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Assessment of Magnitude and Factors Affecting Health Information System (HIS) Use in Private and Public Health Facilities in Addis Ababa

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ACRONYMS

DHIS: District Health Information Systems

EPR: Electronic Patient Records

HIS: Health Information Systems

HMIS: Health Management Information Systems

HMN: Health Matrix Network

HSDP (III): The Third Health Sector Development Plan

IT: Information Technology

MCH: Maternal and Child Health

MDG: Millennium Development Goals

MOH: Ministry of Health

PASDEP: Plan for Accelerated and Sustained Development to End

Poverty

WHO: World Health Organization

Abstract

Background: Health information systems are critical to improving health system effectiveness and monitor and evaluate performance. However, the utilization of HIS at facility level has been frequently reported to be poor.

Objective: To assess the magnitude and factors affecting Health Information System (HIS) use in both private and public health facilities in Addis Ababa.

Method: a cross sectional, descriptive study was conducted in Addis Ababa. A structured questionnaire was filled by 124 health facilities and; in-depth interview with 11 health facilities were conducted A total of 124 health facilities were included in the study.

Result: the health facilities were found to perform poor in terms of basic inputs to HIS; inadequate processes and; insufficient outputs. The use of HIS in the facilities is thus found to be very low (22.5%) although the government health facilities were performing relatively better. The absence of incentives to the use of HIS, the inability to participate HIS workers in the planning process, lack of local skills to manipulate the data, lack of information culture, low attitude and commitment of managers as well as staffs, lack of basic inputs to HIS, centralized decision making, lack of feedback and absence of technical support as well as supportive supervision were found to be the major factors affecting HIS use in the facilities.

Conclusion and Recommendations: it can be concluded that the utilization level of HIS in health facilities under study is far below the standard expectations. It is recommended from this study that a common understanding should be reached between the facilities and the responsible organs so that facilities could know the use of the data they generate to local need rather than sending reports upwards.

Key words: Health information systems, Data collection; Decision making, data quality.

INTRODUCTION

Countries need to have sufficiently developed health information systems to permit regular monitoring and evaluation. Different activities have been implemented so as to integrate HIS in the health system including the introduction of appropriate technologies, allocation of funds specifically for HIS, providing equipments and conducting on job trainings for the health workers. [1, 2]

The Millennium Development Goals (MDGs), which have strong health components, have been widely endorsed as a framework for measuring development progress. Ethiopia has also implemented a multisectoral Plan for Accelerated and Sustained Development to End Poverty (PASDEP), with specific goals related to health. It is also stated that one of the objectives of the Ethiopian Health Sector Development Plan (HSDPIII) is to insure use of health information in decision making at federal, regional, woreda and health facility levels [3].

However, the poor data quality emerging from the health facilities added with other factors resulted in failure to use data as a basis for informed decision making. There are various reasons as to why the data quality can not be ensured. The lack of coordinated effort and leadership, lack of strategy and policy, shortage of human resource and lack of guidelines and poor timeliness and completeness of data, lack of management skills, lack of incentives, inadequate dissemination of information, centralized organizational behavior and parallel reporting mechanisms resulting in multiple reporting formats leading to an increased administrative workload are the few. All this and other problems contribute to the failure (at all levels) to use data

as the basis for informed decision-making in planning and management [4, 5, 6, 7].

The quality of national data and decision making depends on the quality of data generated from individual health facilities. Besides, the impact of HIS in each specific health facility, it also has an implication on the overall quality of national data generated based on the reports of those facilities. The evaluation and monitoring of the health status are measured using this same data.

How well are health information systems performing currently in Ethiopia? It is obviously difficult to give a straight forward answer for there are no adequate researches made on this area, aside from the continuous assessment reports delivered by the Ethiopian ministry of health. In addition, the assessments so far have been viewing HIS from the point of report delivery rather than the capacity of the facilities to generate those reports or use the data for their own local decisions.

Hence, this study tries to assess the magnitude of HIS utilization at facility level for decision making and to identify the factors associated with the utilization level. It tries to assess the capacity of the facilities in terms of inputs, processes, outputs, data management, dissemination and use of HIS. It is believed that identification of those factors affecting HIS use will give highlight to the responsible government and non government bodies as to how to improve the situation. Even though the study is conducted only in Addis Ababa, the result of this study is hoped to pave the way to undergo other similar researches in the country too.

STATEMENT OF THE PROBLEM

In recent years an increased attention to tracking performance, monitoring progress and evaluating effectiveness, efficiency and impact of health service interventions made by national and international bodies across the world. Health information system (HIS) which, is the collection of people, procedures and equipments designed, constructed, operated and manipulated to collect, record, process, store, retrieve, disseminate and use information concerning health , is believed to be the tool for this purpose. It is to be noted that Health Information System, like any information system, is composed of certain components for the purpose of coming up with information suitable for decision making. The different elements of the HIS are identified under the major components – **Input, Process, and Output.**

HIS is even more vital in developing countries where the trends of disease are sever and resources are limited. It is these countries the need for HIS is magnified where most of the health interventions are financed by donors. HIS has various benefits to developing countries such as Ethiopia. Evidence based decision making, disease surveillance, and Electronic Medical Records could be some of the services the health sector can get out of HIS. [5]

Ethiopia has signed an agreement to monitor and report its progress towards MDG with the World Health Organization (WHO) and United Nations (UN). For this purpose, the HMIS/M&E strategic plan aims to establish a shared monitoring and evaluation system was set up in Ethiopia. Along with this, different efforts are made to strengthen the HIS of the country. The Federal Ministry of Health (FMOH) has also emphasized the HMIS as a key component for successful implementation of the Health Sector Development Program's (HSDP). The need for HIS is

underlined by FMOH and other delegated organizations in the country [3, 4].

However, as to my knowledge, there are no adequate researches made on the HIS at facility level. It is not well known whether the health facilities are equally committed to implement the HIS of the country or not. The existence of sufficient inputs, appropriate processes, and expected outputs is not frequently assessed at facility level. Besides, the private and public health facilities have not been viewed in separation for the purpose of HIS implementation which may contribute to the incompatible performance.

The intention of this paper is thus to assess the inputs, processes and outputs of HIS of the health facilities. The existence of those components, according to this study, shows the level of HIS utilization. Successful implementation of HIS involves identification of the factors that affect the utilization level. Thus this study is aimed to study the utilization level and factors affecting HIS use in the level of health facilities that are found in Addis Ababa. The outcome of this study is wished to help in revising the existing HIS of the facilities.

RATIONALE OF THE STUDY

The need for better health information is vital in the age of globalization. There are various preset standards to measure progress of a country. A country like Ethiopia need to profit from the “information age” where prerequisite from other ages (industrial or agricultural) are not central. The need for HIS is mostly underlined by the ministry of health and other responsible organs.

However, the existence of a common understanding and commitment among the health facilities is questionable. This paper thus intends to study the level of HIS utilization in the specific facilities and to study the factors that are affecting use of health information in the Ethiopia context, especially in Addis Ababa. This research is hoped to contribute a lot to know the current magnitude of use of HIS and to identify and tackle the factors determining the magnitude of the use.

LITERATURE REVIEW

There are various efforts invested on improving health care services globally. Improving quality of health service for instance, is a major component of millennium Development Goals (MDGs). Among the efforts made to an effective health care service, one is improving the HIS of the facilities. Health information system plays major role on making evidence based decision for a better health of a nation.

What is HIS?

Health information system, is an information system in the domain of health, which is the collection of people, procedures and equipments designed, constructed, operated and manipulated to collect, record, process, store, retrieve, disseminate and use information concerning health [8].

As can be seen from the above definition, HIS is not only about technology, rather it is about the people working on it, the procedures, rules and guidelines they use, the equipments they work on, and the data manipulations (collection, storage.....and use). This implies that an information system also includes the social system, which in turn, has its own subsystems of people, business processes, social structure, and culture. The development, implementation and use of information systems are well known and invariably they concern an interaction of human, organizational and technical factors, which cannot be separated. Therefore, information systems (HIS) should not be regarded as technical systems with behavioral implications but are better conceptualized as social systems in which technology is only one of the elements. [9]

Types of HIS

Health information system, or any information system, could be one among the following types [8]:

1. **Management information system**- mostly concerned with the generation of reports for management
2. **Transaction processing system** – to handle interaction of customers with facilities, like electronic patient records (EPR)
3. **Decision support systems**- are used to help managers to do various analysis (what if analysis for instance) for decision making
4. **Office Automation Systems** - is to use new technology to improve a working environment.
5. **Expert systems** – are systems that are designed to work as experts in a specific field. For instance, a system can be developed so that it could act as a doctor, given a set of inputs. In this type of systems, computers are meant to be artificially intelligent, imitate human learning potential, that are mostly referred to as Artificial Intelligent systems.

From this categorization it is clear that HMIS is a sub component of HIS, although it is mostly referred to say the same thing. HMIS is mostly concerned with report generation and use for evidence based decision making which is a subset of HIS. HIS on the other hand comprises all the subcomponents listed above.

Components of HIS

The health matrix network, which is established to set standards to country HIS, describes the standards components of HIS relating to the inputs, processes, outputs and outcomes of the health information system and comprises six Sub-components [10,11]:

a) **HIS resources** - includes the policy, legislative, regulatory, management and financial environment that must be in place; and the infrastructure and resources required to ensure a fully functional health information system.

b) **Indicators** – encompasses the process of defining core health indicators covering the domains of health information.

c) **Data sources** – describes and sets key data sources, standards for their use, their role in generating health information and potential linkages between them. The subsystems are census, vital events monitoring, health facilities statistics, public health surveillance, population-based surveys and resource tracking, including health infrastructure and human resources.

d) **Data management** – includes optimal processes for collecting, sharing, and storing data, data flows and feedback loops.

e) **Information products** – quantifies criteria for assessing the quality of available data.

f) Dissemination and use – these include norms for presenting, disseminating data and sharing information among stakeholders and creation of incentives for evidence-based decision making.

HIS is said to exist when facilities adhere to the components listed above. Facilities and nations can be assessed for having and not having these components and can be leveled accordingly. For instance, a facility which has all the inputs but does not produce and use information can not be referred to qualify to meet the standards of global HIS. According to the above listing facilities are expected to have rules governing information use, assign resources for the purpose of HIS activities, collect and classify data, and manage the data they collected in such a way that its quality is assured. They are also expected to store the data collected appropriately, use the data for decision making and disseminate the health information for appropriate bodies.

Domain of HIS

In terms of demand, the domains that the health information system should address include [12]:

- Health determinants (socioeconomic, environmental and behavioral factors) and the contextual and legal environments within which the health system operates;
- Inputs to the health system and related processes including policy and organization, health infrastructure, facilities and equipment, costs, human and financial resources and health information systems;
- The performance or outputs of the health system such as availability, quality and use of health information and services;

- Health outcomes (mortality, morbidity, disability, well-being, disease outbreaks and health status); and
- Health inequities in determinants, coverage and use of services, and outcomes, including sex, socioeconomic status, ethnic group and geographical location.

Benefits of HIS

There are various benefits one can get out of HIS which include [13]:

- Improved health strategies that lead to improved health programs;
- Improved management of programs by an increased focus on measurable results;
- Improved programs by using data and information to make service delivery, programmatic and management decisions at the health facility, program site, and program management levels;
- Increased awareness of emerging or existing health problems by key decision-makers and opinion leaders;
- Awareness of successful interventions among policymakers and donors leading to increased support including increased funding;
- Improved transparency of health programs leading to improved confidence by funding agencies that health funding is accomplishing results; and
- Improved data quality when those who generate data use the data, since they have a vested interest in collecting data regularly and maintaining data quality.

Beneficiaries of the data produced by facilities may include: Patient, Chief health officer, Physician, Nursing Officer, Community Health Worker, Trained Birth Attendant, MCH worker, District health manager, Director of health care, federal and national health offices.

Measurements of Quality Data

Quality of data justifies its precision to promote evidence based decision making. Low quality data thus results in poor performance monitoring which results in irrelevant decision making. Thus there is a need to measure the quality of data generated. Data quality can be measured using the following attributes [14]:

- **Accuracy and validity** – of the original source data;
- **Reliability** – data are consistent and information generated is understandable;
- **Completeness** – all required data are present;
- **Legibility** – data are readable;
- **Currency and timeliness** – data are recorded at the time of observation;
- **Accessibility** – data are available to authorized persons when and where needed;
- **Meaning or usefulness** – information is pertinent and useful

HIS in Ethiopia

HIS has been one of the seven major components of the third Ethiopian health sector development plan HSDPIII [2]. It is clearly stated on the development plan that HIS will help evaluate and monitor the progress of the country towards better health delivery. Ethiopia, like other countries in the world, have gone through various reform programs to monitor and evaluate the existing HIS. There are also different guidelines whose overall aim is to stimulate and support evidence based decision making [15].

However, the performance of the system is often reported to be very low in terms of data quality for decision making. A report from Ethiopian HMIS Reform team noted that the HIS does not address the root cause of overall poor data quality and insufficient use of information to improve health service delivery across the country. The report further implies that if information is not used by those who produce the service; it has limited value to the organization [4, 15]. It is also added that the focuses of HIS reforms were to make sure information use.

Despite the efforts made to improve the HIS of the country, the progress towards a better HIS which leads to better health delivery is far below satisfactory [4,15]. This may imply the presence of policy and implementation gaps.

Factors Affecting HIS Use for Decision Making

The collection of data on a daily basis does not guarantee its use for decision making for the facility, the same way that the collection of reports from facilities does not show use of information at sub city or federal level. It also does not guaranty the quality of the data for upper level data manipulations and use by other involved organs, like Ministry of Health (MOH). Health information system could fail due to the technology itself or the people working on it and using it. The various factors which are seen from different angles by a number of articles and assessment reports are presented below:

1. Emphasis on Technology than People

Introducing technology needs to consider the people who are working on it. The people need to be assessed for their level of knowledge and attitude towards the technology. We also need to ask ourselves “do we have the necessary infrastructure to support the technology”. It may not make sense if one buys a radio if there is no power supply in the surrounding.

Several researchers have come up with various reasons why HIS fail. [16,17,18] One of these papers argues that HIS often fails because such behavioral aspects of organization are not taken in to account [16]. In line with this it is stated that introducing computer technology is not necessarily the silver bullet that creates effectiveness and efficiency in health services. In addition, lack of appropriately trained staff and hardware and software problems sometimes result in the decay and obsolescence of expensive computer equipment, without any gains in decision making [17]. Another paper also emphasizes this point by stating that technology is not a major barrier to making HIS a reality,

instead most of the barriers are legal, societal, organizational and cultural in nature [18].

As can be learned from the above explanations, technology can be seen from the point of view of the users. In-depth understanding of users' attitude and skill must be taken it to account. The availability of the necessary infrastructures should also be made sure prior to implementing technology.

2. Lack of Participation and local use

Working with data and information within the health information system involves filling in forms, tally sheets and registers, collating data into aggregated reports and statistics and the reporting of health data from low levels to higher levels of the health information system. These activities make up important aspects of most health workers jobs. The health information systems therefore tend to be deeply human oriented and it is often advisable to involve them in HIS developments.

It is argued, that it is crucial to not unthinkingly delegate this work to those who produce the data in the first place. When they have to invest time and effort in the production of disentangled data, they should be the primary beneficiaries of these efforts. Most importantly, they are the ones who know what is going on in the facility, the data surely tells that. Problems arise whenever they are made responsible for the 'disentangling' of data which they themselves will not use [19].

Without seeing a significant benefit of the health information systems towards performing their community roles, the health workers still prioritized meeting the community's health needs over their health information systems tasks [20]. To this end, it is declared that people

have the right and duty to participate individually and collectively in the planning and implementation of their health care [21]. Lippeveld and Sapirie 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. [22]

Creating a mechanism to participate users in the planning process of facilities and providing support from the central management can also contribute to the successful implementation of HIS. As mentioned on another article, a process can only get off the ground when properly supported by central management and future users, a recipe that, when followed, will certainly avoid disaster [23].

3. Lack of Information Use Culture

Frequently mentioned reason for HIS failures is failure to take account of healthcare cultures [24]. Developing any program in any setting needs a thorough understanding of the cultures in that specific area. Various researches revealed that there is little tradition of information use for decision making at the facility level in most developing countries, even among health managers [25]. Hence there is a need to devise a way to improve the level of information use culture in those facilities before making any progress on program development.

The need to create the culture of information looks to be agreed up on by different organizations and nations, especially by developing countries. However, it is noted that creating an information culture is a long-term behavioral intervention [26]. We can see and monitor the culture as it grows. The gradual ownership of data and development of a culture of information use is evidenced by improved data quality and a post-training commitment to improve practice [5]. Although different parties

should participate in this process, decision makers in particular can play a vital role in creating a culture of information use [16].

4. Adapting Technologies

Another factor for HIS use is adapting technologies and programs which may not necessarily bring change. The prevailing situation of the area of implementation should be considered prior to any action. A study conducted in Bangalore, India, shows transfer of interventions even between two neighbor countries with similar cultural and social setting entails problems of assimilation and adaptation [6]. This implies that social, political, cultural and organizational settings need to be considered.

5. Other Factors

Factor affecting HIS are mostly common in developing countries. A report presented in Thailand noted that there are a number of constraints common in many developing countries in terms of data collection and transmission, data presentation and analysis and, use of HIS for decision making at different levels of the health system. These are said to be mainly due to inadequate training of staff in data presentation, analysis, and use, and lack of feedback mechanism [27].

Another study from Malawi stated that the reasons for inadequate use or non-use of information are lack of accountability and leadership, resource constraints, lack of holistic/vision approach, lack of management skills and personality, punitive environment, lack of incentives, inadequate dissemination of information, organizational and behavior and absence of change strategies. It is added on this study that interventions to improve the HIS in the least developed countries, often donor driven, have often focused only on a specific subsystem, primarily

for health service statistics, and have neglected other components of the HIS [28].

A study conducted in south Africa also pointed out Several factors affect the lack of data utilization, including a severe shortage of health informatics skills needed to provide the necessary support, feedback and training in information utilization [29].

Another article that have studied factors affecting nursing information systems, which is one type of health information system, states that age, computer knowledge, and usage, and incentive (usage benefit), training, system usability, time spent on planning are the main factors affecting use of the information. The study further indicates that when the incentive to perform and to monitor quality is low, the use of information can be expected to be equally low [30].

Hence, from the above review it can be concluded that resource, technological, behavioral, societal, organizational and cultural factors are affecting the use of health information system.

OBJECTIVE

General Objective

The general objective of this study is to assess the magnitude of use of HIS in public and private health facilities in Addis Ababa and identify the factors that affect the use of HIS in those facilities.

Specific Objectives

The specific objectives of this study are:

- To assess magnitude of different inputs, processes, outputs specific to HIS in various health facilities.
- To compare HIS utilization among private and government health facilities
- To identify the factors affecting use of HIS in the facilities.

METHODOLOGY

1. Study Area

Addis Ababa is the diplomatic capital of Africa. More than 92 embassies and consular representatives cluster in the city where the Organization of African Unity and the UN Economic Commission for Africa have their headquarters. Addis Ababa lies between 2,200 and 2,500 meters above sea level. The city lies at the foot of the 3,000 meters high Entoto Mountains. Based on the 2007 census results, Addis Ababa has a total population of 2,738,248, consisting of 1,304,518 men and 1,433,730 women. The city is fully urban, with no rural dwellers within the city's administrative boundaries. All the Ethiopian ethnic groups are represented in Addis Ababa due to its position as capital of the country. This ethnic blend gives the city a diversity of culture making the capital even more attractive.

Compared to other cities of the country, it has the maximum number of health facilities [31]. According to the 2008 health and health indicators, Addis Ababa has 30 hospitals, 29 health centers, 94 special clinics, 99 higher clinics, 146 medium clinics, and 103 lower clinics. As a result the data generated from the city will have a significant effect on the overall analysis of the country's information. The lion's shares of the country's data are found in the city. The health facilities range from government specialized hospitals to privately owned ones, from higher clinics to lower clinics and from health centers to health posts.

2. Study Design

The study is cross sectional descriptive study with both quantitative and qualitative study designs. In order to identify determinants of HIS use, internal comparison between health institutions having and not having HIS were employed.

3. Duration of the Study

The study was conducted between November, 2008 and June, 2009. The data collection was conducted on months March, 2009 and April, 2009. While the data analysis and write up was made on May, 2009 and June, 2009.

4. Study Population

4.1. Quantitative

Source population: all private and public health facilities specifically Hospitals, health centers, higher clinics that are found in Addis Ababa.

Sample Population: all private and public hospitals, all health centers, and all higher clinics found in Addis Ababa that fulfill the inclusion criteria.

Inclusion and Exclusion criteria

- **Inclusion criteria** - All hospitals, higher clinics, and health center which were functional during the data collection period with more than two years of service.
- **Exclusion criteria** – facilities which have been opened less than two years ago and those which have participated on the pretest were excluded from the study.

4.2. Qualitative

The study population for the qualitative study was that selected health facilities were contacted. The selection was made by considering the reporting system, experience of the respondents on HIS activities, trainings on HIS and the profession of the respondents.

5. Sample size

All private and government hospitals, higher clinics and health centers found in Addis Ababa were included in the study. According to the 2007/08, Health and Health Indicator, there are 30 hospitals, 99 higher Clinics, 29 health centers. Deducting the health facilities which have been closed in those years, the total number was 147.

6. Sampling Procedure

All the facilities were included in the study. List of all those facilities is retrieved from the corresponding sub city health offices. However the respondents for the qualitative as well as the quantitative data are selected using purposive sampling. The details are given below:

6.1. Quantitative study

The respondents in the facilities are chosen based on a purposive sampling, for the study only needs to address people working in relation to HIS. In this study, 147 health facilities have participated. Administrators of each health facilities were requested select the responsible personnel whose work is related to HIS activities. Accordingly, the one among the following people are contacted:

- Managers of the facility (using the HIS for decision making purposes) or
- Nurses and physicians (whose duty involved data handling) or
- People from HIS/ statistics/ or other department responsible for HIS of the facility.

6.2. Qualitative study

A purposive sampling technique was employed for the qualitative study. The sampling procedure for the in-depth interview is:

- Among the subjects who respond to the questionnaire, only those who have relatively more experience with HIS activities, whose profession is related with HIS, who have taken trainings on HIS (DHIS) were chosen. i.e. purposive sampling
- A total of 11 interviews were conducted, among which 4 hospitals, 4 higher clinics and 3 health centers.

7. Data collection

The quantitative method was used for assessment part by using a self administered questionnaire, which is done on all the public and private hospitals, health centers, and higher clinics in Addis Ababa. Qualitative method is used to further explore the results found from the quantitative study using in depth interview with selected participants. Data collection methods used in the study were:

7.1. Questionnaire:

The questionnaire included questions that help to assess current practice of HIS by dividing in into five distinct sub topics, among which the last part of the questionnaire addresses the determinants of HIS use. Both open and close ended questions were included in the questionnaire. The questionnaire was self constructed with reference to standard HMN guideline for HIS. The questionnaire was pre tested prior to the actual study period and appropriate accommodations were made. The questionnaires are addressed personally to the subjects.

One data collector was hired from each sub city for it was easier to locate the facilities with people who live in those sub cities. The data collectors

were responsible to distribute the questionnaire as well as help the subjects fill the form. The data collectors were given training on how to help the subjects while filling the form. They were also responsible for collecting back the questionnaires they have distributed. Each of them had a list of facilities they are assigned to which was hoped to increase the response rate.

7.2. In-depth interview:

In-depth interview is held after the questionnaire are collected and analyzed. The interviews were requested to give further exploration about the results obtained.

Challenges and prevailing situations of HIS in those facilities were addressed through the interview. The interviews are conducted face to face and are recorded and transcribed for the purpose of analysis. Eleven interviews were conducted and saturation level was reached. It was preferred to conduct all the interviews by the principal investigator since the principal investigator was doing the qualitative analysis based on the interview, literatures, personal observation and judgments. A thematic analysis technique was used to analyze the interviews. Interviews were used to explain the result of the questionnaire.

8. Data Analysis

The data from the questioner is entered in to SPSS version 15 by the principal investigator to be analyzed. The assessment of HIS components has been described using tables, graphs and frequencies. A score to test the use of HIS was made by combining eight different variables, which are HIS personnel, availability of Stationery, collect data on a daily basis, data are classified according to some criteria, records are put in appropriate location, data are accessible, use information for decision

making, disseminate data. Based on the score, comparison of public to private information use is presented.

Moreover, the effect of possible factors on the use of HIS are analyzed using binary logistic regression analysis and all the factor were adjusted for possible confounding. The result from this analysis was taken as a hint to the interview and further analysis was done to explore the reason why these factors have existed and are influential. After the interviews are 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. Comparison was also made between the findings of this study and other related research works.

9. Ethical Considerations

The study was carried out after getting permission from the ethical clearance committee of Addis Ababa University, Medical Faculty through School of Public Health. Data were 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 are willing to participate in the study; and those who had refused to participate were excluded. Informed verbal consent was obtained from all interviewed subjects. Objective of the study were discussed with each participants and privacy was maintained during interview. All the interviews were transcribed with great care and questioners were also distributed in such a way that the respondents were helped in case they face a difficulty.

10. Quality assurance

Data quality was assured using different techniques such as:

- Training was given to data collectors for two days about the contents of the questionnaire and frequent supervision was done. The qualitative data collection was conducted by the principal investigator.
- Problems encountered at the time of data collection were reported immediately and appropriate action was taken
- Properly designed questionnaires and interview guides were prepared; moreover pretest was done prior to the study and corrections were made. Data collectors had also assisted the respondents in case of difficulties
- The questionnaires were checked for missing values and inconsistency. Questionnaires that were found to have lots of missing values and inconsistencies (2.6% of the facilities) were excluded from the study and considered as non respondent.
- The data entry and cleaning were made by the principal investigator. Double entry was made for 15% of the total data. Data was then checked and cleaned. Interviews were also conducted by the principal investigator to avoid any miss understanding.

11. Dependant and Independent Variables

Dependant variable

- HIS use

Independent variable

- Overwhelming data
- Clear data definition
- Feedback
- Training
- Accessibility of records
- The presence of incentives
- The attitude of staffs
- The attitude of management
- Skill of staffs to collect compile and use information
- Getting technical support
- Centralized organization
- Participation in planning
- Information use culture

12. Operational Definitions

- **Appropriate location:** refers to the existence of storage in the facilities, that data are put in a place where they will not be damaged
- **Collect data on a daily basis:** is the clinical and administrative data collected in the facility
- **Computer Knowledge:** refers to the basic skills of computer, like word processing.
- **Data are classified according to some criteria:** is the process of classifying the data collected according to any criteria such as age, sex, and so on. The classification can be different for different health facilities
- **Disseminate information:** disseminate information to the general public, NGOs, other relevant destinations, but not to sub city or federal health office in the form of a report, bulletin, or any kind of publication
- **Feedback:** get response to the reports they send, negative or positive.
- **HIS office:** is any kind of unit whose overall purpose is to perform HIS activities, not the physical office
- **Legislative and regulatory and planning framework concerning the use of HIS:** are the rules that are set out by the facility itself or adopted from some standard that govern the use of HIS in the facility in terms of data collection, processing, storage, retrieval, dissemination and use for other purposes
- **Personnel:** could be a person assigned specifically to HIS or a person who take responsibility for HIS, although the person is assigned to other duties with any professional category.
- **Stationery:** may not be the complete set of stationery products, basics like pen, paper are taken as stationery

- **Use of HIS:** is the sum of eight variables and facilities are labeled as using HIS when they have all the following components:
 1. HIS personnel,
 2. Have Stationery,
 3. Collect data on a daily basis,
 4. Data are classified according to some criteria,
 5. Records are put in appropriate location,
 6. Data are accessible,
 7. Use information for decision making,
 8. Disseminate data to any external body except for sub city or regional health offices

RESULTS

Characteristic of Facility and Respondent

A total of 147 facilities from all the 10 sub cities of Addis Ababa have been included in this research out of which Kirkos sub city constitutes the majority of the facilities;23 (18.5%) followed by Addis Ketema sub city which comprises 17 (13.7%) facilities. Gulele and Akaki Kaliti sub cities are found to have the least number of facilities which is 5.

After repeatedly trying to contact the facilities, twenty of them were excluded because they were not willing to participate. Lack of time for research works, and work burden were the reasons given for their inability to participate. For the study has taken all the facilities as a sample, there was no way of replacing them and they were excluded. Four facilities were also excluded since the data they provided was inconsistent and incomplete. The rate of non respondents is thus 16 % and; analysis was done with the remaining 124 facilities.

The numbers of hospitals which have participated in the study were 21, among them 14 are privately owned. Twenty two health centers and 81 higher clinics have participated in the study. Most of the respondents have a managerial position (47) followed by HIS officers who comprise 45 of the respondents. The majority of the respondents were nurses (34) and medical doctors (32). Among the total number of respondents, 79 have a service year of less than ten, with a mean of 8.6 years. (Table 1)

Table – 1: Socio Demographic Characteristics of the Respondents and Type of Health Facilities in Addis Ababa, 2009

Sub City (n=124)	n	%
Arada	15	12.1
Kirkos	23	18.5
Addis Ketema	17	13.7
Lideta	16	12.9
Bole	15	12.1
Yeka	12	9.7
Kolfe Keraneo	7	5.6
Nifas silk Lafto	9	7.3
Gulele	5	4.0
Akaki Kaliti	5	4.0
Type of Health Facility(n=124)		
	N	%
Private (N=92)		
Hospital	11	8.8
Higher Clinic	81	65.2
Government (N=32)		
Hospital	9	7.3
Health Center	22	17.5
Position of Respondents (n=124)		
	N	%
Manager	47	37.9
HIS Officer	45	36.3
Head nurse	11	8.9
Nurse	5	4.0
Others	11	8.8
Missing	5	4.0
Total	124	100
Qualification (124)		
Medical Doctor	32	25.8%
Nurse	34	27.4%
12 completed	9	7.3
Accounting	7	5.6
Lab Technician	6	4.8
Health Officer	5	4.0
Others	17	13.7
Missing	14	11.3
Total	124	100
Service Years (n=124)		
1-10	79	63.7
11-20	22	17.7
21-30	9	7.3
Missing	14	11.3
Total	124	100

Assessment of HIS inputs

All the 124 facilities were asked for the existence of legislative and regulatory and planning framework concerning the use of HIS. Out of all the facilities only 33 have revealed the existence of those rules. The existence of a unit specific to HIS is also approved by 40 facilities while the rest confirmed that there is no unit. The numbers of respondents who have answered “yes” to the question that asks if there is a personnel assigned specifically to HIS are 41 (33.1%).

According to the study only 21 facilities among the 124 have assign budget for HIS activities. These facilities were further enquired to rate the adequacy of the budget. Among the 21 facilities, all except one facility were found to have inadequate budget.

Respondents were also asked for the presence of the necessary equipments to perform HIS tasks. Eighty three (66.9%) facilities have reported to have the equipments although the type varies as described below. (Figure1)

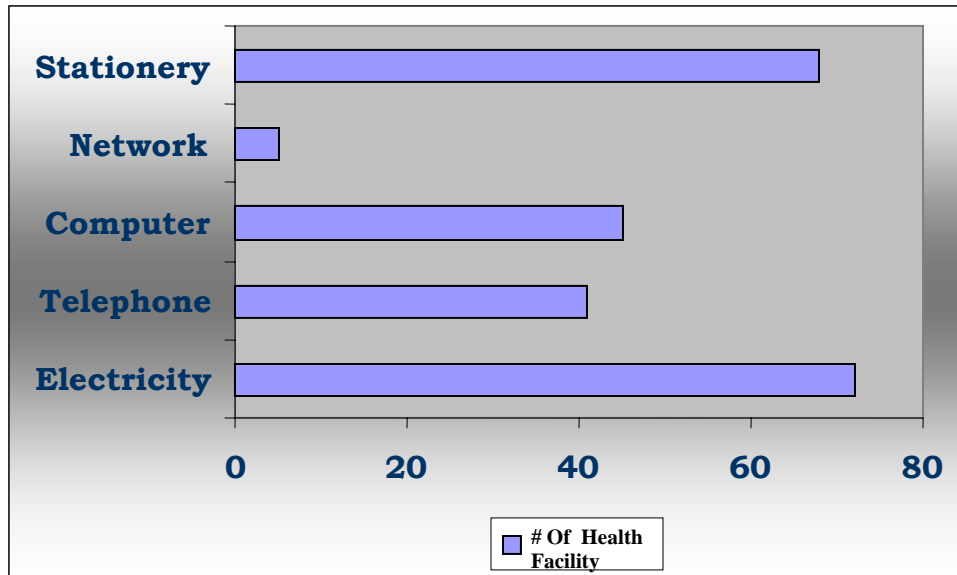


Figure -1: List and magnitude of HIS equipments found in facilities of study in Addis Ababa, 2009

Of all the facilities 41(26.6%) are reported to deliver basic computer trainings to their staffs. This number does increased by 13 when asked if training concerning HIS was given. Even though the number of facilities which attended HIS trainings is relatively average, only few (< 25% workers) from the facilities have attended the trainings. Besides, the trainings were given more than a year ago for greater than 75% of workers. Among all the facilities only 25% of them have reported to have coordination mechanisms among the other sub components of HIS. (Table 2)

Table-2: HIS Inputs information Facilities' in Addis Ababa, 2009

HIS Inputs	Yes (%)	No (%)	Total (124)
<i>Have legislative, regulation concerning planning framework</i>			
<i>HIS use</i>	33(26.6)	88(70.9)	121
<i>Unit (Office) is assigned to HIS</i>	40(32.3)	82(66.1)	121
<i>Personnel is assigned HIS</i>	41(33.1)	81(66.3)	122
<i>Budget is assigned to HIS activities</i>			
<i>activities</i>	21(16.9)	102(82.3)	122
<i>There are the necessary equipment</i>			
<i>equipment</i>	83(66.9)	36(29)	119
<i>There are trainings on basic computer</i>			
<i>computer</i>	41(26.6)	81(66.3)	122
<i>There are training on HIS</i>	53(42.7)	71(57.3)	124
<i>There are coordination mechanisms</i>			
<i>mechanisms</i>	31(25)	89(71.8)	120

Assessment of HIS processes

All the 124 facilities were asked for the performance on HIS core processes. Of all the facilities 118 has revealed that they collect health data on a daily activity of patient care. Although almost all the facilities collect the data , only 62.1% of them were classifying and coding the collected data after each clinical visit.

Socio economic and demographic data are reportedly collected in 85 facilities while this number has diminished to 53(42.7%) for collection of data about environmental and behavioral risks factors. The study further shows that only 30(24.2%) facilities used population data for denominators.

Among the data collected, 107 facilities have reported to put their data in appropriate locations, in such a way that it will be secured. The data are classified according to some criteria in the 91(73.4%) of the facilities. of all the facilities only 71(57.3%) of the facilities put their data at administrative level.

Concerning the quality of data collected, only in few (17.7%) of the facilities has trainings on quality assurance delivered. Despite this fact, there are local quality control mechanisms in nearly half the number of facilities (66).

Inline with these, quality indicators like timeliness, consistency, aggregation, completeness and representativeness were assessed. Among all the participants 75 of agreed that the data collected are timely, while 72 respondents have said the records are consistent. Ninety five of the respondents have reported that the data collected was desegregation,

while completeness and representativeness of the data were report by 55, and 69 respondents respectively. (Figure. 2)

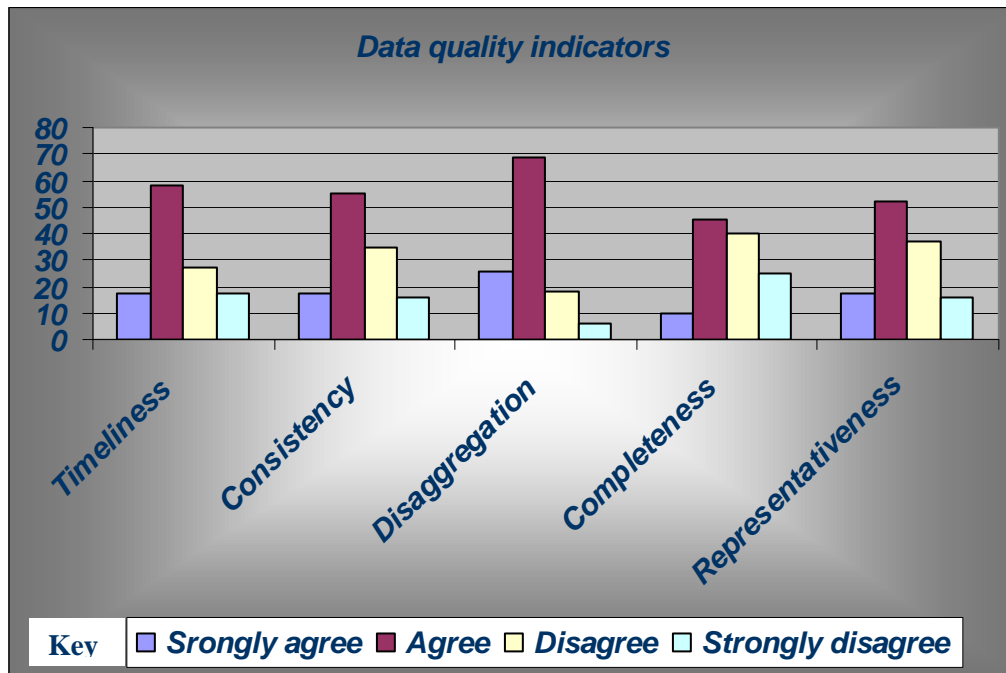


Figure -2: Data quality measures assessed in health facilities of Addis Ababa, 2009

Among all the facilities, 61 revealed that there are procedures for distributing and reporting data. They were also enquired if rules for minimum period of maintenance and dispatch time for the collected data exist. The result showed that 82 facilities did not have such infrastructure. (Table 3)

Table-3: Information on HIS core Processes of Facilities' in Addis Ababa, 2009

HIS Processes	Yes (%)	No (%)	Total (124)
<i>Collects health data on a daily bases</i>	118 (95)	5 (4)	123
<i>Classify and code data after each visit</i>	77(62.1)	46(37.1)	123
<i>Collect Socioeconomic and demographic factors</i>	85(68.5)	35(28.2)	120
<i>Collect data about environmental and behavioral risk factors</i>	53(42.7)	64(51.6)	117
<i>Use population based data</i>	30(24.2)	88(71)	118
<i>Data are put in appropriate location</i>	107(82.3)	17(14.7)	124
<i>Procedures for distributing and reporting data</i>	61(50.8)	63(49.2)	124
<i>Rules for minimum period of maintenance and dispatch time</i>	42(33.9)	82(66.1)	124
<i>Data are put at administrative level</i>	71(57.3)	51(41.1)	122
<i>Data are classified according to some criteria</i>	91(73.4)	29(23.4)	120
<i>There are regular local quality controls by the facility itself</i>	54(43.5)	66(53.2)	120
<i>Take up-to-date training on quality assurance</i>	22(17.7)	98(79)	120

Assessment of HIS Outputs

Respondents were asked whether their facility have the necessary outputs of HIS or not and the study used different variables. Hence, one variable is use of information for decision making. Of all the facilities, less than 47% (46) of them have confirmed the use of information for decision making. Fifty two facilities are reported to use information for future references concerning service delivery. The number of participant facilities which use information to observe trends on service delivery and those who do not use it is almost equal (63, 60).

Concerning the dissemination of data, almost all the facilities (106) use information to pass report data sub city/ federal health offices. However, the magnitude of mechanism to disseminate health information to external environment, aside from the reports sends to sub city/ federal health offices, was only 28.2%.

Only 18.5% participating facilities have reported to have policies concerning information use. The facilities which have legislative and regulatory environment about data security were added to be 37(29.8%). Legislative and regulatory environment about retention and destruction of data; and transfer of data to external users are reported to be 26(21%) and 40(32.3%) respectively. (Table 4)

Table-4 HIS Outputs of Facilities' in Addis Ababa, 2009

HIS Outputs	Yes (%)	No (%)	Total (124)
<i>Use information for decision making</i>	46(37.1)	77(62.1)	123
<i>Use information for future reference</i>	52(41.9)	71(57.3)	123
<i>Use information to observe trends on service delivery</i>	63(50.8)	60(48.4)	123
<i>Use information to pass report data sub city/ federal health offices</i>	106(85.5)	17(13.7)	123
<i>There are policies concerning information use</i>	23(18.5)	96(77.4)	119
<i>Have legislative and regulatory environment about data security</i>	37(29.8)	86(69.4)	123
<i>Have legislative and regulatory environment about retention and destruction of data</i>	26(21)	95(76.6)	121
<i>Have legislative and regulatory environment about transfer of data to external users</i>	40(32.3)	82(66.1)	122
<i>Have mechanism to disseminate health information</i>	35(28.2)	88(71)	123

Comparison of HIS Utilization among Private and Public Health Facilities

As have been defined in earlier HIS utilization is measured using eight variables for the purpose of this study. Hence comparing private and government health facilities is comparing the magnitude of those variables in both types of the facilities.

A total of 32 government and 92 private facilities were assessed for the existence of responsible person to perform HIS activities. Among all facilities 26 % (24) of the private and 75% (24) of the public facilities were found to have responsible person to perform HIS activities. Out of all the facilities 57 % (53) of private and 71 % (23) of the government facilities reported have stationery (at least pen and paper) assigned for HIS activities.

One hundred and twenty four facilities were expected to collect data on a daily activity of patient care, while almost all the health facilities showed an encouraging result. Even though most of the facilities collect data on a daily basis, only 72% of the private and 78% government health facilities have mechanisms to classify the data according to some kind of pre set criteria. This problem was also emphasized when accessibility of records to the staff of the facilities was enquired, although the government facilities showed better outcome.

All the facilities were asked if they use information for decision making or not. Only 30% (28) of the private health facilities confirmed to do so. This result was low compared to the government facilities which have a 65% (21) use level. Finally, the comparison was made by asking if the facilities have any mechanism to disseminate health information to the outside environment aside from the reports send to sub city/ Addis Ababa health

offices. Only 29.3% of the private facilities were found to have such a mechanism, while 75% of the government facilities have reported to disseminate information to the general public which is a relatively good output.

Adding up all these outcomes, HIS use among all health facilities was found to be 22% (28). Among all the facilities 19.6% are from the private and 31.3% government health facilities were assessed to use HIS. According to this research the use of HIS is relatively better in government facilities, although the result is still low compared to national standards. (Table 5)

Table-5: Comparison of HIS utilization among private and government health facilities in Addis Ababa, 2009

<i>Utilization measures</i>	<i>Private</i>		<i>Government</i>		<i>p-value</i>
	<i>(92)</i>		<i>(32)</i>		
	<i>Yes</i>	<i>%</i>	<i>Yes</i>	<i>%</i>	
<i>HIS personnel</i>	24	26.1	24	75.0	<0.01
<i>Stationery</i>	53	57.6	23	71.9	0.08
<i>Collect data on a daily basis</i>	88	95.7	30	93.8	0.33
<i>Data are classified according to some criteria</i>	67	72.8	25	78.1	0.28
<i>Records are put in appropriate location</i>	78	84.8	29	90.6	0.21
<i>Data are accessible</i>	61	66.8	24	75.0	0.19
<i>Use information for decision making</i>	28	30.4	21	65.6	<0.01
<i>Disseminate data</i>	27	29.3	17	53.1	<0.01

Identification of factors affecting HIS utilization

Various determinants including the existence of incentives for information use at facility level, participation of HIS workers during planning, attitude of staffs and management towards HIS, and the existence of trainings on HIS were discovered from different literatures and the data collected. Using binary logistic regression, the factors were tested if they have relationship with HIS use. The lack of incentive was found to affect use of HIS in strongest magnitude; Based on the crude ratio, facilities which were reported to give incentives were found to use HIS 9.1 times compares to those facilities with no incentive with 95% CI (2.1, 39.5). The confidence interval does not cross one which shows that the relationship is significant.

The presence of clearly defined data is found to encourage use of HIS compared to unclearly defined data in those facilities. The existence of clearly defined data elements is found to promote the use of HIS 7.5 times and the association is significant.

According to the analysis, feedback has also affected the use of HIS 8.2 times with 95% CI (3.2, 23.7). In addition, training on HIS favors use of HIS 4.8 times compared to those facilities who did not take one with 95% CI (1.9, 12). As compared to the facilities that did not get one, getting technical support from external environment favors use of HIS.

If data are accessible to all authorized staff, according to this study, it affects use of HIS 5 times than those in facilities with no data access with 95% CI (1.4, 17.6).

Attitude factors, which are good attitude among the management and the staff, have been found to encourage the use of HIS. In addition to the attitude, skills were also tested for a relationship with HIS use. Hence compared to the facilities with low skilled personnel on data manipulations, HIS was used 5.7 times in facilities with better skilled personnel with 95% CI (2.2, 14.5).

Participating HIS workers on planning process has significantly contributed to the use of HIS.

The relationship of HIS use with all the aforementioned factors was further adjusted for possible confounders. Hence, all the factors are found to be non significant after being adjusted. (Table 6)

Table-6: Possible determinants of HIS utilization in private and government health facilities found in Addis Ababa, 2009.

Determinants	HIS Utilization		Crude OR
	Yes (%)	No (%)	
<i>Data sources are overwhelming</i>			
Yes	12(5.6)	65(84.4)	1.00
No	13(34.2)	25(65.8)	0.4 (0.1, 0.9)
<i>Data definitions are clear</i>			
Good	22(37.9)	36(62.1)	7.5 (2.4, 23.6)
Low	4(7.5)	49(92.5)	1.00
<i>Feedbacks and supportive supervision</i>			
Yes	18(51.4)	17(48.4)	8.2 (3.2, 20.8)
No	10(11.5)	77(88.5)	1.00
<i>Trainings on HIS</i>			
Yes	20 (37.7)	33 (62.3)	4.8 (1.9, 12)
No	8 (11.3)	63 (88.7)	1.00
<i>Data are easily accessible for all the staff</i>			
Yes	25 (29.8)	59 (70.2)	5.0 (1.4, 17.6)
No	3 (7.9)	35 (92.1)	1.00
<i>There are incentives for information use</i>			
Yes	6 (66.7)	3 (33.3)	9.1 (2.1, 39.5)
No	20 (18)	91 (82)	1.00

<i>Attitude of staff is good</i>			
Good	18 (38.3)	29 (61.7)	5.1 (2.0, 13.1)
Low	8 (10.8)	66 (89.2)	1.00
<hr/>			
<i>Attitude of management is good</i>			
Good	26 (26.8)	71 (73.2)	8.4 (1.1, 65.6)
Low	1 (4.2)	23 (95.8)	1.00
<hr/>			
<i>Skills to collect, compile, analyze and use information is good</i>			
Yes	19 (40.4)	28 (59.6)	5.7 (2.2, 14.5)
No	67 (89.3)	8 (10.7)	1.00
<hr/>			
<i>Get technical support from external bodies</i>			
Yes	17 (50)	17 (50)	7.0 (2.7, 17.4)
No	11 (12.6)	76 (87.4)	1.00
<hr/>			
<i>Organizational decision making is centralized</i>			
Yes	13 (16.3)	67 (83.8)	1.00
No	14 (36.8)	24 (63.2)	3.0 (1.2, 7.3)
<hr/>			
<i>HIS workers are allowed to participate during planning</i>			
Yes	9 (60)	6 (40)	5.1 (1.6, 16.7)
No	15 (22.7)	51 (77.3)	1.00
<hr/>			

QUALITATIVE RESULT

An in depth interview was conducted on three health centers, four higher clinics and four hospitals. People who work on management related jobs and on data handling were contacted. The first question raised for the interviews was why the HIS in the facilities was performing low; why there are no necessary inputs, processes and outputs of HIS; what challenges the use of HIS.

Local need for HIS

Most of the respondents have expressed that the need for HIS was not taken into account by the health facilities. An interviewee in a health center said *“for what purpose would a health facility use HIS if all the plans are made at the sub city level?”* The absence of local need for information was frequently raised. Another respondent also said that health facilities do not use HIS because they don't know the benefit; that they don't know what benefit it would bring to their facility, that it has no measurable benefit. He added that facilities will do the job with the existing system any way. The interviewees recommended that government and nongovernmental bodies should be responsible for ascertaining understanding of facilities that the HIS gives competitive advantage to the facilities in the market, specially to those of the private facilities.

Awareness

Another idea that was raised was the absence of awareness about HIS, its use, advantages.... A respondent revealed *“the sub city health officials may sometimes come and check your registration book and see if you do the report correctly; but they never in any situation consult the health facility about the use and benefits of HIS.”* According to the interviewees neither the management nor the other workers of the facilities have awareness about HIS.

Technology

Technology was also another factor mentioned by the in-depth interview. An interview, who was a manager of a higher clinic, reported “*some staffs, especially those of “chronic nurses” are mostly “Techno phobic”. Older people hate to learn new technology and what they do is reject everything that seemed to be new. The nurses are inclined to using paper based recording with poor hand writing, which seems to be a custom among health professionals.*” According to this explanation health workers relate HIS with using technology and thus avoid using it.

Information culture

Information culture was raised as a major issue for prohibiting HIS from functioning. Most interviewee agreed that collecting data is the only task that seemed to be HIS. Compiling and using information for decision making was way out of the prevailing culture. As has been raised by the interviewees the problem was not only the technology that matters, but mostly of the culture.

A hospital which had an electronic patient record system (EPR) has been found to only collect the data with out compilation, let alone use. An interviewee from this hospital said that daily surveys are made to know the number of people who come to the OPDS. All the details of the patients were recorded by the physicians, who are mostly reluctant to do so according to the respondent. But that data is said to be put in the store of the hospital and it has never been used. The culture of collecting data does not grow into processing it and changing it into information.

The following is part of what the interviewee said:

“ I don’t know why they collect the daily surveys.....may be they want to know what number of people come to the hospital.... and they may also want to know how much they earn....I don’t know. But I know something for sure, there has never been any compilation made on the data collected.....I have been the HIS officer for long and I have never witnessed any processing on the data so far.....it is just a habit of collection”

Management Knowledge and Commitment

The interviewees have also raised the issue of lack of knowledge both in terms of skill and in-depth understanding of the use of information. Most staffs are referred to have low skills of compiling data and using it. They are also claimed not to have understanding about what information can do to them or to the facility they are working in.

A health officer who has also gained a degree in IT has emphasized the lack of commitment from the facility management as a major challenge to HIS. The following is how he puts it:

“if the management believes in HIS implementations, the other workers of the facilities can be made to understand it. Management can prepare trainings, publish reading materials, conduct frequent meetings and can create awareness among workers and underline the importance. It is only that managers are either not aware or not committed”.

The need to participate staffs during managerial decisions and planning is also believed to contribute to the increase in need of information. It was pointed that when people participate in planning they will know that

they should monitor their progress as the same time, they will think of the next plan, that they will need information. An interviewees said *“there could be no participation at all, because even the management does not know the data can be used as a basis for planning, even if they do know, they may not think that ordinary staffs know more than they do, but the evidence is with the staffs”*.

The absence of responsible body in the health facilities was also another factor that was raised while the interviews. An interviewee from one higher clinic told me that there is no person in the facility to be contacted in case there is a need for information. He added that a person whose job is to do HIS activities should be assigned and that person should necessarily be an IT literate.

It was frequently mentioned by the interviewees that responsible government bodies do not seem to care about the quality of HIS except for the reports send to them on regular bases. He said:

“...but how can they be sure about the reliability of the data. I mean look at any system, does it look like it will deliver correct and timely information? I admit that they come to our facility a couple of times, although the last time they come was 2 years back, if I remember correctly. And the purpose of the visit was to check the registration book, not to give us any feedback or support...”

Most of the interviewees emphasized that if HIS has to work, awareness raising must be made by responsible organs. An interviewee said:

“... just the way they are eager to take the reports from the facilities, they should be responsible to create awareness among the management as well as the other staffs. They should be able

to create a common understanding among all the health facilities that the data collected are important to the facilities themselves as well as the country...”

Another interviewee with the same view point added that:

“... what the officials are doing is ‘trying to clap with one hand’ which will never work. If you want to measure the progress of the health status of a country, it starts by measuring how the health facilities are performing. If performance reports are made based of the data generated from the health facilities whose validity is frequently questioned, then the country’s information is also under question”.

They have emphasized lack of coordination between the facilities and government. The need to coordinate efforts and have a common understanding between the respective government organ and each health facility is underlined by most of the interviewee.

A question was forwarded to identify the attitude of staffs towards HIS, which was reported to below. The interviewees were requested to tell why staffs had those low attitudes. Different reasons were raised among which considering HIS as a work burden; considering it as useless activity, having less knowledge for HIS; phobia about HIS; lack of confidence (a fear to be proven wrong) were frequently referred. An interviewee who is a medical director in a health center added that *“...some staffs believe that additional money should be paid to HIS activities”.*

DISCUSSION

This study was conducted having three specific objectives. The first objective of the research was to assess magnitude of HIS use. To do this, the components of HIS were assessed for existence or absence. The assessment was made in three subtopics, as the discussion will also follow the same format.

HIS inputs

Basic inputs to HIS are not found to be sufficient according to this study. There were no adequate legislatives and planning frameworks concerning HIS, a unit assigned, and personnel to perform the tasks. There was also no budget assigned to HIS activities, or may not be adequate budget.

According to the in-depth interview, the reason for the absence of budget is different for public and private health facilities. The government facilities (health centers in particular) have their budget allocated from the sub cities and the money is mostly spent for “critical purposes”. The word critical reminds us of the misconceptions of people about HIS. The private hospitals on the other hand don’t see the point of spending money on such useless activity.

This implies the lack of understanding about the use of HIS for the facility itself. Since the facilities are not trained in such a way that the data seems to benefit the facility itself, they consider the job as doing a favor to MOH or performing their duty of sending reports. As has been stated on literatures, people should not be made to collect and compile data if they are not beneficiaries (1, 19). Facilities should have prepared all the inputs to HIS if they were convinced that it is going to have a measurable profit to their organization.

The lack of understanding could also be from the absence of up to date trainings as have been described in the result section. If there were trainings to update them on the recent improvements of HIS inline with the need to include it on their daily activities; things could have been different. In addition, the lack of coordination mechanisms has played its part for this challenge. HIS programs like any other intervention, needs infrastructures/ inputs to be prepared ahead of implementation.

HIS processes

Almost every facility has been collecting health data on a daily activity of patient care. The case is also better in terms of coding, classifying and reporting the data. According to the interviews and the literatures, problem arises when it comes to use of the information. This could be due to two things:

1. The facilities collect the data thinking that it is a must to send the reports to the responsible upper level health office. There will of course be a consequence on the facilities if they don't send it;
2. A culture of collection and reporting than a culture of using information (24, 25)

Majority of the facilities do not collect population based data. This implies that it is difficult for the facilities to monitor their progress in their service coverage. The public facilities are better in these terms because they at least know their area of service coverage.

Quality of data is questioned for there are no sufficient local quality controls. Besides, the absence of up to date quality assurance trainings has worsen the situation. The fact that the quality of data is poor at facility level implies that the national data will be put under question mark.

Among the facilities who were asked to measure the timeliness, consistency, representativeness, completeness and disaggregation of data collected, most have given a positive response saying that the data was timely, consistent, complete, disaggregate, and representative. However, on the other hand, the interviewees said that the quality is low. In addition, the lack of quality control and absence of trainings on quality assurance was raised by most of the respondents. Quality of data is mostly measured using these quantities (timeliness, completeness....). There is a clear disagreement of results in this regard. This could be due to misunderstanding of these terms among the respondents of the facilities.

HIS Outputs

The research have assessed for the presence of expected outputs of HIS, like policies for information use, decision making based on information, dissemination of results.

The main output of HIS is the use of information for decision making where far less than 50% of the facilities have reported to do so which has a huge implication on the low performance of the system. As had been described on the literatures, different writers have agreed that if information is not used for decision making, it has no value. The collection of data which is proved to perform well in our context should have been used for decision making. But in most of the cases, the purpose of collection is to complete the reports. The absence of policies for information use in the facilities has also its own impact on the non use of HIS. If there were preset facility level policies and standards about use of information health workers should have guidelines to be evaluated on.

The health information generated from each health facilities is also not disseminated outside the facility itself. Data collection is of course such a useless and tiresome activity if it is not used for any purpose. Somebody may be wondering, why are they doing the collection then? The answer is straight forward; they collect the data to pass to the sub city/ federal health offices and to store it appropriately incase there is a cross check. The data, according to the interviews I conduct has not considered as essential for the facility at all. The local use of information is not apparent in most of the facility. This problem is frequently referred to be the problem of developing countries in deferent researches; collecting rather than using [19, 27, 29]. In line with this idea further researches are needed to assess the use of the reports and data quality at administration level.

The Private/ public gap

There is a visible gap between the private and public institutions, both in terms of infrastructure and use of HIS. Anecdotal evidences referred private hospitals as having better HIS facilities mostly because they have no financial problems. However, according to this study government health facilities were found to have better inputs, processes and outputs. Use of HIS is also far better in government health facilities. This could be due to various explanations. As have been expressed by the health facilities which were interviewed, DHIS was implemented government facilities. Trainings were given while the implementation process which may have contributed for the relative success. The commitment of managers at government health facilities towards HIS was also reported to be good, which will of course have a positive impact on creating information culture on other workers of the facility.

However, the number of private facilities is huge compared to the government and relatively large number of people use the facilities. This

could imply that the data generated from private health facilities has a great importance. The interviewees have also emphasized that the private health facilities should be aware about the use of HIS for local and national use. Responsibility according to my judgment lies on government and non government organizations who are implementing HIS in the country.

Factors Affecting HIS Use

Identification of factors affecting HIS use in the health facilities was the other objective of this study. The factors that have affected the use of HIS in this study are similar to those who were presented on the literatures, especially those of developing countries. The lack of incentives for information use and inadequate resources, have all contributed their share to the non use of HIS. A study conducted to identify the factors affecting nursing information system supports this idea by stating that usage benefits have contributed positively to the use of information [30]. The lack of feedback mechanism and lack of support have made the facilities to consider the data as a burden rather than an opportunity. This kind of situation, according to the interviewees, has made the workers think that it is not as such an important activity, instead it is a job added to them. They think that if the data was vital to those who need it, they should have come and tell them what to do and support the facilities in all the way possible.

According to this study the attitude of the staff towards HIS has been very low. This was explained on the interviews that the people have no culture of information use. The low attitude could also be from the reported lack of skill to do HIS manipulations which has resulted in lack of confidence. The lack of awareness about use of HIS is definitely the result of inadequate training. This problem can also be explained with the fact that the people hate HIS because they are being forced to collect

the data they are not going to use. The people should also have been participated on planning activities of the facilities, which in this study is found to be negative. This could also contribute for the negative attitude of HIS. This is because, knowing or not knowing the status of the facilities does not add any value on decision making, if they don't participate on the actual decision making processes. The lack of participation can also be further explained from the fact that most of the health facilities we contact use a centralized decision making. [16, 19, 20, 21, 22, 23]

As can be seen from this explanation, it can be concluded that the factors are interrelated to each other. One could be the consequence as well as the result to the other. This could explain why the factors couldn't be significant after they are adjusted added with the fact that the number of respondents was small.

Adapting standards to a country will be more functional if the cultural and societal settings are considered. A research conducted in India supports this idea by stating that even programs adapted from neighboring countries with the similar settings could be incompatible. This implies that the societal norm of the people who are intended to implement the program should be thoroughly studied before it is introduced. A study conducted in South Africa has also emphasized the consideration of social factors prior to HIS implementations. [6, 29]

Commitment of management was also found to be the key to HIS success in this research. If management is committed to bring a change in the facilities it will, according to the interviews. Researches also support that managers could play a vital role in bringing a culture of HIS although it could take time. [16, 28]

However managers themselves, according to this study are not aware of the use of HIS to their facilities. The competitive advantages of using HIS are not clear to them. This implies that prior to implementing HIS; creating awareness and common understanding could have been made, or should still be made.

According to this study, despite the frequent reforms made to improve the HIS, HMIS more specifically, of the country; the progress recorded is far from satisfactory. Most of the interventions have been agreed upon by the ministry while the programs are implemented at facility levels. Anecdotal evidences showed that facilities are not accountable for the data they produce, except for the report they send to the responsible offices. Thus from this explanation, it can be understood that there may be an information gap between the ministry and the facilities, which is a mismatch between plan and implementation.

STRENGTH AND LIMITATIONS OF THE STUDY

Strength

- All the population was taken during the study which makes the conclusion valid to all the facilities under study
- Both qualitative and quantitative data were collected so that an issue missed by one method could be picked by the other
- This study is probably the first in its kind in Ethiopia as to the knowledge of the principal investigator, which is believed to pave the way to other related researches.

Limitation

- The fact that the questionnaires are self administered may affect the validity of the responses
- The absence of updated list of health facilities made it difficult to locate them which may have contributed to the relatively high non response rate (16 %).

CONCLUSION

In general, this study found that the necessary inputs to HIS such as legislatives and planning framework, unit, personnel, budget, equipments, trainings and coordination mechanisms among other subcomponents are not sufficiently allocated on the facilities. In terms of processes, performance of the facilities is low except for collection of data. The HIS in the facilities under study does not produce information for decision making, nor disseminate the information. The only information they send to the outside environment is the reports. But the quality of the reports can't be assured for there are no local quality control mechanisms as well as up to date quality assurance trainings. This has in a way a direct implication on the quality of the nationally generated data.

There also happens to be a significant difference between government and private health facilities in use of HIS. The vast numbers of private health facilities are not moving according to standards. Even though both needs improvement, there is a gap between private and government health facilities.

Various factors are found to affect the use of HIS at facility levels. The main factors contributing to the low performance of HIS are; 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.

RECOMMENDATIONS

The recommendation comprises what should be done at the regional Health bureau as well as at facility level:

- Health facilities must be assessed for having the appropriate inputs before they are forced to do HIS activities and a common understanding between the facility and the responsible organs should be reached before HIS is implemented
- The collection, compilation and data quality assurance processes of facilities must be taken in to account before they are requested to send reports;
- Health facilities must be given frequent trainings to use the data generated for decision making at facility level, and the use of HIS for their facility (local use) must be underlined in all the trainings;
- Supportive supervision and technical assistants should be delivered to monitor their progress towards HIS;
- Efforts have to be made to improve the culture of information and the attitude of staffs towards HIS in the facilities both at the regional as well as facility levels;
- Trainings and other briefings have to be given for the management of the facilities;
- Facilities should promote decentralized decision making and HIS workers and other professionals should participate in the planning process of their own facility;
- Records of the facility should be accessible both to the facility workers and external organs, and rules for denial or acceptance of access should be set.

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Annex A English Questionnaire

Structured questionnaire for assessing the magnitude and factors affecting HIS use in private and Public Health facilities in Addis Ababa

Subject information sheet

Greetings:

My name is _____ I am working with AZEB MENGISTU who is currently a post graduate students in Addis Ababa university department health informatics.

The objective of the study is to assess the magnitude and factors affecting the use of health information systems in both private and public health facilities. Hospitals, higher Clinics and health centers are chosen to participate in the study. In each facility, individuals whose work involves HIS activities are selected. And you are selected just because of your position.

Even though study is conducted for the partial fulfillment of master program in health informatics, it is believed to contribute much for understanding the current information utilization pattern and to identify the factors contributing to the existing situations. This in turn is hoped to give insight as to how to improve the HIS use in the facilities as well as others.

You will be asked to fill a questionnaire that will help in investigating the issues. Your co-operation is very helpful. Your name will not be written on the questionnaire and all the information you will provide will be kept strictly confidential. You will be facing no harm by participating and you are also not obligated to answer any question you don't wish to answer. To fill the questionnaire 25-30 minutes will be required. If you wish to comment feel free to use the contact address.

Consent Form

Considering the information you get from the general information sheet, we would be thankful if you spend sometime with us solving questions related to the issues. Are you comfortable to participate in this study?

- If yes, continue to next page
- If no, skip to other participant

Contact

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HIS: in this context means the collection of people procedures, and equipments designed, constructed, operated and manipulated to collect, record, process, store, retrieve and disseminate information concerning health.

Part One: Background Information

No.	Questions	Answers	Remark
101	Respondent Number:	
102	Sub city	
103	Type of health institution	1. Hospital 2. Higher Clinic 3. Health center	
104	Type of organization:	1. Private 2. NGO 3. Government	
105	Position of the respondent in the facility:	1. Manager 2. HIS officer 3. If other, specify.....	
106	Year of Serviceyears	
107	Qualification	

Part Two: Facility's HIS inputs

No.	Questions	Answers	Remark
201	Does your facility have legislatives, regulatory and planning frameworks concerning the use of HIS?	1. Yes 2. No 3. Don't Know	
202	Is there a unit (an office) assigned specifically to HIS?	1. Yes 2. No 3. Don't Know	
203	Does your facility have personnel specifically to HIS? (Note:the person could have other duties too)	1. Yes 2. No 3. Don't Know	
204	Does your facility assign budget for HIS activities?	1. Yes 2. No _____ 3. Don't Know	→ 206
205	How do you rate the adequacy of budget for HIS?	1. Very Adequate 2. Adequate 3. Inadequate 4. Very Inadequate 5. Not sure	
206	Are there the necessary equipments for HIS in your facility?	1. Yes 2. No _____ 3. Don't Know	→ 208
207	If yes for question number five,	1. Electricity	

	which of the following equipments are assigned to HIS? (Multiple answers are possible).	<ol style="list-style-type: none"> 2. Telephone 3. Computer 4. Internet or any kind of network 5. Stationery (at least pen and paper) 6. If other, specify..... 	
208	Are there trainings on basic computer literacy for the staffs of your facility?	<ol style="list-style-type: none"> 1. Yes 2. No 3. Don't Know 	
209	Are there any kinds of trainings (in-service) on HIS activities for the staffs?	<ol style="list-style-type: none"> 1. Yes 2. No → 212 3. Don't Know 	
210	If yes to question # 9, how long has it been after the last training is given?	<ol style="list-style-type: none"> 1. 0 -6 months 2. 6 months to one year 3. One year to one and half years 4. More than two years 	
211	For how many of the staffs were the training given in the last 12 months?	<ol style="list-style-type: none"> 1. For less than 25% of the staff 2. For less than 50% of the staff 3. For less than 75% of the staff 4. For all of the staff 	
212	Are there any coordination mechanisms in your facility to facilitative use of HIS resources (human, material, financial.....)?	<ol style="list-style-type: none"> 1. Yes 2. No 3. Don't Know 	

Part Three: Facility's HIS Processes

No.	Questions	Answers	Remark
301	Does your facility collect health data on a daily activity of patient care?	<ol style="list-style-type: none"> 1. Yes 2. No 3. Don't Know 	
302	Are records classified and coded just after each clinical visit?	<ol style="list-style-type: none"> 1. Yes 2. No 3. Don't Know 	
303	Do you think the data sources to be collected are overwhelming?	<ol style="list-style-type: none"> 1. Yes 2. No 3. Don't Know 	
304	Do the data collect cover socioeconomic (like household	<ol style="list-style-type: none"> 1. Yes 2. No 3. Don't Know 	

	income...) and demographic (age, sex...) factors?		
305	Do the data cover environmental (like pollution...) and behavioral (like smoking...) risk factors?	1. Yes 2. No 3. Don't Know	
306	Does your facility use population base data (census, survey.....) to use as a denominator?	1. Yes 2. No 3. Don't Know	
307	Which type of institution based data does your facility use? (multiple answers are possible) Service records (records of your facility as well as outside sources)	1. Resource based (<i>meaning, health service inputs</i>) 2. Service records (<i>meaning, records of your facility as well as outside sources</i>) 3. Individual records (<i>meaning, data from provision of health service</i>)	
308	Are the records put in appropriate location?	1. Yes 2. No 3. Don't Know	
309	How do you rate the ease of accessibility (retrievably) of the records for the appropriate staffs?	1. Very easy 2. Easy 3. Difficult 4. Very difficult 5. Not sure	
310	Are there clear procedures for distributing and reporting the data collected?	1. Yes 2. No 3. Don't Know	
311	Are there rules for minimum period of maintenance and dispatch time for the records?	1. Yes 2. No 3. Don't Know	
312	Are the data put at administrative level?	1. Yes 2. No 3. Don't Know	
313	Do the data classified according to some criteria (like date, geographic location or title and/or national code)?	1. Yes 2. No 3. Don't Know	
314	Are there regular local quality control and data checks by the facility itself?	1. Yes 2. No 3. Don't Know	
315	How do you rate the clarity of definition of data elements?	1. Very clear 2. Clear	

		<ul style="list-style-type: none"> 3. Unclear 4. Very unclear 5. Not sure 	
316	Does your facility take up to date trainings on assuring data quality while data collection and data use?	<ul style="list-style-type: none"> 1. Yes 2. No 3. Don't Know 	
317	Are frequent feedbacks and supportive supervision given for data collectors and used from any concerned outside organs?	<ul style="list-style-type: none"> 1. Yes 2. No 3. Don't Know 	→ 319
318	If yes for question # 17, how frequently do you get the feedback?	<ul style="list-style-type: none"> 1. Every month 2. Every quarter of a year 3. Every half year 4. Every year 5. If other Specify..... 	
319	Do you agree that the data collected by your facility are timely?	<ul style="list-style-type: none"> 1. Strongly Agree 2. Agree 3. Disagree 4. Strongly Disagree 5. Not sure 	
320	Do you agree that the data collected by your facility are consistent?	<ul style="list-style-type: none"> 1. Strongly Agree 2. Agree 3. Disagree 4. Strongly Disagree 5. Not sure 	
321	Do you agree that the data collected by your facility are representative?	<ul style="list-style-type: none"> 1. Strongly Agree 2. Agree 3. Disagree 4. Strongly Disagree 5. Not sure 	
322	Do you agree that the data collected by your facility are disaggregated (like by age, disease code ...)?	<ul style="list-style-type: none"> 1. Strongly Agree 2. Agree 3. Disagree 4. Strongly Disagree 5. Not sure 	
323	Do you agree that the data collected by your facility are complete?	<ul style="list-style-type: none"> 1. Strongly Agree 2. Agree 3. Disagree 4. Strongly Disagree 	

		5. Not sure	
<i>Part Four: Facility's HIS Outputs</i>			
No.	Questions	Answers	Remark
401	Do you use the information you collected for decision making?	<ol style="list-style-type: none"> 1. Yes 2. No 3. Don't Know 	
402	For what other purposes do you use the information you collect? (multiple answers are possible)	<ol style="list-style-type: none"> 1. For future reference 2. To observe trends on service delivery 3. To pass the data for subsidy health office 4. If other, specify..... 	
403	Are the data produced easily accessible by all staffs when the need arises?	<ol style="list-style-type: none"> 1. Yes 2. No 3. Don't Know 	
404	Are there incentives for information use?	<ol style="list-style-type: none"> 1. Yes 2. No 3. Don't Know 	→ 405
405	If yes, specify what kind of incentive	<ol style="list-style-type: none"> 1. Money 2. Training 3. Recognition 4. Other..... 	
406	Are there policies in your facility for information use?	<ol style="list-style-type: none"> 1. Yes 2. No 3. Don't Know 	
407	Does your facility have legislatives and regulatory environment about data security?	<ol style="list-style-type: none"> 1. Yes 2. No 3. Don't Know 	
408	Does your facility have legislatives and regulatory environment about retention and destruction of data?	<ol style="list-style-type: none"> 1. Yes 2. No 3. Don't Know 	
409	Does your facility have legislatives and regulatory environment about transfer of data between the facility and external users of the records?	<ol style="list-style-type: none"> 1. Yes 2. No 3. Don't Know 	

410	Does your facility have any mechanism to disseminate health information to the outside the facilities aside from the reports send to the sub city health offices?	<ol style="list-style-type: none"> 1. Yes 2. No 3. Don't Know 	
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Part Five: Possible determinants

No.	Questions	Answers	Remark
501	Are there any kinds of incentives/ motivation for HIS use?	<ol style="list-style-type: none"> 1. Yes 2. No 3. Don't Know 	
502	How do you rate the attitude towards HIS among workers in your facility in general?	<ol style="list-style-type: none"> 1. Very Good —————→ 2. Good —————→ 5. Low 6. Very Low 7. Not sure 	<p>▶ 504</p> <p>▶ 504</p>
503	If Low, or very low, what negative attitudes have you come across?	<p>.....</p> <p>.....</p>	
504	How do you rate the attitude of the facility's management towards HIS?	<ol style="list-style-type: none"> 1. Very Good —————→ 2. Good —————→ 3. Low 4. Very Low 5. Not sure 	<p>▶ 506</p> <p>▶ 506</p>
505	If Low, or very low, what negative attitudes have you come across?	<p>.....</p> <p>.....</p>	
506	How do you rate the expertise of your facility to collect, compile, analyze and use information on a facility level	<ol style="list-style-type: none"> 1. Very Good 2. Good 3. Low 4. Very Low 5. Not sure 	
507	Does your facility get technical support from concerned bodies about HIS issues?	<ol style="list-style-type: none"> 1. Yes 2. No 3. Don't know 	
508	If yes, from where do you get the support? (multiple answers are	<ol style="list-style-type: none"> 1. Subsidy health offices 2. National health office 	

	possible)	3. NGOs 4. If other, specify	
509	How is your organizational behavior?	3. Centralized 4. Decentralized 5. Not sure	
510	Do you agree that HIS workers are being allowed to participate in planning process of the facility?	1. Strongly Agree 2. Agree 3. Disagree 4. Strongly Disagree 5. Not sure	

Annex B

Interview Guide for identification of factors affecting HIS use

1. Why do you think that health facilities do not have the necessary inputs concerning HIS?
2. Why do you think that health facilities do not perform the basic processes concerning HIS?
3. How do you evaluate the HIS of health facilities?
4. How do you compare the use of HIS in private and government health facilities?
5. What do you think are the challenges of HIS?
6. what can you say about the effect of the following
 - participation in planning, centralization and decentralization
 - attitude, skill and culture of staffs and management about HIS
 - feedback, supervision and support
7. How influential are the challenges, and how can the situation be improved?