK	7	3.2%
Existence of procedure for reporting/disseminating information.	Yes	5	2.3%
	No	202	91.8%
	DK	13	5.9%
Existence of data quality assurance mechanism	Yes	13	5.9%
	No	192	87.3%
	DK	15	6.8%
Existence of regular programs & guidelines for supervision	Yes	6	2.7%
	No	206	93.7%
	DK	8	3.6%
Existence of mechanism/ system for M&E	Yes	5	2.3%
	No	203	92.3%
	DK	12	5.5%
Existence of regular feedback	Yes	5	2.3%
	No	201	91.4%
	DK	14	6.4%

*DK-I do not know

4.1.3.2. Data Transmission and Processing

There was an effort to see whether health workers have been using ICT or computerized program for data capturing, transmission, processing, analysis and information use or any other HMIS related activities. The majority of respondents (96.8%) indicated that they did not use ICT. However, only 42 respondents (19.1%) have been using word process and excel to compile and process data as well as to produce report. Regular and timely data flow is crucial for HMIS even if 202 respondents (91.8%) did not know the existence of both minimum period of data processing and procedures of transmission or reporting. According to 207 respondents (94.1%), summary reports are sent in paper form while 13 respondents use soft copy using flash disk or floppy for data or report transmission purpose.

Health workers were also asked which data sources they are using while data capturing and report generating. 84.1% of them are using service records contained as individual medical record folder, 12.7% are using health and disease records and 3.2% are using administrative records.

Development of a set of indicators and minimizing the number of data elements is a major shift from the old system to the ‘’new’’ health information system. Regarding to this, 117 respondents (53.2%) claimed that the new HMIS includes all necessary data elements. However, 93 of the respondents (42.3%) suggested the need to include additional essential data sets. According to figure 4.1 below, sixty health workers from hospitals (81.1%) reported that the new HMIS does not include adequate data elements.

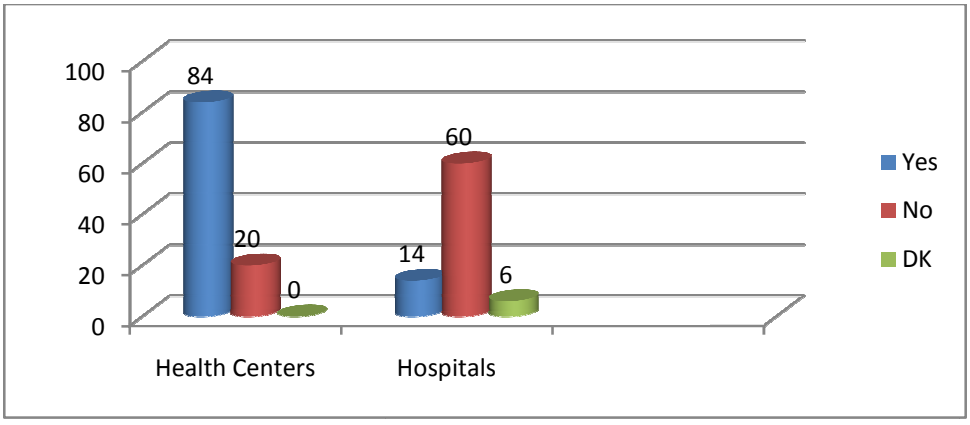


Figure 4.1: Adequacy of Reportable Data Elements in the new HMIS among Health Facilities, Addis Ababa, 2010

Respondents were asked to point problems related to this idea and their response are as follow:

- New HMIS disease classification underestimates the diagnostic capacity of hospitals where most common diseases are categorized as 'others,'
- A patient who got treatment for different interrelated diseases in one episode is considered as if he had got only one treatment and these different diagnoses are reported as a single' main diagnose' leaving the rest as 'others'. The new system did not consider these 'others' as a non reportable data element since they are very important to identify the ten top disease for that particular health facility, or for its logistic arrangements, or even they may serve as a spring board to conduct surveyor surveillance for that particular health facility,
-Some indicators such as surgical infectious rate that possibly used to assess service quality of particular facility, office level health related activities of sub cities or region indicators, laboratory performances which possibly measure our diagnostic capacity and other possible indicators are not included in the new HMIS,
-HMIS does not consider the four-tier system of health services delivery where health centres and hospitals at different levels are assumed to capture as well as report similar data sets and compute similar indicators even if they provide the different health services,
-Currently, HMIS fails to incorporate data from other health facilities such as private as well as non-government organization health facilities and even community level health activities,

4.1.4. Assessment of HMIS Outputs

4.1.4.1. Data Quality: the foundation for the new HMIS

There was an attempt whether health workers know the existence of mechanism that control data quality and continuous quality assurance for the data being collected and processed. 192 (87.3%) of them did not know its existence. Even 206 respondents (93.6%) claim that there is no regular programs and supervision conducted yet. Health workers were asked to rate data quality in terms of the degree to which data is up-to-date and available when needed, and submitted on time according to established deadlines. 149 (67.7%) as well as 192 (87.3%) respondents show their agreement on timelines and adequacy of data or reports respectively. On the completeness of tally sheets, registers and reports, only 102 respondents (46.4%) agree and on the accuracy data only 96(43.3%) of respondents agrees.

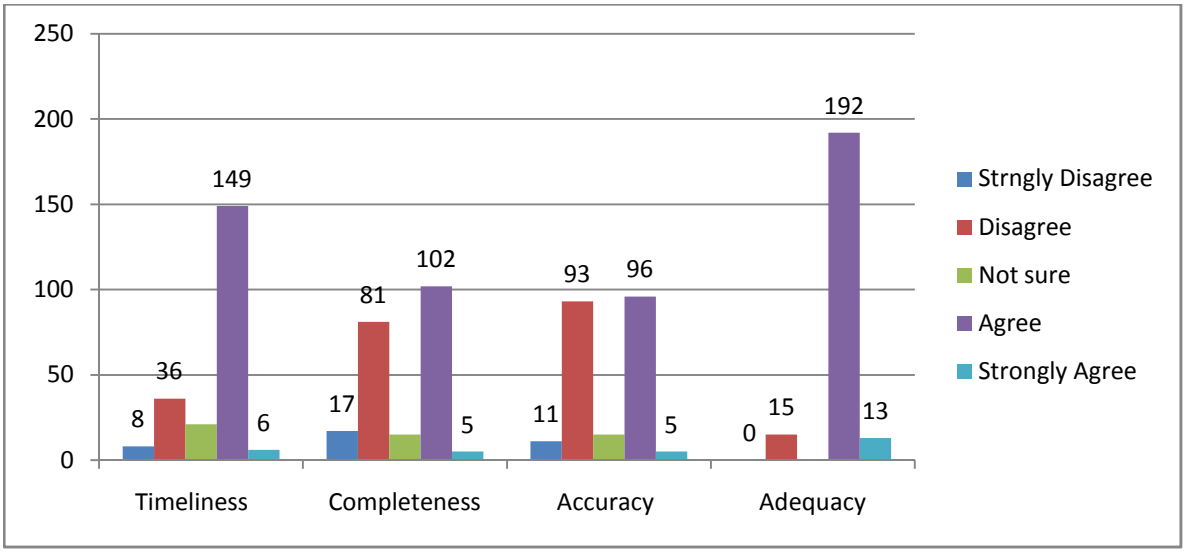


Figure 4.2: Data Quality Measures assessed in Health Facilities of Addis Ababa, 2010.

4.1.4.2. Data Analysis and Presentation

The analysis and interpretation of data at any given health service level can help to know the status of health services provided and identify possible health problems at the place of their origin. Data presentation is a means of displaying data to be accessible to other people. Health workers were asked 'how and to whom generated report or information is presented?' 207 of respondents (94.1%) reported that reports are presented in paper form. These reports are sent to management body of the facility, to regional health bureau and to the departments in their facility according to 66(30.0%), 53(24.1%) and 44(20.0%) respondents respectively.

4.1.4.3. Information Use: ultimate target of the new HMIS reform

There was an effort to see 'for what purpose health workers are using information from this routine health services. According to table 4.5 bellow, most health workers use information from the new HMIS for reporting purpose (95.9% (n=211)) or to give information for internal stack holders. By far, only few health workers are using this information for decision making (36.8%), for planning purpose at institutional level (36.8%), to compare with previous report (35.9%) or to monitor and evaluate performance (35.9%).

Table 4.5: Information Use pattern in the new HMIS in Addis Ababa, 2010.

Information Use	Yes	No	I don't use
For reporting to higher level only	211(95.9%)	8(3.6%)	1(0.5%)
To give information to the stack holders	178(80.9%)	42(19.1%)	-
To compare with the previous report	79(35.9%)	140(63.6%)	1(0.5%)
To monitor and evaluate performance	79(35.9%)	141(64.1%)	-
For planning purpose at institutional level only	81(36.8%)	139(63.2%)	-
For decision making/ to take action at institution level	81(36.8%)	139(63.2%)	-

Two hundred six respondents (93.6%) did not know the existence of any incentive that encourages information use. According to table 4.6 bellow, only nine respondents (4.1%) consider training they took as an incentive. In addition to this, 85.5% of respondents (n=188) claimed that there is no policies that cultivates Information Use Culture.

Table 4.6: Information Use Enhancement Mechanism used in the new HMIS in Addis Ababa, 2010

	Response	Frequency	Percentage
Existence of Incentive for Information Use	Yes	9	4.1%
	No	206	93.6%
	I don' know	5	2.3%
Kind of Incentive used for Information Use	Money	1	0.5%
	Training	9	4.1%
	I do not know	210	95.5%
Existence of policies that Encourage Information Use Culture	Yes	1	0.5%
	No	188	85.5%
	I don't Know	31	14.1%
Existence of Backup	Yes	21	9.5%
	No	190	86.4%
	I don't know	9	4.1%

4.1.4.4. Feedback

There was an attempt whether health workers know the existence of regular monitoring and evaluation mechanism, as well as regular feedback. Monthly or quarterly M&E meeting is not made according to 203 respondents (92.3%). Very few respondents reported that management review monthly meeting is currently used as a monitoring and evaluation mechanism of HMIS. 201 health workers (91.4%) claimed that feedback mechanism is not currently employed. According to table 4.2, regular supervision, or consultancy scheme at least is not designed.

There was an interest to see the existence of backup system that may help to use information for future references.190 Health workers (86.4%) assure that there is no any back up document of last two years even if very few respondents indicates the existence of computerized and paper based system. There are no rules and regulations about the security, use, transfer, retention, and destruction of health data or information according to one hundred ninety nine respondents (90.5%) even if 19respondents did not have the information about these facts.

4.1.5. Assessment of Determinants of HMIS Implementation.

PRISM framework classifies factors that influence implementation status of HMIS into technical, organizational and behavioural determinants. Health workers were asked to rate their agreement towards these sets of determinants.

4.1.4.1. Assessment of Technical determinants

The frame work considers technical aspects of determinants as the nuts and bolts of the information system that the system developer and implementer should focus their energy. The majority of health worker agree with the existence of standardized set of indicators and a well designed data collection and reporting forms according to 187 (85.0%) and 175 (79.5%) respondents respectively. Many Health workers, on the other hand, believe that they (60.9%) are not well trained to properly fill out HMIS formats and they (76.8 %) are not skilled

enough with HMIS related activities. One hundred and ninety four respondents (88.1%) also suggest that there are non friendly format for reporting and to visualize results.

According to table 4.7, most of respondents (96.8%) also claimed that the new HMIS currently does not use appropriate information technology for data capturing, analysis, transfer, and presentation.

Table 4.7: Technical determinants of HMIS Implementation Addis Ababa, 2010.

Technical Determinants	Disagree	Neutral	Agree
There is standardized set of Indicators	21 (9.6%)	12 (5.5%)	187 (85.0%)
There is well designed formats	23 (10.5%)	18 (8.2%)	175 (79.5%)
There is well Trained staff	134 (60.9%)	33 (15.0%)	53 (24.1%)
There is skilled human resource	19 (8.6%)	32 (14.5%)	169 (76.8%)
Friendly formats	194 (88.1%)	7 (3.2%)	19 (8.6%)
Use of appropriate ICT	213(96.8%)	2 (0.9%)	5 (2.3%)

4.1.5.2. Assessment of Organizational Determinants

Table4.8. bellow shows Health workers agreement on effect of organizational also referred to as environmental or systemic factors on the implementation status. Most health workers disagree with the existence of coordinated effort and leadership (85.9%), existence of strategy and policy that show clear roles and responsibility of professional in data collection, management and use (63.6%) and existence of organizational culture that exploits its shared values for the implementation success (57.3%).

There were a significant number of respondents (57.7%) that agreed with the absence of devolution or decentralization in the implementation process (planning, training, pilot running and implementation) that create a shared responsibility to address possible problems at their infant stage. Large numbers of respondent (76.8%) disagree with the existence of

budget or HMIS resources control. Few staff (17.8%) shows their disagreement on the existence of narrow structure of the health system that may possibly affect implementation status.

Table 4.8: Organizational determinants of HMIS Addis Ababa, 2010.

Organizational/environment/ systemic factors	Disagree	neutral	agree
Existence of coordinated effort and leadership	189 (85.9%)	17 (7.7%)	14 (6.4%)
Existence of strategy and policy	140 (63.6%)	70 (31.8%	10 (4.5%)
Presence of Devolution /decentralization.	127 (57.7%)	83 (37.7%)	10 (4.5%)
Presence budgets or resource Control	169 (76.8%)	44 (20.0%)	7 (3.2%)
Existence of wider Structure of the health system	39 (17.7%)	101 (45.9%)	80 (36.3%)
Existence of organizational culture (acceptance or resistance)	126 (57.2%)	78 (35.5%)	16 (7.3%)

4.1.5.3. Assessment of Behavioural Determinants

There was an effort to see the impact of behavioural factors on the HMIS implementation status. Most health workers (92.3%) agreed that the new HMIS is not the extension of the previous one. According to table 4.9. bellow, there is no motivational mechanism that uses data to assess performance according to 204 respondents. Large number of health workers (201) suggested the absence of follow up, coordination, cooperation and communication. One hundred seventy eight health workers believed that HMIS implementation lack ownership that transform care provider into effective data collectors and information users. Health workers are not empowered to take active participation and take HMIS as part and parcel off their professional duty according to 203 respondents and even they lack confidence to participate and make decision for HMIS related activities according to 191 respondents. Many health workers believed that there is a failure of advocacy about the new HMIS (191) and there is a lack of promotion about information use culture according to 195 respondents.

Table 4.9: Behavioral determinants of HMIS Addis Ababa, 2010

Behavioural Factors	Disagree	Neutral	Agree
The new HMIS is not considered as extension of the previous one-fails to give credit to the previous good work	10 (4.5%)	7 (3.2%)	203 (92.3%)
Lack of motivational mechanism when data collectors use it for assessing their performance	5 (2.2%)	11 (5.0%)	204 (92.7%)
Absence of better follow up, coordination, cooperation and communication	4 (1.8%)	15 (6.8%)	201 (91.4%)
Lack of ownership	17 (7.7%)	25 (11.4%)	178 (80.9%
Lack of Empowerment of care providers	17 (7.7%)	176 (80.0%	27 (12.3%)
Lack of confidence to make decision at HMIS related activities	29 (9.1%)	171 (77.7%)	20 (9.1%)
Poor Advocacy (Failure to speak of the opportunity with HMIS reform)	40 (14.1%)	160 (72.7%)	20 (9.1%)
Lack of Promotion of Culture of Information	25 (11.4%)	171 (77.7%)	24 (10.9%)

Respondents were asked to mention the success or failure obtained after implementing the new HMIS. The response to this open ended question is summarized as follows:

- it is a good start, failure is with the absence of follow up, ownership, coordination, and strong advocacy,

- HMIS needs continuous and regular supervision for the formats to be filled on time and complete,

-there is no ongoing monitoring and evaluation on implementation status in line with what is planned and feedback for the activities performed and reported,

-performance monitoring and data quality assurance to be made at individual health worker level on daily base, departments level on weekly base, facility level on monthly base, sub cities level on quarterly base regional level on annual base,

-let health-workers be consulted for revision on what HMIS misses,

- by giving refreshment courses and practical training on HMIS

-let leadership commitment from top management and role modelling involvement from specialized health professionals, to prioritize HMIS activities by management staff and full support from other stack holders

-staffing card room with skilled personnel and computerize to minimize problem in it,

- use the opportunity associated with ICT in recording and reporting system,

- by timely provision of all needed supplies, allocating budget and assign HMIS focal person on every facility,

-stated clear role of individual health workers, their departments, health facilities, sub cities (= districts), and region (=Addis Ababa Health Bureau) for the sustainability of HMIS implementation,

4.2. Qualitative Result

An in depth interview was conducted with 18 respondents in 7 hospitals, 5 in health centres, 5 in sub cities and 1 in region. The interviewed personnel were medical directors, HMIS focal persons and BPM officers who work on behalf at sub cities. There is no focal person trained and assigned as HMIS officer for each health centres.

Interview focuses on issues about how the new HMIS is implementing, data sources used, common tools employed on data capturing and reporting, inclusion of adequate data elements, commitment of the management to priotize this core activity, assign appropriate resources

The respondents were asked to express their view about the new HMIS and how it is running in their facilities in terms data collection, and reporting system. Many respondents consider 'HMIS as the new style of recording and reporting. It is very easy, comfortable and best for staff as well as for patient.' Another interviewee added similar view that 'there is a clear image on reportable data elements even if there are some limitations.' One of the HMIS focal individual has expressed his opinion that 'HMIS related works are improved from day to day; many works are done with minimum person with better quality of data. It avoids multiple reporting systems. It uses one card folder for one patient or client for all possible services that can be provided in our facility.'

Head of sub city health offices and facilities were asked 'how management is committed to strength and priotize HMIS as core institutional activities.' Most respondents claim that they did not know how and when HMIS implementation to be launched at regional level. One medical director has said that 'it would have been better if special training or workshop was given on the management of implementation process before its launched.'

Head of one sub city health office has said that 'our management was not ready for HMIS implementation. We have not assign HMIS officer and allocate budget at sub city as well as health centres level and even we do not consider HMIS as one of our core activities in our plan. There is no shared responsibility with region regarding HMIS. Every direction is given from region without our participation.' Medical director of one health centre has said that 'our health centre was a pilot area for the new HMIS. We hadn't got any benefit such as fund, computer or the like. My staffs were de-motivated and did not have positive feeling towards HMIS. Neither our practice nor other similar cases were not evaluated and communicated to us. I think sub city and region did not communicate with Tullen about the plan for pilot running and the current implementation.' Another medical director of hospital has said that 'we had reorganized our service departments according to civil service reform. HMIS, the latest reform, needs card room to be re-organized again.'

There was idea raised to interviewee about what data sources the new HMIS is used. One informant has said 'we know from the training that HMIS can use both population and service based data sources. I usually use medical service records as well as common health data capturing tools such as registers, and forms to trap required information from my clients

during each clinical visit. I have never used neither administrative records nor population based data sources such as census, vital registrations, and survey and surveillance reports.'

There was an interest to know what common problems faced during a day to day HMIS related activities. One respondent has said 'there is lack of knowledge about new HMIS. I usually observe during supervision that health workers face problem in data capturing and reporting. There is some misunderstand in registering admission and discharge as well as post offering services. They lack confidence to base on crude client information to consider her as a new or repeat customer.'

'Nine days training for HMIS focal persons, five days for most health officers or nurses, and a two day orientation to pharmacists, laboratory technologists, and some administrative staffs with same course module is not enough to internalize and practice the new HMIS' according to one focal person.

Another person has said 'HMIS creates more burdens on our work. We have no time to give proper care to patients in emergency. Let HMIS considers about our customer satisfaction than lose their golden time by such useless recording and reporting activities with these many forms for every individual clients.'

Medical director of one hospital has said that 'HMIS register books do not use name and bed number but patient ID only which is difficult to associate register with the individual patient and even this creates a problem during rounding and attending his health progress. Formats are unfriendly; they are lengthy and difficult to read some column notes. There is no enough space in the tally sheets boxes.' Another focal person has said 'HMIS is not applied properly, poor registry, improper and inaccurate recording and reporting. There are missing values and discrepancies between registers and tallies.'

A medical director from one health centre pointed that 'there is no responsible person for HMIS who can supervise our day to day HMIS activities, consult when the need arise and sometimes monitor our work. This may minimize irresponsibility of some staff to complete and fill these forms and registers.' 'It would have been best if health workers at facility level participate in the design and planning for implementation. I think there is no clear role among each stack holders. If health workers, for instance, engaged and clearly know their role, they may support the reform with the sense of responsibility by performing activities that HMIS demands' according to one informant.

Respondents were asked whether the new HMIS includes all reportable data elements for all their institutional interests or not. One respondent has said 'HMIS disease classification needs revision since most diseases are categorized as 'others'. HMIS does not properly specify some common diagnosis in our hospital like ectopic pregnancy which leads to incomplete reporting for most our hospital services and creates problems for logistic arrangements.' Another respondent has said 'HMIS assumes the number of patients to match with the number of main diagnosis which deviates data capturing process from the reality that one patient may have more than one interrelated or even different disease at a single episode and this even underestimate the number of work done.'

According to medical director of one hospital, 'HMIS under estimates the diagnostic capacity of our country and even it does not consider the ever changing advancement in medical technologies. There is no register for instance to record any laboratory results such as body fluid analysis .Even the work of pharmacist is ignored in the new system. Pharmacy and Diagnostic Units (Laboratory and Radiology) do not have registers. Pharmacist and laboratory technologists design their own forms to follow their daily activities and simplify their work. HMIS is not capable to capture PIHCT service or HIV case for <15 years.'

Another interviewee has recommended that 'HMIS needs revision since services at OPD demands many forms to be filled but the new civil service reform which was started to a year before HMIS reform requires many people to be served in a specific period of time. This may lower both the client satisfaction on health care provision and data quality while recording and reporting.'

Another idea that was asked to informants was to express their view on the principle of standardization, simplification, and integration in the new HMIS. One respondent has said that 'even if there is small number of indicators, standardized data collection forms and integrated channel of reporting through a single reporting unit, HMIS creates high burden to us. It requires repeated registering and tallying. It needs many forms to be filled for every client at OPD which affect their satisfaction. I think HMIS is failed unless immediate corrective measures are taken.' Another informant has said, 'in laboratory and in pharmacy, professionals prepare and use their own form since HMIS do not have standardized forms and registers.'

There was an interest to see the view of respondents how the new HMIS is implemented according to the stated requirements particularly in terms of physical and technical standards such as computers and offices availability, logistics such as forms and registers supplies, trained personnel and reporting requirements as well as budget allocation. Most medical directors from health centres have said that HMIS implementation in their facility was too late to start. It starts recently after 6 months of training. There is no computer, vacant position for HMIS personnel to assign, and budget allocated. Logistic Supplies was too late. They are sure to say HMIS is not a well organized program and there is no responsible body who can direct, guide and follow up the implementation status.'

A large number of respondents from all facilities have said that 'integrated card rooms are not organized and functional in line with this reform requirements, their workers are not capable for the HMIS, they are not interested and capable to get when patients lost their service card id, retrieve card missing. They usually give single master patient card number (MRN) for many individuals or two or more MRN for one person. They are incapable to index master patient index cards alphabetically, they are killers of HMIS.' Another interviewee with the same view point added that 'card rooms needs more and skilled staff. Culling procedures should be drawn and followed.'

Informants were asked how the challenges in implementing HMIS are alleviated. According to the interviewees neither the management nor the other workers of the facilities have better awareness about HMIS. It is surprising to have a response 'HMIS is not yet started' and 'I don't have idea on HMIS' from Addis Ababa health bureau experts. Most of the interviewees emphasized that awareness rising must be made by responsible organs.

Focal person in the hospital has said 'Health workers should be motivated to consider HMIS as a part and parcel of their professional duty, sub cities and region should take lion share on implementation. Technical supporting agency should work in the manner that avoid dependency and to ensure sustainability of HMIS implementation.' Another interviewee has added 'there should be sharing of knowledge, experience and skill among all participants on HMIS related activities.'

A BPME team officer has said 'that collecting data should not be the only task and final goal of HMIS. There should be a culture of information use both at facilities and office levels for decision making and planning purpose, to monitor the progress of health programs and

evaluate our progress against indicators.' Another medical director added his word on this idea that 'information should be used for Patient/ client management, facility management, health system management as well as for resource management.'

Another medical director believed that most implementation related problems are related to absence of follow up, coordination, cooperation and communication and he concluded his remark as follow: 'Who is the owner of the HMIS project? Please handover the key to the right and responsible organization so that we could enjoy the benefits and fruits of HMIS and be accountable for the failure by implication.'

4.3. Observation

During Physical Observation, the following items were considered and observed: implementation progress reports, data collection and reporting formats, minutes of important HMIS related meetings, official letters, quarterly HMIS reports, visits of card rooms and BPME sub core processes,

-The data encoders were seen while compiling tally sheets and prepare summed up reports at Yekatit and Menilik hospitals. These forms were repeatedly erased and rewritten,

- Lot Quality Assurance Sampling (LQAS) method of data quality assurance is performed in Yekatit and Menilik hospitals only. BPME team members at Yekatit hospital is performing this technique regularly once a month, they sent the result for discussing at management meeting and document it in a book with suggested solution for future references,

-Data encoders enter data into computers and reports are prepared from these aggregates through computer aided word and excel in all hospitals,
-There are three types of HMIS reports and one additional facility report used for management meetings:

-Quarterly Inpatient (IPD) Disease Report (through quarterly IPD morbidity and mortality report form)
-Quarterly outpatient (OPD) Disease Report (through quarterly OPD disease report form and
-Quarterly Service delivery Report

-There is no table, chart and graph prepared that demonstrates or make information accessible to external bodies about new HMIS performance in any of health facilities for example

-on sequential disease prevalence or ten top disease of that facility,

- possible services provided

- comparisons of plans and performances or some common indicators this may show incapability or absence of initiatives on HMIS workers in information generation.

-There is an opportunity to see some indicators posted on wall as well as many standardized reports of DHIS in Ras Desta Hospital where this software is still in use along with the HMIS reports and statistics unit is functional. This is the result of personal initiative of the former statisticians now assigned in another position and medical director encourages this effort since he is interested to see trends in clinical services of the hospital.

-There is no functional Data Quality Assurance or HMIS Monitoring and evaluation team to check data quality, evaluate and follow the progress of the newly launched HMIS in any health facility.

-The reports of health facilities of private and NGO are sent to their respective sub city and region they are not currently integrated and compiled with public facilities data (report)– the private sectors role and use information from them are not used to plan service coverage, to share knowledge, experience or control their activities.

- There is an effort to convert first, second and third quarter reports into HMIS report at sub cities and health centres by circular paper written from region even if implementation is launched in May 2010 after six months from training,

-There are adequate print out supplies of registers, forms and cards to all health facilities that can serve for one fiscal year even if there is no plan for supplies for the year after,

-Many 'other diseases' in forms filled in many hospitals during diagnosis may high light the existence of the problems and assessment at facility level may further needed,

-There is no opportunity to observe or read from document in any facility that performance monitoring and evaluation (M&E) had ever performed even if M&E can be performed at

individual level on daily base, at department level on weekly base, at facility level on monthly base, at Sub city (woreda) level on quarterly base and regional level on annual base,

-Training is given to 1378 health workers (for five days) and selective administrative staffs (for two days) at sub cities and health centres, 20 HMIS focal persons were trained for nine days (5 from hospitals 10 from sub cities and 5 from regions) even if 2 from hospitals (40%), 2 from region (40%) and 4 from surveyed sub cities (80%) leaves their responsibility of coordinating and guiding implementation activities because of the absence of incentives from region,

-One data encoder for each health centres and two diploma holder HMIS officers are not yet recruited even if the new HMIS reform requires,

Table 4.10: HMIS Implementation Assistance by responsible bodies Addis Ababa, 2010

Implementation Activities	Responsible Bodies		Remark
	Region	Tullen U.	
Human Resource recruitment	√ √ √		Two data encoder per hospital
Renovation of MR (Card) room	√ √ √		All facilities where HMIS implementation is launched
Training (implementers)		√ √√	Provided for all Health Workers
Printing: cards, registers, forms		√ √ √	Supplied for one year to all facilities
Computer & Accessory supply	-	-	There is no such assistance from anyone

-All facilities tries to renovate their card rooms according to the specification ($60m^2$ for hospitals and $24m^2$ for health centres), each card room in facilities is restructured with two or more windows to minimize long waiting hours due to card integration that avoid multiple card keeping system for a single client/patient, and master patient card is designed to be indexed alphabetically so that card duplication is minimized even if workers are incapable to do it,

-All card rooms of health facilities are equipped with MPI boxes even if some of them are not prepared according to the HMIS specification, there are no file cabinet and computers in any of the facility,

- Budget, Planning, Monitoring and Evaluation (BPME) sub core process (= department) at hospitals and region, BPME officer at each health centre and sub city are responsible bodies for over all HMIS activities. HMIS acting Unit or BPME sub core process is the only centralized HMIS information centre that is planed to serve as source of any horizontal and vertical information (data) transmission for health centres, hospitals, sub cities and region according to the figure 4.3.bellow.

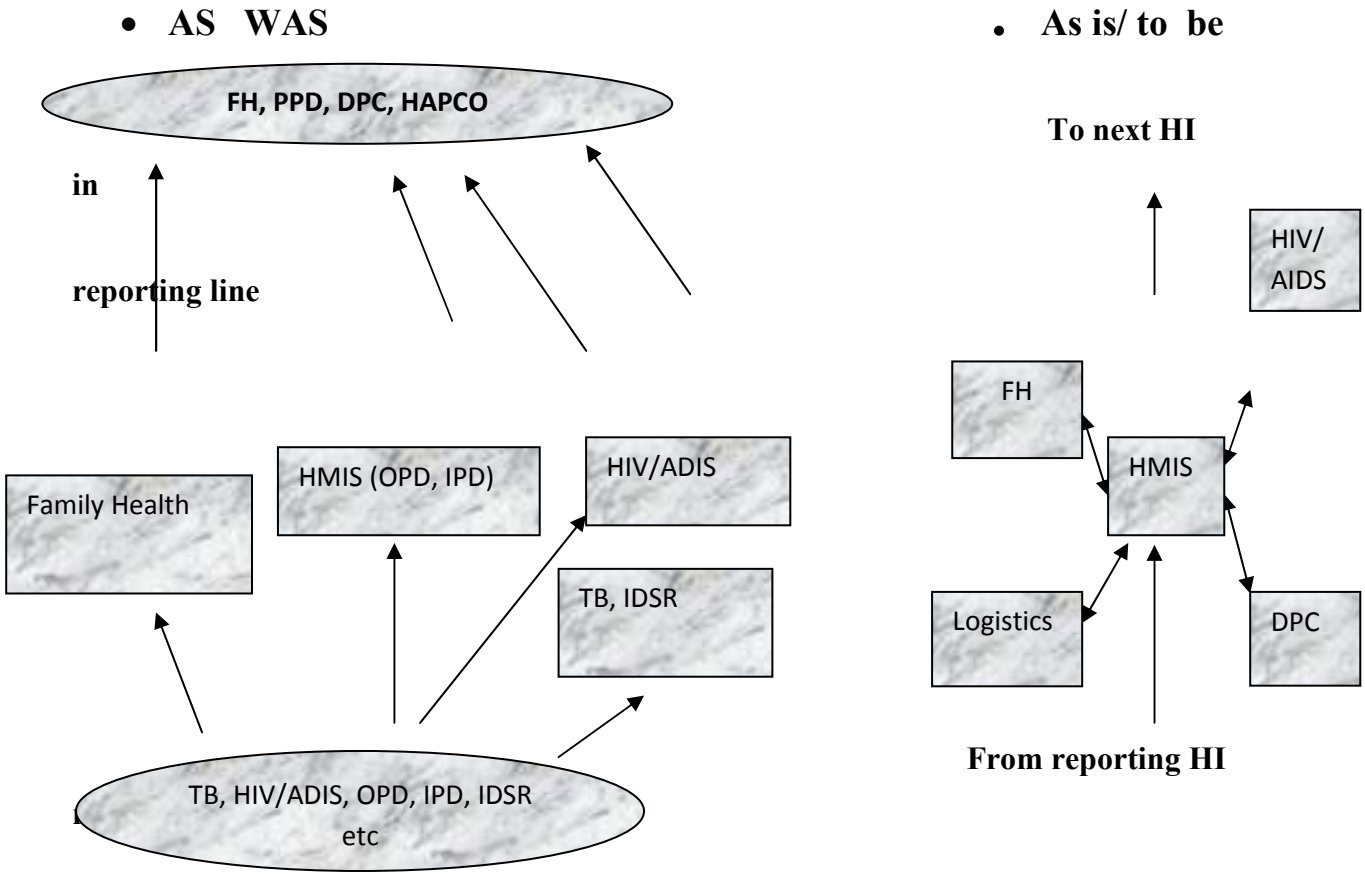


Figure 4.3: Information flow pattern in the old and in the new HMIS within Health Institutes (HI) and reporting Units (HMIS) (19)

-There is no budget allocated for HMIS activities nor for the vacant HMIS position in any facilities or health institutions,

-BPME sub core process at hospitals and regional health bureau are organized with ICT equipments and infrastructures according to table 4.11 bellow. There are no such facilities in health centres and sub cities.

Table 4.11: ICT equipments and infrastructures in BPME* sub core processes Addis Ababa, 2010.

	computers	printers	internet	telephone	Health officers	Data encoders	DQA team**	Backup ***
Menilik	2	1	Yes	Yes	2	3	No	No
R.Desta	2	1	No	No	3	3	No	Yes
Gahandi	2	1	No	Yes	4	1	No	No
Yektit	3	1	No	No	2	2	No	No
Zewditu	4	1	No	No	3	4	No	No
Region	3	2	Yes	Yes	3	-	No	Yes

*BPME-Budget, Planning, Monitoring &Evaluation**DQA team-Data Quality Assurance team ***Back up of the last two years health data

CHAPTER FIVE

DISCUSSION OF THE FINDINGS

5.1. Introduction

This study is conducted with four specific objectives. These objectives are to assess the data capturing and reporting design and implementation process of the new HMIS, identify the strength and weakness of the implementation status, investigate factors that possibly affect implementation program in Addis Ababa and propose possible solutions for the effective implementation of the new HMIS. Findings of the research will be discussed using the Performance of Routine Information System Management (PRISM) framework. The PRISM framework assumed that inputs, process and outputs are influenced by three determinant factors. The first two specific objectives will be seen through assessment of inputs, processes and outputs components of HMIS and the discussion will be presented as follows.

5.2. Assessment of HMIS Inputs

One hundred seventy six respondents (80%) are health workers who directly involve in the health care provision, 136 (62%) are degree holders and above and among these respondents, 44(20%) are heads of case teams or core processes. From the above evidence, respondents are well educated health workers and involve in the HMIS related activities. They can give their work experience with respect to the implementation status of the new HMIS in Addis Ababa City public health facilities, sub cities and regional health bureau.

The new Ethiopian HMIS intervention focuses on minimizing the amount of data collection. It standardizes this data collection through paper based tools that can stimulate information use at all level of health care system. Registers and forms are re-designed to provide continuity of care and to activate the process of tracing with tally sheets and reporting forms. Tally sheets are introduced to count activities. A ‘comment’ column and suggestion box in the collection and compilation forms is introduced. Health workers are expected to check and sign before submission. M&E officers some times renamed as ‘HMIS focal persons’ are believed to search for missing values, obvious fluctuations and computational errors (GP8).

All reports need to have the name and signature of the compiler (3,19). Thus, standardized forms, available procedures, cross checking mechanisms and responsibilities attached facilitates data quality.

The existence of adequate resources for the best implementation of HMIS program is an invaluable resource. Necessary inputs such as legislatives and planning framework, HMIS unit and required personnel, budget, equipments, trainings and coordination mechanisms were not sufficiently allocated in both facilities and health institutions according to this study. The new HMIS introduces guide lines, regulatory or planning frame works as a standard even if most do not know the existence of physical and technical, logistic, personnel as well as budget and reporting requirements.

In most facilities and health institutions, there is no budget allocated for the acquisition of human and material requirements necessary for success of the implementation. Sub cities and health centres did not have HMIS focal persons and there is no plan to recruit. This will create difficulty to compile, present and report HMIS data captured and facilitate health management decision-making and public health practices at different levels of any health system (13, 20, 22, 25). HMIS process re-engineering assessment report remarks lack of skilled human resource (18). A study conducted by Azeb identifies that HIS at health facilities lack appropriates inputs (9). Similar assessment study conducted by Meseret on HMIS at public hospitals also reveals the existence of low commitment of the decision making bodies in allocating human, material and financial resources (12).

Health workers were asked about HMIS related assistance received from sub cities, regional health bureau, ministry of health and donors. 167(75.9%) and above respondents demands feedback for what they are doing HMIS related activities, supervision as well as consultancy even if they did not get from any of them (GP9). From the document analysis, there is support from region to temporarily recruit data encoders for hospitals. Region also funds health facilities to renovate integrated single card room since the new HMIS demands integrated card system organized centrally in one room before launching HMIS implementation. Technical agency provides short period trainings and printed cards, forms and registers. There was a chance to see mentors from technically supporting agency supervise and consult focal persons at health facilities even if there was no schedule approved or at least known by immediate management body. Thus, there is uncoordinated and limited assistance in the implementation process.

5.3. Assessment of HMIS Processes

According to this study, almost all health workers (94.5%) in Addis Ababa had not participated in the designing efforts of the new HMIS (GP4). HMIS usually draws information from routine operations which are relatively inexpensive and available wherever health system operates. HMIS is now uses health service records, health and disease records and administrative records as facility based information sources according to 84.1%, 12.7% and 3.2% respondents respectively (GP2). Health Metrics Network frame work is used to look at the relationships between HMIS and other information sources. The new HMIS also uses population-based data sources such as census of Addis Ababa City Administration as well as information from supporting and administrating system such as logistic information system. Ethiopian Demographic Health Survey (EDHS), along with HMIS gives more useful picture of health sector (2, 19, 55).

Many of the respondents (68.6%) are currently involving in the data collecting, analyzing, interpreting or report generating activities even if significant number of health workers (30.9%) did not know their role in these HMIS core activities. HMIS forms, tally sheets and registers are used for data collection and reporting. These common data collection tools are being filled, counted or coded immediately after each clinical visit or after other HMIS related works (GP2). Over loaded health workers (20.0%) are doing these routines at the end of each working day personally or through assistance nurses (3, 19, 51).

This study find out the existence of the following problems related to data collection activities. Respondents particularly claimed that the new HMIS disease classification underestimates the diagnostic capacity of hospitals where most common diseases are categorized as ‘others’. Even a patient who get treatment for different interrelated diseases at one episode is considered as if he had got only one treatment and is reported as a single ’ main diagnose’. Thus, many ‘other diseases’ may create problems and further assessment survey at facility level may be reputedly required to know say ten top diseases for logistic arrangements or any other health interventions. There are controversy issues on recording admission and discharge cases, as well as new and repeat cases in family planning services.

HMIS focuses on data collection while BPR on patient satisfaction where thus contradicting focuses shall match with patient load in OPD and Emergency services. HIV <15 is not reportable. Some registers, tally sheets and forms needs revision. There is no register to

record any laboratory results and pharmaceutical activities. Professionals from laboratory and pharmacy design their own register to follow and simplify their work even if this is not in line with the principle of standardization in the new HMIS (19). Card rooms are not organized with qualified, motivated and capable workers as well as assisted with ICT technologies. Data or Report from private sectors is not integrated with the new HMIS even if they contribute a lot in the health sector and information from them is invaluable to plan sub city or regional service coverage, to share knowledge and experience or control their activities. Timely provision of denominator data from population is needed since they are inflated from time to time for different reasons. Assessment report 2006 also shows the existence of inconsistencies of population denominator between levels up to 20% (5, 18).

The main purpose of HMIS is to produce information that can be utilized for the management of health at each level of the health care system (GP5). HMIS tries to enhance the utilization of processed data at facility level as well as timely data or information transmission to the next level (2, 19). Currently, HMIS is designed to uses paper based horizontal transmission (within in individual health institutes) or vertical information transmission to sub city or region level (19). Health workers (96.8%) do not use computerized program or software for data recording, report generating or for any other HMIS related activities. However, only 19.1% respondents have been using word process and excel to record data and to produce their report. Data or report transmission from hospitals or sub cities to region is made through paper based mode of transmission even if the new HMIS design proposes ICT use. There is an opportunity to see data presented in some friendly formats and reports on sequential disease prevalence using DHIS software in Ras Desta hospital.

The new HMIS demands each level in the health care system to send a quarterly summary of activities to the level above. Hospitals directly reports to regional BPME sub core process while health centres reports to their respective sub city health office BPME officer acting as HMIS officer (unit). Most respondents (94.1%) sent summary reports in paper form while some use flash disks and floppies for transmission purpose. This summary report is expected to be sent after checking for data correctness, completeness and consistency. Each level reports only data directly connected to analyzable indicator at sub city, regional or federal level; other information is expected to be retained at the facility in register, service records contained in individual medical folder, other data capturing tools as well as summary of activities in paper or electronic form (GP3). HMIS acting Units at sub cities and health

centres or BPME sub core process at hospitals and region is planned to be the only central unit for any horizontal or vertical information transmission in the new HMIS (8, 19).

5.4. Assessment of HMIS Outputs

The new HMIS advocates efforts that can maintain data quality in terms of the degree to which it is up-to-date and available when needed as well as submitted on time according to established requirement (19). According to this study, many respondents show their agreement on timelines and adequacy of data or reports. On the average, few respondents agree with the completeness (46.4%) and on the accuracy (43.3%) of tally sheets, registers and reports. According to 93.6% respondents, there is no continuous and regular individual supervision that facilitates the formats to be filled on time. From the interview, Data Quality Assurance or Monitoring and Evaluation team of health experts is not yet organized in any facilities. Lot Data Quality Assurance Sampling method (LQAS) is not performed by these teams of experts in health facilities but by data encoders in few hospitals. Data encoders at Yekatit and Menilik hospitals conduct a self-assessment feedback through cross-checking the consistency among registers, forms, reports and tally sheets in addition to little effort to employ LQAS. M&E that can be performed at individual level on daily base, at department level on weekly base, at facility level on monthly base, at Sub city level on quarterly base is not yet performed (19). There is also little practice of Evaluation of HMIS works on management review monthly meeting according to few respondents (5.8%). Many scholars, how ever, remark that HMIS in any country shall focus on data quality since timely, complete and accurate information is invaluable in measuring and improving the coverage of health services through effective and efficient management at all levels of health services (2, 3, 9, 11, 13, 20).

This study reveals the existence of encouraging progress in data quality in terms of timeliness and adequacy to sub city and health centres. Completeness and accuracy portion of data quality can easily be achieved if a team of health experts at each facility is organized, skills of HMIS officers is developed, managements are committed and regular technical support existed to help HMIS officers conduct supervision, LQAS and M&E (10, 19). These coordinated efforts along with the introduction of standardized and uniform formats as well as minimized recording-reporting steps by the new HMIS can improve data quality by far(10, 19). An assessment study on HMIS at public hospitals in Addis Ababa by Meseret and a

study on Information Utilization to HIV/AIDS program in north Gondar in Amhara regional state by Gashaw remarked the existence of inappropriate data collection and complexity of reporting formats, untimely reporting system and absence of responsible person for HMIS related activities particularly in health centres and woreda levels lead to poor data quality (2, 5, 12). A study in Malawi also recommends that the main aim of optimizing data quality is not yet fully achieved despite many more progress in HIS (39).

Table 5.1: Basic comparisons in number of data elements and reporting steps between old and new HMIS, Addis Ababa, 2010 (19).

AS WAS	AS IS/TO BE
• Diseases OPD: 250+ • Age group/Gender: 12 • Total data elements: 960 • Diseases IPD: 250+ • Age group: 12 • Total data elements: 3072 • HC: 400-600, per month • Woreda 600 per month • Reporting format 15 pages	• Diseases OPD: 80 • Age group/gender: 6 • Total data elements: 498 • Diseases IPD: 100 • Age group: 6 • Total data elements: 1200 • HC 164 • Woreda 164 • Reporting 4-6
a. HC/HP 60 steps b. Woreda 33 c. Region 28 d. Federal 200+	.Estimated at 22 (60% fewer) .Estimated at 22 (33% fewer) .Estimated at 22 (22% fewer) .75% fewer steps

Development of a set of indicators is a major shift from the old system to the 'new' health information system (19). According to this assessment, 42.3% of the respondents suggested the need to include additional essential data sets. Health workers from hospitals (81.1%) claimed that the new HMIS does not include adequate data elements and some indicators (GP2). Surgical infectious rate is not included as service quality measurement indicator.

Major hospital diagnoses such as ectopic pregnancy are missed because of limited HMIS-Disease Classification. HMIS is not capable to capture PIHCT service or HIV case for <15 years' and laboratory results such as body fluid analysis as data element. These findings remark the need for revision of the new HMIS to address such problems, considers diagnostic capacity hospitals as well as technological advancement in clinical services. The process of fine-tuning and introducing best HMIS version is always a continuing and dynamic process according to many scholars (33, 34, 41, 42, 35, 43).

Number of Indicators=105

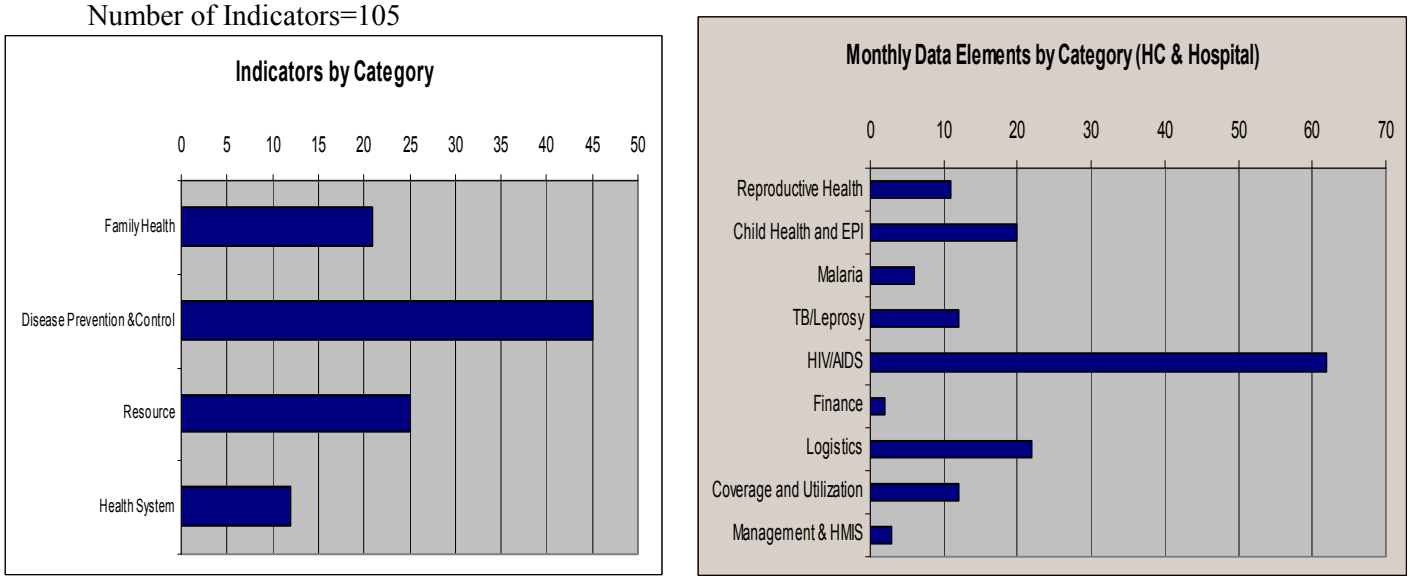


Figure 5.1: Indicators and Data Elements in the new HMIS, Addis Ababa, 2010 (19).

Technical skills and motivation of HMIS focal persons, and BPME officers as well as health workers at grass-root level is a prerequisite for the availability of quality data (13). Supervision, LQAS, M&E introduced by the new HMIS is believed to assist appropriate and quality data collection, compilation and generation of information as well as computation of indicators (2, 19). The analysis and interpretation of quality data to generate information at any given health service level can help to identify health problems at the place of there origin and solve them with minimal local resources (GP5, 2). Two hundred and seven respondents (94.1%) claimed that reports are presented in paper form. These reports are sent to management body of the facility, regional health bureau and the department in their facility according to 66(30.0%), 53(24.1%) and 44(20.0%) respondents respectively. There is no significant additional effort to see manual or print outs that display the activity of the health facilities or their service coverage except three standardized report forms of HMIS.

Tables, wall charts and graphs are not prepared and used to display HMIS information in any facilities. 2 from hospitals (40%), 2 from region (40%) and 4 from surveyed sub cities (80%) leaves their roles of coordinating, guiding and doing HMIS activities. This implies incapability focal persons and absence of motivation to stay at HMIS work and encourage data analysis, information generation and presentation for use at facility, sub city and regional level. Determining the champion of the new HMIS helps to mobilize and raise awareness of technical realities such as procedures, duties and responsibilities in data analysis and presentation helps to provide appropriate incentive for those performing well (33, 50). This explanation is similar with studies conducted by Azeb, Meseret and PATHS that recommend the need for appropriate incentives to health workers to show dynamic endeavour for constant improvement in HIS (12, 14, 35).

The new HMIS is launched with the ultimate goal of contributing evidence-based decision-making in the health sector through the generation of quality information and promoting the use of this information for action (19). According to this study, most health workers use this information for reporting purpose or to give information for interdepartmental use. HMIS data is sometimes used at monthly management meeting. Only few health workers are using this information for decision making (36.8%), for planning purpose (36.8%), to compare with previous report (35.9%) or to monitor and evaluate performance (35.9%). Planning is still based on previous year experience in view of current market conditions. HMIS data is not yet used for strategic planning process. Leadership at all levels of the health care system is not sufficiently uses information for decision making. Program managers and supervisors do not have analysed information against indicator to identify problems within individual programs. HMIS is being used for sending- report purpose (GP5). This implies information use culture is poor. Many respondents (93.6%) claim that there are no incentives of any kind or policy that cultivates Information Use Culture. Management support that emphasizes, develop, facilitate and motivate information use culture is minimal. Most HMIS staff, for instance, does not allowed to participate in the planning and decision process. Similar to this study finding, many assessment studies suggested the need for more work that improves information use culture that avert the regression of HIS (2, 4, 14, 49, 50 54).

According to many respondents (90.5%), there are no rules and regulations provided in the new HMIS about the security, use, transfer, retention and destruction of medical records, health data or information. According to 190 respondents and physical observation, there is

no a back up documents of the last two years (GP1) even if DHIS was ones popularly used health software learned, shared and adopted from the experience of sustainable and flexible health system introduced elsewhere under the principle of Free and Open Source Software. DHIS had served as a data base and data bank that facilitate data entry, data processing, data analysis, presentation and data storage (backup) (12, 13, 14, 18, 34, 35, 46, 51, 54). From the interview, culling procedure for medical cards is not introduced by the new HMIS.

One of the motives for the HMIS reform is to provide M&E mechanism and feedback that can improve information use culture (19). They encourage health workers to give more attention to the quality and consistency of their own data capturing, analysis and report generating efforts. According to this study, there is no feedback, M&E mechanism, Supervision or Consultancy Scheme such as forum or workshop employed for successful implementation of HMIS (GP7, GP9). Data Quality Assurance Team to be headed by medical directors of each facility and Implementation Technical Committee at regional level are not yet established. A study Conducted by Azeb on factors affecting HIS use in Private and Public facilities and assessment of HMIS by Alganesh in Addis Ababa health bureau as well as an assessment on Rwanda HMIS strongly suggest the need for feedback on the practice, changes and progress of HIS (13, 14, 50, 54). Many other scholars and Institutions working with health related activities also remark the need for feedback mechanisms for successful implementation and introducing better version of HMIS (7, 9, 20 25, 29, 49)

5.5. Assessment of Determinants

The third objective of this research 'assessment of determinant factors that possibly affect implementation program in Addis Ababa' will be discussed using PRISM framework as follow.

Prism Framework considers technical determinants as the nuts and bolts of the information system that the system developer and implementer should focus their energy (12, 14, 19, 54). The majority of health worker agree with the existence of standardized set of indicators and a well designed data collection and reporting forms according to 187 (85.0%) and 175 (79.5%) respondents respectively. The new HMIS introduces three standardized quarterly and annual reports (19). In contrary to this achievement of new HMIS, a study conducted by Meseret on public hospitals in 2009 proved that statistician, the then HMIS worker, was expected to prepare 26 reports in Zewditu, 17 in Minilik, 14 in Yekatit,11 in Ras Desta and 6 in Gandhi

hospital (12).The work of Sapirie and Gashaw also remark the absence of standardized collection and reporting format as well as identification of important indicators as the main problems in the studied HIS (27).

The sending report activity is not yet transformed into data analysis and information generation effort that can be used for health service management and the design of intervention at each health level. This transformation and effective implementation of HMIS needs to focus on capacity building efforts (31, 32, 33). Health workers shall actively involve in the HMIS activities since many Health workers (60.9%) believe that they are not well trained to properly fill out HMIS formats they took two to nine day trainings only (GP6). HMIS focal persons and BPME officers are responsible for reporting data as well as analysing, presenting and using information for supervision, monitoring and evaluation of service delivery. They need organized capacity building efforts since large scale training and support schemes in the use and management of health information consume 70-80% of the resources allocated to system development (54).

Effective and practical full-time and on-job training, review meetings and workshops is mandatory things. These efforts can strengthen their technical skill, improve their commitment and play proactive leadership role and being accountable in the implementation program. They centrally provide timely information from HMIS unit about coverage and quality of service delivery to the managements, to the staff and to other stack holders of the health system. Assessment studies contacted by Meseret, Alganesh, Azeb and Gashaw recommend the need for trained and skilled health workers for the best improvement of HIS (12, 13, 14). In many literatures, scholars suggested the need for capacity building effort to the success of HIS reforms (25, 35, 54).

Observation and interview show that adequate ICT equipments and infrastructures for HMIS are needed. There is no computer in health centers and sub cities covered by the study. Most of respondents (96.8%) assured that the new HMIS currently does not use appropriate information technology (GP1). ICT may improve the friendliness of some reporting formats that many respondents (88.1%) claim for its improvement. ICT can be applied in most HMIS activities such as data capturing, processing, analysis and information use and can bring many more advantages (12, 13, 35, 40).

DHIS, for instance, has been used in the Ethiopian HIS because of its great flexibility, capacity to handle new data elements and facilities, built-in data quality checks; ability to produce standard reports and capacity to view data in friendly formats . In addition to this, DHIS is capable to incorporate and use census data to resource allocation such as equipment, staff, and infrastructure and their proper use. DHIS also improves data quality assurance, and other data collection process as well as positive consequence for nation-wide roll-out. It is capable to show and compare performance changes in two or more years. It is free open software, easily adaptable to local languages and interest even if such ICT application effort demand additional acquisition of computers, printers and ICT infrastructures, cultivating technical skills of data managers (focal persons and BPME officers), day-to-day maintenance of the system with respect to electricity supply, and running costs (12, 13, 14, 18, 34, 35, 46, 54). Many researchers recommended the application of ICT in HMIS since it dramatically improve data processing and management, accuracy and timelines along with trained and skilled human resources (12, 13, 35, 46, 51).

Environmental or systemic factors such as resources (human, material and financial), roles and responsibilities of stockholders, organizational structure, management support and enabling environment are some organizational factors that determine the implementation status of any HMIS (12, 52, 53, 54, 55). Health workers were also asked to rate their agreement on effect of organizational factors on the implementation status. According to this study, large number of health workers disagrees with the existence of coordinated effort and leadership (85.9%), existence of strategy and policy that show clear roles and responsibility of professionals in data collection, management and use (63.3%) and existence of organizational culture that exploits its shared values for the implementation success (57.3%). There were a significant number of respondents (57.7%) that disagreed with the presence of devolution or decentralization in the implementation process (planning, training, pilot running and implementation) that create a shared responsibility to address possible problems at their infantile stage.

From interview, most respondents did not have orientation nor attend workshop on the management of implementation process before its launching. Sub cities did not communicate with region and Tullen about training and the current implementation activities. This creates dependency on uncoordinated leading effort of the regional health bureau and puts sustainability of implementation in question. Health workers also show their agreement on

the existence of narrow structure of the health system that may possibly affect implementation status. According to interview and observation, Health Centres and Sub cities do not have HMIS units and personnel assigned for this 'core activity'. BPME officers and other professionals are assigned to work on behalf as HMIS focal persons. Card room is restructured according to civil service reform commonly called Business-Process Re-engineering implemented a year before HMIS implementation is launched. The two reforms shall be compatible. Both region and sub cities did not practically priotize HMIS as a core institutional activity (15). There is no budget allocated neither for HMIS activities nor for the vacant HMIS position in any facilities or institutions. Large numbers of respondents (76.8%) disagree with the existence of budget or HMIS resources control. A study conducted by Meseret showed similar findings that there is centralized decision making, low political commitment, and narrow organizational structure (12).

There was an effort to see the impact of behavioural factors on the HMIS implementation status. Most health workers (92.3%), agrees that the new HMIS is not the extension of the previous one (GP1, GP10). There is no motivational mechanism that encourages the use of data to assess HMIS performance according to most respondents (92.7%). Health workers believed that HMIS implementation lack ownership. Large number of health workers (91.4%) suggested the absence of follow up, coordination, cooperation and communication in the implementation course of action.

Health care providers are not transformed into effective data collectors and information users, Health workers are not empowered to take active participation and take HMIS as part and parcel off their professional duty according to 203 respondents and even they lack confidence to participate and make decision for HMIS related activities according to 191 respondents (GP4). Many health workers believed that there is a failure of advocacy about the new HMIS (191) and there is a lack of promotion about information use culture according to 195 respondents. Many assessment studies showed similar findings that the management of HMIS activities should be accompanied with follow-up, coordination, cooperation and communication among responsible bodies, motivational mechanism that can create ownership among stakeholders and empowering them to actively participate in the HIS decision making activities (12, 14, 49).

5.5. Limitation and Strength of the Study

Strength

-Both quantitative and qualitative methods of data collection are used for this assessment study.
-All public health facilities and institutions under Addis Ababa Health Bureau and where the new HMIS is implemented are covered in the study.
-The study uses both HMN and PRISM frameworks in combination for assessment purpose.

Limitation

-It is generally impossible to find out the relevant facts from all health workers and service departments since there is limitation in time and resources. In addition to this, all health workers did not participate in the study since some of them did not take HMIS training and did not participate directly in clinical services where HMIS data capturing is made during or after each clinical visit. All medical directors of health facilities and head of sub cities and regional bureau were not participated in the study since they claimed being busy and did not take training.

CHAPTER SIX

CONCLUSIONS AND RECOMENDATIONS

6.1. Conclusions

Based on the objectives of the assessment, available literatures were referred and necessary information about the new HMIS implementation process and resources available were gathered from facilities and health institutions as well as from health workers who are both at clinical services and management level through questioner, interview, observation and document analysis. Finally the data obtained were analysed and interpreted and major findings are summarized and the following conclusions are arrived.

HMIS standards and requirements are not well communicated to stakeholders. HMIS unit in each facility or sub city is not restructured in their organogram. In most facilities and health institutions, HMIS inputs (human, material and financial resources) are not available according to the requirements. ICT is not currently used in the reform for data recording, or information generating. Most facilities do not have skilled and well trained staff for HMIS related activities. Most health workers had not participated in the designing efforts of the new HMIS. Significant number of them (30.9%) did not know their role in these HMIS activities. Adequate regular technical assistance is needed by health workers.

There are no rules and regulations about the security, use, transfer, retention and destruction of medical records, health data or information in the new HMIS. There is no back-up document of the last two years or for those to be retained at facility after reportable data/ information is sent to the next level.

The new HMIS underestimates data capturing and reporting. There are controversy issues in data capturing. HIV <15 year is not reported. There is no register to record any laboratory results and pharmaceutical activities. There is mismatch in focuses on data collection (HMIS) and patient satisfaction (BPR). HMIS also underestimates the diagnostic capacity of health facilities. Major hospital diagnoses are missed in the HMIS-DC. Surgical infectious rate is not included as service quality measurement indicator. Body fluid analysis is not reportable data element.

Capacity building activities is needed to improve data quality, transform sending report into information use culture and for success of HMIS implementation in general. Effective and practical trainings, review meetings as well as workshops are necessary to health workers strengthen their technical skill, improve their commitment and play their role and being accountable in the implementation program.

There is low political commitment to practically priotize HMIS as a core institutional activity at facility, sub city or regional level. Most respondents did not have orientation nor attend workshop on the management of implementation process before its launching. There is no a shared responsibility among stack holders to address possible problems at their infantile stage in the planning, training, pilot running and the current implementation of the new HMIS (57.7%). Implementation lack ownership, follow up, cooperation and communication among stakeholders (91.4%), lacks coordinated effort and leadership (85.9%), strategy and policy that show clear roles and responsibility among professionals in data collection, management and use (63.3%) and do not exploit shared values in health sector for its success (57.3%). The new HMIS is not the extension of the previous HIS and does not take its strength (92.3%).There is a failure of advocacy and promotion about the new HMIS and information use culture.

6.2. Recommendations

Data found from respondents, observation and documents are presented and discussed and conclusions are arrived. Based on the conclusions, the following recommendations are forwarded for the success of the new HMIS implementation program in Addis Ababa public health facilities and institutions.

1-There should be practical commitment to priotize HMIS as a core institutional activity at all levels in Addis Ababa to set and organize HMIS units with appropriate inputs.

2- HMIS implementation at should have ownership, follow up, coordination, cooperation and communication as well as shared responsibility among stakeholders in the implementation course of actions.

3-Guide lines, planning frame works as well as standards in the new HMIS should be well communicated and applied accordingly.

4-The new HMIS should be revised to adjust limited HMIS disease classification, controversy issues on recording and reporting, inclusion of some data elements and indicators, data collection tools to keep the principle of standardization with pharmacy and laboratory works.

5-Data quality and Information use culture should be strengthened with developed skills of HMIS officers and health workers and through incentives, policy, M&E mechanism and feedback.

6- HMIS focal persons, the champion of the new HMIS, should be assigned, trained and motivated to play proactive leadership.

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Annex 1

Questionnaire

Subject information sheet

Dear respondents:
I'm---------- working with Tilahun Alemu, a post graduate student in Addis Ababa university department of health informatics. He is doing a research entitled 'Assessment of Tullen University Supported new health management information system (HMIS) implementation program in Addis Ababa ' as a partial fulfilment of Master program.

The objective of this study is to assess the status of Tullen University supported new HMIS implementation program in Addis Ababa City Government administered health facilities, sub cities and regional health bureau and to identify possible factors that affect program implementation and give recommendation based on the findings.

You are, therefore, kindly requested to fill this questionnaire. The information you provide will kept strictly confidential. You will be facing no harm by participating and you are also not obligate to answer any question you don't wish to answer. It may require 25-30 minutes to fill questionnaire. If you wish to comment feel free to use the contact address.

Contact
Name: Tilahun Alemu
Tel: 251-911-42-46-54
e-mail tilahunal2009@yahoo.com

Part One: Background Information

Respondent No._____

101. Name of the institution you are working in _____

102. Unit/ department you are working in _____

103. Your Position /occupation in the institution _____

104. Your sex 1) Male 2) Female

105. Your educational status _____

106. If you are health worker, what is your field of specialization please encircle.

1) Health Officer
2) Environmental Health Technician
3) Nurse
4) Health Assistant
5) Laboratory Technician
6) Pharmacist
7) Pharmacy Technician
8) General Practitioner
9) Other (please specify)_____

Part Two: Inputs of HMIS

201. What is your role in health management information system (HMIS)?
1) Data collecting, analysing, interpreting, and reporting to HMIS unit
2) Data encoder 3) computer programmer 4) I don't have any role HMIS

202. Have you ever involved in the design of new HMIS?
1) Yes 2) No 3) I don't know

203. Which standard (guideline, regulatory or planning frame work) of HMIS facility is available in your /health facility?
1) Physical & technical – equipment (Computer, Office)
2) Logistics (eg. forms}
3) Personnel Trained Requirement
4) Budget
5) Reporting requirements (Time schedule, Aggregation guidelines)
6) I don't know which standard to have

204. Is there a unit (an office) assigned specifically to HMIS?
1) Yes 2) No 3) I don't know

205. What HMIS related assistance do you get frequently from the Sub City/Regional/MOH/Tullen University?

Assistance Received	Never	Rarely	Sometimes	Often	Always
1) Training					
2)Feed back					
3) Supervision					
4) Consultancy					
5)Logistic(forms,registers,…)					
6) Financial					

206. Do you have adequate finance assigned to HMIS unit?
1) Yes 2) No 3) I don't know

207. Which of the following Equipments does your HMIS unit furnished with?

Equipment/Facility	Yes	No	Remark
1) Computer			
2)Fax machine			
3)Printer			
4)Telephone line			
5)Internet or any kind of network			
6) Stationery (pen, paper,…)			

208. Did you ever attend training on HMIS?
1) Yes 2) No. 3) No response

209. Do some issues/questions raised during the training better explained or referred to the next decision level?1) yes_____ 2)No_____3) I don' know

Part Three: Process of HMIS

301. Do you use forms, tally sheets, and registers as a common tool for data collection and reporting? 1) Yes 2) No 3) I don't know

305. Does your facility collect/record health related data on every visit of a client? 1) Yes 2) No 3) I don't know

302. Are tally sheets, registers or forms filled ,counted or coded just after each clinical visit or other HMIS related work?
1)Yes 2) No 3) I don't know

307.Which type of health data sources your facility is used? (you can choose more than one)
1)Health and disease records only 2)Service records only
3)Administrative records only 4)Census
5)Vital registration 6) Survey and surveillance

306. Do you think the new HMIS include all reportable data elements for your facility/sub city/ region requirement?
1) Yes 2) No 3) I don't know

303. Do you use computerized program/software for recording and generating report?
1) Yes 2) No 3) I don't know

304. If yes, what program/software do you use to record and produce report? (You can choose more than one)
1) DHIS Software 2) Word Processing 3) Ms/ Excel
4) Other _____

309. Is there rules for minimum period of maintenance and processing time for the data?1) Yes 2) No 3) I don't know

308. Is there clear procedure for reporting/ transmitting raw or processed data within or out side your department/ facility
1) Yes 2) No 3) I don't know

310. How do you rate the data or report quality of your facility in terms the following parameters ? (Make a tick (√) mark)

	Strongly Agree	Agree	Disagree	Strongly Agree	Not sure
1) Timeliness reports					
2)Completeness of Tally sheets, registers, reports					
3)Accuracy (Consistency-among tally sheets, registers and reports & Reliability-data, reports)					
4) Adequacy of reports					

311. What failure did you notice while data capturing, recording and reporting based on the new HMIS? Please specify _____

_____

312. Is there any mechanism that controls the data quality and continuous quality assurance of health system data being collected and processed?
1) Yes 2) No 3) I don't know

313. Do you have regular programs and guide line for supervision in the new HMIS? 1) Yes 2) No 3) I don't know

314. Who performs supervision? 1) Organized staff team 2) sub city
3) regional health bureau 4) Others specify__

315. What findings were usually identified?
_____
_____

316. In what form the generated report/information presented to the upper level? 1) In paper form 2) E-mail 3) Networking
4) Soft copy form using flash disk/floppy diskette/ CD

317. To whom do you distribute the generated report? (You can choose more than one)
1) To the department/units in your facility
2) To the higher management body of the facility/sub city/ region
3) HMIS unit only
4) RHB / MOH
5) Other _____

318. Do you have a mechanism/ system for monitoring and evaluation in new the HMIS? 1)Yes 2) No 3) I don't know 4) No response

319. If the answer for the above question is yes, what is the monitoring and evaluation system of the new of HMIS?
1) Quarterly review 3) Management review
2) Annual review 4) Regular feedback
5) Other (please specify)_____

320. Do you regularly receive feedback from higher levels?
1) Yes 2) No 3) I don't know 4) No response

321. If yes, in what interval do you receive feedback?
1) Every month 3) Every six month 2) Quarterly
4) Annually 5) Other_____

Part Four: out put of HMIS

401. For what purpose do you use the information from HMIS unit?

(Make a tick (√) mark)

Information Use	Yes	No	I don't use
1) For reporting to higher level only			
2)To give information to the users			
3)To compare with the previous report			
4)To monitor and evaluate performance			
5)For planning purpose at institutional level only			
6)For decision making/ to take action at institution level			

402. Is there an incentive for information use?
1) Yes 2) No 3) I don't know 4) No response

403. If yes, what kind of incentives is used?
1)Money 2)Training 3)Recognition 4)other------

404.Is there legislative and regulatory policies that encourage information use culture? 1) Yes 2) No 3) I don't know 4) No response

405. Do you have document of the last two years HMIS data/ report /survey conducted 1)Yes 2) No 3) I don't know

406. If your answer is yes, how do you document (you can choose more than one) 1) In a computerized form 2) Paper form
3) Any other form, please specify _____

407. Do Your facility have rules and regulations about security, use, transfer, retention, and destruction of health data/information
1) Yes 2) No 3) I don't know

Part Five: Possible Determinants of HMIS

501. How do rate your agreement on the new HMIS implementation status in terms of the following technical determinants that influence quality data and use of information? (Make a tick (√) mark)

Technical Factors	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1)There is standardised set of Indicators					
2)There is well designed data collection and reporting forms					
3) Trained staff able to fill out forms					
4) There is skilled human resource					
5) Friendly format for Reporting results and Easy-to-visualize					
6) Use of Appropriate technology for data analysis, transfer, presentation					

502. How do you rate your agreement on the new HMIS implementation status in terms of the following organizational/Environmental/Systemic factors? (Make a tick (√) mark)

Organizational/environment/ systemic factors	Strongly disagree	Disagree	neutral	agree	Strongly agree
1) Existence of coordinated effort and leadership (political commitment)					
2) Existence of strategy and policy (Clear roles and responsibilities related to decision-making)					
3) Devolution/decentralization.					
4) Control of budgets or allocation of resources					
5) Narrow Structure of the health system					
6) Organizational culture (acceptance or resistance)					

503. How do you rate your agreement on the new HMIS implementation status in terms of the following Behavioural factors?
(Make a tick (√) mark)

Behavioural Factors	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1)The new HMIS is not considered as extension of the previous one					
2)Lack of motivational mechanism when data collectors use it for assessing their performance					
3)Absence of better follow up, coordination, cooperation and communication					
4)Lack of ownership (transforming care providers into effective data collectors and users.)					
5)Lack of Empowerment of care providers(to take action based on data)					
6)Lack of confidence to make decision at HMIS related activities					
7)Poor Advocacy(Failure to Brings credibility with previous good work)					
8)Lack of Promotion of Culture of Information (Role modelling, …)					

504. What success or failures did you get after implementing new HMIS so far?

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505. How can the new HMIS implementation status be improved?

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505. If you have any comment, please specify.

Annex 2

Interview Guide Lines

Part one (HMIS Focal Person)

1) Can you tell me how the new HMIS is running in your department/facility? In terms of data capturing, reporting and information use, do you use any facilitating documents/ guidelines/ standards ?

2) What are your sources of new HMIS data (facility based and population based)?

3) What common tools are used for data collection? Are they correctly and completely filled? Do you employ any mechanism to control data quality?

4) Do you organize process and analyse data collected to produce relevant, timely and quality Information? Do you have guidelines/standards regarding information generation, use and reporting?

5) How do you see standardization, simplification and integration in data capturing, recording and reporting in the new HMIS?

6) How do you receive feedback/supervision on HMIS? From whom? In what Interval?

7) To what extent do the senior leaders in your organization support the HMIS performance improvement? Do you have access to resources (people, time, funds, and technology) to carry out the process? Do leaders allocate resources to the HMIS process?

8) What are the existing challenges/ problems in connection with new HMIS implementation?

9) How can these situations be improved? (In terms of better attitude, skill, and culture of the staff as well as the management support for the HMIS related activities).

Thank you for taking the time to conduct this interview!!

Part Two (Medical Director/ sub city head)

1) Can you tell me how the new HMIS is implementing in your department/facility?

2) How do you see the work of Your HMIS unit to the standard (planning frame work)? (In terms of Physical & technical – equipment (Computer, Office), Logistics (eg. forms), Personnel Trained Requirement, Budget allocated, Reporting requirements (Time schedule, Aggregation guidelines)

3) How do you see the application of the principle of standardization, simplification and integration in data capturing, recording and reporting in the new HMIS?

4) Do you employ any mechanism for the maintenance of data quality?

5) Do you think the new HMIS include all Reportable data elements for all of your institutional interest? Do you conduct survey to fill these gaps? Do you regularly conduct performance monitoring and evaluation for the better implementation of the new HMIS?

6) How the management is committed to strength BPME sub core process (responsible unit for HMIS activities), allocating budget and priotize HMIS as a core institutional activities?

7) What do you think the existing challenges/ problems in connection with the successful implementation of the new HMIS program?

8) How these challenges are improved?

Thank you for taking the time to conduct this interview!!

Annex 3

Physical observation Checklist

Department/facility/sub city/region_____

Formats/sheets/ registers used_____

Skill/ Competence/experience/ of the staff (by observing filled formats, tally sheets, and registers, their Legibility and Completeness of data_____

Room Status_____

No of staff in HMIS unit _____

Availability IT/communication equipment (pc computers, printers, telephone, intern ate, networks, etc)_____

Availability HMIS office_____

Backup system_____

Software used for data capturing, Reporting, _____

DECLARATION

This thesis is my original, has not been presented for a degree in any other university and that all sources of material used for the thesis have been duly acknowledged.

_____

Tilahun Alemu

June 2010

The thesis has been submitted with my approval as a university advisor.

_____

Dr. Mesfin Addisse

June 2010