Addis Ababa University

College of Health Sciences

School of Public Health

Assessment of Routine Health information utilization and its associated factors among Health Professionals in Public Health Centers of Addis Ababa, Ethiopia

Investigator: Meskerem Mengistu (BSc in PHO)

Advisors: Dr. Girma Taye (Ph.D., Associate professor)

Mr. Wondimu Ayele (Ph.D. Fellow, Assistant professor)

A thesis to be submitted to College of Health Sciences, School of Public Health, Addis Ababa University for the Partial Fulfillment in Masters of General Public Health

June 2020

Addis Ababa, Ethiopia

ASSURANCE OF PRINCIPAL INVESTIGATOR

I, the undersigned MPH student declare that this thesis is my original work in fulfillment of the requirement for the master of General Public Health.

Name of the student: Meskerem Mengistu Gashe

Email: mengistumeskerem3@gmail.com

Phone No: 0921055340

Date._____

Signature_____

Approval of the primary Advisor

This thesis work has been submitted with our approval as the university advisor.

Name of the primary advisor: _____

Date._____

Signature _____

Acknowledgment

My sincere and deepest gratitude goes to **God** for his favor and guidance throughout this entire Master's program.

Special thanks go to my advisor, **Dr. Girma Taye**, for openly providing me valuable comments and advice since the design of the protocol to the write up of this thesis report. Also, I would like to express my deepest gratitude to my advisor **Mr. Wondimu Ayele** for his constructive advice.

Also, great thanks go to **Doris Duke Charitable Foundation (DDCF)** project for funding in my thesis work and I appreciate members of the DDCF project who show collaboration in my work, especially Mr. Ephrem Biruk who is the project coordinator.

I also thank the data collectors and health facilities which let me collect data for my thesis.

Table of Contents

List of Tables

List of figure

List of Abbreviations and Acronyms

ART	Anti-retroviral therapy
CAC	Comprehensive abortion care
DDCF	Doris Duke Charitable Foundation
DHIS	District health information system
HCIS	Health care information system
HMIS	Health management information system
HIS	Health information system
HIV/AIDS	Human immune-deficiency virus/Acquired Immune-deficiency syndrome
ICTs	Information communication technologies
IP	Inpatient department
IT	Information technology
MOH	Ministry of health
OPD	Outpatient Department
PHC	Primary health care
PHCU	Primary health care unit
PRISM	Performance of Routine Information System Management
SPSS	Statistical Package for the Social Sciences
VCT	Voluntary counseling and testing
WHO	World health organization

Abstract

Background: - Routine Health information system (RHIS) is a system whereby health data are recorded, stored, retrieved, and processed to improve decision-making in the health sector. Reliable and timely available health information is vital for operational and strategic decision making that saves lives and enhances health. In Ethiopia, information availability and use remain weak among health professionals, particularly at district health offices and primary health care facilities to facilitate decision making, even in Addis Ababa. There is poor access to health information use at the facility level. Poor handling of medical documentations among health professionals is an additional burden for the health care system.

Hence, this study aimed to assess the information utilization status of Routine Health Information System and associated factors among health professionals in Addis Ababa city public health centers.

Method: - Facility-based cross-sectional study design was conducted from March to April 2020 among 408 health professionals randomly selected from 22 health centers in Addis Ababa. Data collected using a Semi-structure questionnaire and an observational checklist were cleaned, coded, and entered into EpiData version 3.1 and transferred into SPSS version 20 for further statistical analysis. Descriptive statistics like frequencies, proportions, and summary statistics were used to summarize key findings. Variables with a p-value of less than 0.05 at multiple logistic regression analysis were considered statistically significant factors for the utilization of Routine health information system. Odds ratios with 95% confidence interval were computed to identify the factors statistically associated with routine health information use.

Result: - a total of 402 respondents have participated in the study with a response rate of 98.5%. The median age of study participants was 29 with IQR of 29. Of the total, 103 (25.6%) had attended RHIS related training. Good Routine health information utilization rate among health professionals was 37.3% (95% CI: 32.6%, 42.1%). Use of both manual paper files and computer-based files for recording information[AOR= 1.474 95% CI (1.043, 2.082)] at p-value 0.028, Organizational rules, values and practices [AOR= 1.734 95% CI (1.212, 2.481)] at p-value 0.003, Inadequate Human resource [AOR= 1.494 95% CI (1.056, 2.114)] at p-value 0.023, Problem solving skill of health professionals on HIS tasks [AOR= 2.091 95% CI (1.343, 3.256)] at p-value 0.001, Belief on routine health information use [AOR=

0.665 95% CI (.501, .883)] at p-value 0.005, the Collected information used for planning, monitoring and evaluating of facility performance [AOR= 1.464 95% CI (1.006, 2.131)] at p-value 0.046 and Know their duties and responsibilities in their work place [AOR= 1.525 95% CI (1.121, 2.073)] at p-value 0.007 are significantly associated with routine health information use.

Conclusion: - Good health information utilization status of health professionals in this study was low. Major skill gaps present in the studied health centers health professionals regarding information use. Besides, there is a low level of data collection, data management, information generation, and use that needed for the decision-making process and patient service delivery. Routine health information use was better exercised among health professionals who practiced both paper and computer-based information handling, those who have well organized Organizational rules, values and practices, those who collected and used information for planning and monitoring facility performance, those who have adequate human resource, those who have good problem solving skill, those who had positive belief on RHIS use and those who Know their duties and responsibilities in their work place. Thus, major improvements have to be done in equipping health professionals to generate and utilize the information they have.

Keywords: - Routine Health information Utilization, Health centers, Health professionals

1. Introduction

1.1.Background

Health information system (HIS) is categorized as a Population-based health information system and Routine health information system (RHIS). Routine Health information system (RHIS) is a system whereby health data were recorded, stored, retrieved, and processed to improve decision-making about health (1-4). A routine health information system is frequently referred to as the interaction between people, processes, and technology to support operations management in delivering essential information to improve the quality of healthcare services (5). It is one of the major components of a health care system (2). RHIS is cost-effective in reducing work burden and improve the quality of patient care (4, 6). RHIS is effective in identifying problems and gaps in the health care system and also helps to resolve the identified problems and improving of health care system(7). Utilization of routine health information helps to facilitate the development of the public health care facilities indicators such as decision-making for patient care and service delivery, planning, monitoring, and evaluation. Routine health information is likely to allow public health facility providers to document analyze and use information to improve coverage, continuity and quality of health care services at all levels by better planning, monitoring, and evaluating health facility service. Information systems are increasingly important for measuring and improving the quality and coverage of health services. Reliable and timely available health information is vital for operational and strategic decision making that saves lives and enhances health.

Globally the development and origin of RHIS are in the late 1950s (8). Electronic data handling, information technology, and the Internet have revolutionized the possibilities of creating integrated routine health information use (9).

Nowadays in most developing countries, the role of information technology is mainly emphasized in the Routine Health Information Systems in which data used for multiple purposes (10).

In Ethiopia, A national RHIS assessment was carried out in 2008 and this was updated and validated in 2011 as a step towards developing a national HIS strategic plan (11). Information Revolution is one of the four transformation agendas of the Health Sector Transformation Plan (HSTP) (12). The objective of the Information Revolution is to transform and enhance

the culture of data use to positively impact population health and health-system performance through evidence-based decision making at all levels of the health system.

Routine Health Information Systems (RHIS) is potentially very important for the development of the health sector in Ethiopia. Ethiopian current health system focused on the district-level primary healthcare system. This health care system contains a network of primary health care units of the health post, health center, district hospital (1, 4). The value and effectiveness of health information were determined by its utilization by health professionals in decision-making. (1, 13).

As of 2008, a comprehensive electronic activated RHIS activity has been developed and deployed to health facilities in Addis Ababa, Ethiopia. (11). Therefore this study aims in assessing the current status of Routine health information use and associated factors in Addis Ababa health centers.

1.2.Statement of the problem

RHIS is expected to produce effective and reliable information for decision-making and planning in the health care system.

The main obstacle to applying the primary health care(PHC) approach in most developing countries is the use of inadequate information by health professionals for the health managerial process (1). So; management and timely utilization of information practices among health professionals are very poor in developing countries (14-17). Besides, it is crucial to implement a health management based information system among health professionals to allocate scarce resources and better patient care. Despite some efforts to make the health care system integrated with information systems, it continues to not be well developed in the Ethiopian nation's health sector.

In Addis Ababa, routine health information availability and use remain weak, particularly at public health centers to facilitate decision making. There is poor practice in data collection and management, data analysis, information presentation, and use. Health workers' level of attitude and belief in data collection and recording are the main factors for the low rate of information use in health centers. Reported data are incomplete, inaccurate, and not timely available in public health centers of Addis Ababa(15).

To improve the situation with the main emphasis on RHIS, many international agencies are investing a huge amount of money (18). Supporting the scarce medical staff by providing information technology(IT) for their everyday work, thus making information about their patients available and allowing them to document medical data in a structured format produces valuable information to make sound decisions for the health care system.

1.3.Significance of the study

This study helps to assess the health information utilization status among health professionals of Addis Ababa city public health centers. Therefore, this study was designed to greatly signal the current status of RHIS in study area. It can also high light the knowledge on utilization of health information and factors associated with utilization of RHIS and perhaps as an initiative and reference to other researchers in this area. Further, in line with these, it will also contribute to policy decision making in the direction of making Routine Health Information System more amenable for better improvement of the health services among health professionals, at primary health care facilities level, at Addis Ababa health bureau level and Federal ministry of health level.

The study identified and gives solutions to the existing gap of routine health information utilization in Addis Ababa city administration public health centers. The expected beneficiaries of this study will be health centers in selected sub-cities plus other similarly structured health facilities. Finally, this study will improve and strengthen the utilization of information for decision-making at health centers.

2. Literature Review

Existing literature on the comparison of available open-source solutions about Routine health information utilization among health professionals will be reviewed. The trend and status of RHIS around the Globe, Africa, especially in developing countries, in Ethiopia will be discussed. Besides, in Addis Ababa primary health care facility information system based Articles with a component of routine health information utilization, strength, and limitations of Routine health information utilization will be discussed then will show the gaps/limitations of RHIS information utilization specifically in Ethiopia, Addis Ababa city public health centers. Besides, detailed factors and obstacles for health information utilization and their possible solutions discussed. Works of literature reviewed in this chapter were related to the guiding objectives of the study. Kinds of literature used in this study were obtained from textbooks, libraries, documentaries, internet, and journals to fit the notes of the topic under study.

2.1. Origin and current status of RHIS across the Globe, Africa, Ethiopia and Addis Ababa

Globally the development and origin of RHIS are in the late 1950s. During the 1960s; the main healthcare drivers in this era were Medicare and Medicaid, the IT drivers were expensive mainframes, and storage and applications arising were shared hospital accounting systems. In the 1970s; the main healthcare driver was the need to do a better job communicating between departments and the need for discrete departmental systems. Computers were now small enough to be installed in a single department without environmental controls. As a result, departmental systems proliferated. During the 1980s; hospitals needed to pull significant health information. At the same time, personal computers and software applications had entered the market, as had emerging networking solutions. In the 1990s; here competition and consolidation drove healthcare, along with the need to integrate providers. Hospitals now had access to broad, distributed computing systems and robust networks (8).

In the 2000s; we now had enough technology and bedside clinical applications installed to make a serious run at commercial, real-time clinical decision support (8). Electronic data handling, information technology, and the Internet have revolutionized the possibilities of creating integrated health information (9). Now we find ourselves in the 2010s and We have microprocessors everywhere (8). Since the 1990s; even if knowledge and understanding of

the role of health information have improved globally, the use of routine health information for evidence-based decision making is still very weak in most low- and middle-income countries (19).

In Ethiopia, A national RHIS assessment was carried out in 2008 and this was updated and validated in 2011 as a step towards developing a national HIS strategic plan (11). At 2006 GC, a situation analysis of HMIS/M&E was conducted in Ethiopia (11, 20). As of 2008, a comprehensive electronic HMIS has been developed and is now being deployed to health facilities in several regions of Ethiopia. In 2011, the MOH organized an eHealth workshop to begin developing appropriate health informatics standards. The country has had a national e-Government policy since 2009 as part of the HMIS reform (11). But the current HMIS/M&E core process is weak at the national level (20). Ethiopia's Black Lion Hospital in Addis Ababa was one of the initial test sites for the development of the telemedicine component of the Pan-African e-network (11). Despite the intensive effort to improve the efficiency of health information systems in the past few years, the utilization of health information at the local level remains a challenge in the Ethiopian health system (13).

2.2. Status of infrastructure and human resource (Computer and Internet Access, Training, supportive supervision, and feedback)

2.2.1. Registration formats, Computer and Internet Access

A study in G.R Medical college of India revealed that of 240 healthcare professionals, only 132 had a computer (21). A research done in New Zealand, the majority of the respondents had computer and internet access at their workplace (22).

A study done at Primary health care facilities in Egypt showed that about half of physicians(51.2%) working in primary care settings had information communication technologies(ICTs) in their workplaces (23). 85.7% of health professionals respond that there was no maintenance access for ICTs materials if they became dysfunctional (23).

A study was done in the Government institution of East Gojjam zone, NW Ethiopia; 65% of health professionals respond that there was no standardized registration book at their health facility, also face a shortage of reporting formats (24). Health professionals in all health centers of Bahir Dar commented that there was no library, internet, journals, books, computer and computer rooms, research papers, soft copy materials, and training access (16,

24). From 182 departments of Health Centers in Jimma zone, only 5 of them had computers, but 140 of 150 units/departments of Districts Health Offices were all computerized. Even those who had computers lacked skilled personnel (17). In PHC facilities in western Amhara, Ethiopia; Only 75 (30%) had a computer in their office and only 15 (6%) respondents had internet access at their offices (14). Study in East Gojjam zone shows, in most departments (93.4%), equipment for data analysis was not available (24). A study done in Amhara national regional, the majority of the respondents(78.5%) replied that only one computer was available for one human resource core process. 72.8% report that Internet and network access were not available (25). In north Gondar, the majority (89.8%) of the participants said that their hospitals had no good infrastructure (26). A study in Gondar comprehensive hospital shows that even if 100% of health professionals reported that they had access to the Internet, the real access at their health office is only 41.8% (27).

A study done in central Ethiopia health facilities revealed that, According to the WHO building block, it was found that existing information is limited in opportunity and scope (28). A study conducted in Public health centers of Addis Ababa shows that 51.7% of the respondents replied that the health facilities had HMIS guidelines and user manuals to run their activities effectively, but 48.3% of respondents did not know whether these materials were available at their facility (15). Access to the internet is limited (38%) to the health professionals and appropriate guidelines and protocols were not up-to-date (15, 28).

So; Globally ICTs availability is around 50%, still poor access. In Africa, the above studies reviewed access to ICTs was low. Ethiopian health professionals reported that the availability of a computer, internet, guidelines was below 25% and in Addis Ababa, staff claimed that access to ICTs was around 35%, guidelines were not up to date and half of the respondents did not know even the presence of HMIS guidelines.

2.2.2. Human resources capacity development regarding RHIS (Training, supportive supervision and feedback)

A study was done in G.R Medical college of India, of 240 healthcare professionals, only 33% had computer training and of all trained healthcare professionals, only 41% of them had good knowledge in RHIS (21). In Australia, the study shows that even if training had been given to health professionals on information management previously, further training still needed (29). A study done in New Zealand shows most respondents had limited computer training (22).

Study at Primary health care facilities in Egypt reveals, there was a great difference between health staff who took training in RHIS and those who did not take any training support (23). A study at District health facilities in Tanzania reveals, working with advanced features were more slowly adopted during on-site training (30). In Egypt, physicians who had ICTs at their workplace have had 51.2% access for training (23). A study done in rural southern Tanzania showed that the proportion of records entered on the same day as attendance at the health center improved from 67% to 85%, due to proper supervision and feedback (31, 32). Staff in Kenya rural health centers agreed that more training and supervision would be helpful for the utilization of health data (32).

A study performed at the Jimma zone supports the idea that lack of supportive supervision and timely feedbacks raised as one of the main problems for poor information utilization of health professionals in the PHCUs (17). A study was done in North Gondar public health facilities, only 12% of the health professionals have trained on how to use routine health information, but the majority of 87% of respondents did not receive any training (2). Similarly, Study in East Gojjam zone shows, 53.2% of the respondents did not receive any training on RHIS, even above 92.5% of staff did not trained on basic computer skills and data analysis process (24). In PHC facilities in western Amhara, Ethiopia; Very few 28.8% of respondents had monitoring and evaluation/feedback reports (14). Research in Hadiya zone health centers, southern Ethiopia; many of the staff did not have clue about the tools and formats due to non-understandability and unavailability of training access in the health facility (1, 17). In Jimma, around 30% of the visited staff did not understand the reporting tools well because of the absence of any training support (17). In Hadiya health centers, most units/departments, 87.4% had received feedback from the district health office on a monthly, quarterly, and annual basis and most of the units/departments, 77.7% were supervised well (1). In east Gojjam, even if 53.3% of health employees were supervised every 6 months, these respondents did not receive any regular feedback from the next higher health authority (24). Research held at Amhara national regional state shows that around 74% of the respondents did not take any training concerning of health information system at their facility (25).

Study in government health facilities in Addis Ababa reveals,74.3% of the respondents in the study have got training on HMIS and 51% of the health institutions received feedback from their correspondence sub-cities (15). About 49.6% of respondents had computer training

before (33). A study conducted in Public health facilities in Addis Ababa from a total of 114 professionals involved in laboratory commodity management, 71(62.3%) were trained in the logistics management information system (34). In central Ethiopia, Monitoring and evaluation practiced fairly in the selected health facility setting (28).

Generally, most respondents of different health facilities around the globe revealed that almost below half percent of employees got training on RHIS and had poor knowledge in IT. In Africa, there was a knowledge gap between the trained ones and those who did not train. Supervision showed great improvement in the information use of staff. In the Ethiopian context, there was a 50-87% difference in training trends at different zones and there was a lack of supervision and M/E access. At Addis Ababa, there was above 70% access to training on average and M/E Programme practiced well.

2.3. Level of Knowledge, culture, and perception of health professionals about health data utilization

A study done in the general hospital of Austria showed that health professionals have a belief that extraction and use of health information become easier because Nurses document patient care outcomes on specific documentation form (35). Also, a study done in G.R Medical college of India revealed that, of 240 healthcare professionals, 58% had some knowledge of computers (21).

A study done in public health sectors of South Africa revealed that by arguing whether routine health information system is easy to use or not; 78% of nurses and 80% of administrators believed that health information system is easy to use and computerized systems were faster than handwritten ones, while doctors agreed with this statement to varying and lesser degrees (32, 36). About 55% of physicians believe that the process that uses paper is more efficient than the use of electronics, which shows they were resistant to new processes of data entering and accessing information from computer systems (36). A study performed in Cameroon health stakeholders shows that health professionals were not motivated to take the additional tasks on handling and reporting health data if additional budget is not allocated (37). A study done among health employees and managers in Tanzania, most of them responded " No answer" to almost all questions they were asked and this shows there is a knowledge gap in the RHIS process (38). In Kenya's rural health centers,

health professionals respond that computerized RHIS is a comfort to them and easy to use (32).

A study done in the Government institution of East Gojjam zone, NW Ethiopia; around 49.9% of the respondents ever heard about the role of Routine health information utilization at district health facility levels. Only 36.7% of the respondents reported that they know about RHIS through training (24). A study done in Amhara national regional state in Ethiopia to assess the perceived knowledge of health professionals revealed that 85% of the respondents reported they believe the RHIS was important. But, 43.9% of respondents did not know the advantages of RHIS (25). In North Gondar, NW Ethiopia; even if More than half (58.6%) of respondents had positive belief in routine health information utilization, their culture of routine health information utilization is very low(23.1%) (2). The study performed in the Jimma zone-Oromia region of Ethiopia, the majority of the staff from 362 respondents at the district level feel that their duty is only collecting and passing data to the next level, direct utilization of health information left for managerial levels (17). In North Gondar, more than two-thirds (75%) had no professional knowledge about national indicators and professional data analysis skills (2, 25, 26). Research done in Northwest Ethiopia showed that participants with good RHIS knowledge were two times more ready to use RHIS than those with poor knowledge (26). Among health centers in Bahir Dar, Only 33.3% of Health professionals were computer literate (16). Around 97.3% of respondents needed health information to update their knowledge and perform their health activities (16). A study in Gondar comprehensive hospital, Ethiopia; around 69.3% of participants report that they had good electronic knowledge (27). But a study in district sites of Ethiopia showed, only 25% of health professionals had average computer knowledge (39). To address this knowledge gap, health professionals put further computer training as a solution (16, 39).

Research done at public health centers in Addis Ababa city administrative, Ethiopia; 74.8% of respondents replied that they had good knowledge and practice of information generation and utilization process at their facility (15). A study in government health facilities in Addis Ababa reveals adequate knowledge of computers among respondents was 33.7% (33).

Generally, at a global level, health professionals had good computer knowledge and believed that computerized RHIS was faster and comfortable. In Africa, Health Professionals had optimal computers skill and believed in preference of the computerized system, but half of

them resisted this belief. Also, were less motivated to the system. In Ethiopia, Health Professionals with good computer knowledge were two times ready to use RHIS. The worst side is that almost half of the staff did not hear about RHIS and count that data recording was not their task. At Addis Ababa, the health professionals had better health information knowledge with a varying degree.

2.4. Data collection and management by health professionals and managers

Based on global review; among high-income countries, the Canadian and the United States systems were among the best described Routine HIS. Besides, Brazil's system was the best documented among middle- income countries. The national routine health information systems of Kenya and Malawi, as well as Swaziland, stood out as especially promising among low-income countries (40). A study done in Asia shows that data entry and recording were required to transfer data from paper-based to web-based systems (41). New Zealand, 84% of health professionals completed their patient records using computers (22).

According to the Nigerian RHIS policy review of 2014, any information should follow the collection and recording process to enhance evidence-based decision making (42). Cameroon stakeholders reported that Health information was collected at health centers and district hospitals monthly (37). It was very laborious to collect data at district health centers on a monthly level, so the system did not flow as it should be (37, 43). In Accra district hospital, Ghana; the study showed that Staff motivation and morale became low due to the burdensome nature of data collection and management (43). Studies done in public health sectors of South Africa, professionals report that patient record-keeping on the computer was essential and make their work easier (44). In Rwanda, assessment of RHIS information showed that Completeness rate of facility became above 80% in 2012 which was below 80% in 2008 (45). A study done in rural southern Tanzania reveals, timely, and periodically information transfer from the periphery to the district was almost null (31). Similarly; by performing double data entry in all units/departments, discrepant entries were noticed and corrected in Tanzania (31). During the visit of PHC units in Alexandria, Egypt, all reviewed sections showed a higher rate of completion in paper-based than electronic records (46).

In a study done in Jimma zone; among 332 individuals who participated from Health Center and district units, 127(38.3%) revealed inconsistency of report (17). Research done at Hadiya zone health centers shows that from the total departments, 289(82.8%) completed data

correctly, and 265(75.9%) were found the consistency of their data with register book, tally sheet, and reporting formats (1). In Jimma zone health facilities, around 71% observed departments kept their reports and registrations in Well-organized hard copy form, and 24% of units/departments did not have well-organized information while 5% had secured information in both hard and soft copy form (17). The study conducted at PHC facilities in western Amhara revealed that 68% and 32% of study participants had regular health facility reports in hard copy formats and softcopy reports respectively (14). Most of the units (99.1%) had prepared reports to the district health office periodically on a monthly, quarterly, and annual basis (14). In Jimma, All the study units/departments filled the tallies, report formats, reporting forms, and registrations manually (17). So; there was great variability in completion rates across different PHC units, while 71(21.4%) claimed inconsistency and incompleteness of the health information reports (17).

About 87% of the study units in Addis Ababa had taken data collection as part of their duty and was committed. Almost all health professionals and data clerks (79.2%) collect data themselves and data are filled legibly by these professionals. 194 (47.5%) of the respondents reply there was the incompleteness of collected data and was an inconvenience with the registered one. 83.1% of them register the health activities routinely (15).

Therefore; globally, there was a good practice of data recording and information management across different continents. In Africa, most health professionals did not have the morale to data record and management due to the so-called laborious property of data collecting, completeness of data which recorded is high in a paper-based format that computerized system. In Ethiopia, data completeness is around 40%-80%, but there is inconsistency with a rate of 38%-70% at different health facilities. The same applies to Addis Ababa health centers, with around 47.5% incompleteness of data that recorded.

2.5. Data analysis, reporting, and Routine Health Information Utilization

According to Global review, few (16 %) of human resource information system crisis countries documented the utilization of information for health activities, in contrast, twice (32 %) of non-crisis countries reported this capability (40). A study was done in Thailand, Asia shows; utilization of electronic health records was important to improve their country's health care system and helped health professionals in tracking and diagnosing disease of patients (41). In Korea, over 80% of the total respondents working the health facilities were positively

evaluated on the utilization of Routine health information (47). In Campania, Italy; workers found it more difficult to accept and use new technology who were working with certain technology (48). In India's public health system, information flow from the community level upwards (49). In Australia, health professionals (86.3%) used a computer for work-related activities and the RHIS process (29). There was an underutilization of electronic health systems in Saudi Arabia (50). Half of the respondents in New Zealand had very low confidence in the use of statistics, graphics, and database applications (22).

In a study done at Primary health care facilities in Egypt, utilization of ICTs in health care services was recommended in addition to the utilization of ICTs in health education and research (23). Generally, the District HIS users and developers agreed that the ICTs fit in with the structure and content of the HMIS and RHIS in Tanzania (51). Respondents in South Africa indicated that they were eager to use the new computerized system for better health care services provision and decision making (42, 44). In a study done at Kenyan rural health centers, Respondents reported that they used patient Summary Reports for HMIS (32). In Cameroon, Collected data are assembled and synthesized at health centers, then send to ministry where it is processed and stored (37). The study of Ghana shows information that was generated from the HMIS is ideally useful for not only patients, service users, and policymakers, but also the healthcare staff (43). A study done at Low-income settings(India and Ethiopia) reveals that the content analysis of health sector information at the district level in India shows that 210 forms were maintained but only 13 forms were maintained at the district level in Ethiopia (49). In a west bank, Ghana; there was consistency in reporting and the use of information from health centers (52).

A study done on the Ethiopian health system reveals Appropriate and timely use of health and health-related information for decision-making was an essential element in the process of transforming the health sector. The value and effectiveness of health information were determined by its utilization by health professionals in decision-making. Information used was wrongly understood in the health system as only data reporting, aggregating numbers and sending those to someone at a higher level, but health information used was the process whereby health-related information analysis, interpreting and elaborating information and synthesizes for decision-making of concerned bodies (1, 13). Study in East Gojjam zone showed 45.8% of the health workers had good routine health information utilization and the proportion of good health information utilization was 51.3%,42.1%, and 38.5% at health

centers, health posts, and hospitals respectively (24). In north Gondar, slightly higher than half of managers and employees use health information for planning (2). The proportion of good routine health information utilization was 84.9% at health centers (2). In Ethiopia, Information that was gathered and analyzed by the district public health office was mainly used to assess plans against accomplishments, used during the monthly review meetings between the health center and District Health Office, to give feedback and for decision-making (49). A study conducted in northwest Ethiopia showed that the overall existing Routine health information utilization in the study area was 46.5% (26). At health centers of Bahir dar, mainly accessed ICTs were only textbooks, protocol manuals, and books (16). A study done in the Hadiya zone showed that the routine utilization of HIS was 69.3% (1). The cumulative utilization of routine health information in the Jimma zone was 32.9% only (17). Research conducted in Southern nations of Ethiopia suggested that major health information were reported inaccurately by the majority of the facilities that were assessed (53). In Ethiopian primary health care system, each department/unit submitted data on a weekly or monthly basis to the health center head, then the compiled data from the health center are sent monthly to the District Health Office, then to the Zone Health Department, here HMIS reports were sent to the region both as a soft and hard copy(49). The study conducted at the North Shoa zone, Amhara region reveals, there was a delay in the submission of forms at health facilities and the main reason cited by health professionals for this was workload and poor internet connectivity (54). From Health Centers and District health offices in Jimma Zone, around 50% of questioned health professionals claimed that lack of training and technical support on RHIS, lack of computer skills and unavailability of computer and inconsistency and incompleteness of the health information reports were the main obstacles for poor information generation and utilization status of employees (17).

A study done in public health centers of Addis Ababa revealed that only around 27.2% of health employees reported that they used generated information to give health information to the user, to compare it with the previous performance, for Monitoring/Evaluation of programs. Only11.2% of the respondents forwarded the generated information to the upper level, the good side was that 62% of the generated and analyzed information also used by the health institution itself (15). In Addis Ababa, the majority of the respondents, 80.7% inadequately utilized computer and who owned computer than not owned personal computers were more likely to adequately utilize routine health information (33). 48.8% of the

information generation mechanisms in the studied health centers in Addis Ababa were predominantly based on a tally sheets, registers, and reports (15). In the studied health centers of Addis Ababa, 43.6% were used only paper formats, 40.2% used both computer formats and paper formats, 16.2% of them used only computer formats to generate client health information (15).

Generally, worldwide, high-income countries encountered two times of routine health information utilization practice than low-income countries and around 80% of countries had a positive practice of routine health information use. In Africa, most health professionals claimed that their source of information generation and use were tally sheet and summary reports. In the Ethiopian context, 45.8%-84% of Health Professionals had a good practice of routine health information utilization, yet health centers have had good status in information use than hospitals and health posts. Around 40% of Health Professionals in Addis Ababa used both paper-based and computerized systems for information processing, around half of the staff generated information from the tally sheet and registrations. Around 62% of health centers in Addis Ababa used generated information for themselves (15).

In this review, we tried to look for the relationship between utilization of routine health information and determinants which affect RHIS. The studies identified the level of information use which results from the process of data collection, data recording, data processing, and information generation that result in low utilization of health information in decision making.

Technical factors like availability of skilled personnel, HIS design, computer software, the complexity of reporting system; organizational factors like management function, organizational rules, and values, the culture of information use, governance, availability of training and supervision and Behavioral factors like knowledge of Health Professionals about RHIS, motivation, problem-solving skill in RHIS, data management skill and confidence level in HIS tasks. Besides, more have to be done on the utilization of routine health information among health professionals to strengthen and improve the health of the community at large. In this study, we tried to assess the level of routine health information use among health professionals in the study area and identified determinants that affect health information use among health professionals.

Conceptual Frame Work

A conceptual framework was developed after referring to different literature that was done in different countries concerning Routine health information utilization by health professionals. Routine health information utilization determinants which are technical, behavioral, and organizational, also the type of service provision were being discussed in the above literature. The PRISM assessment tool of information use and quality used as a source to develop this framework (7).

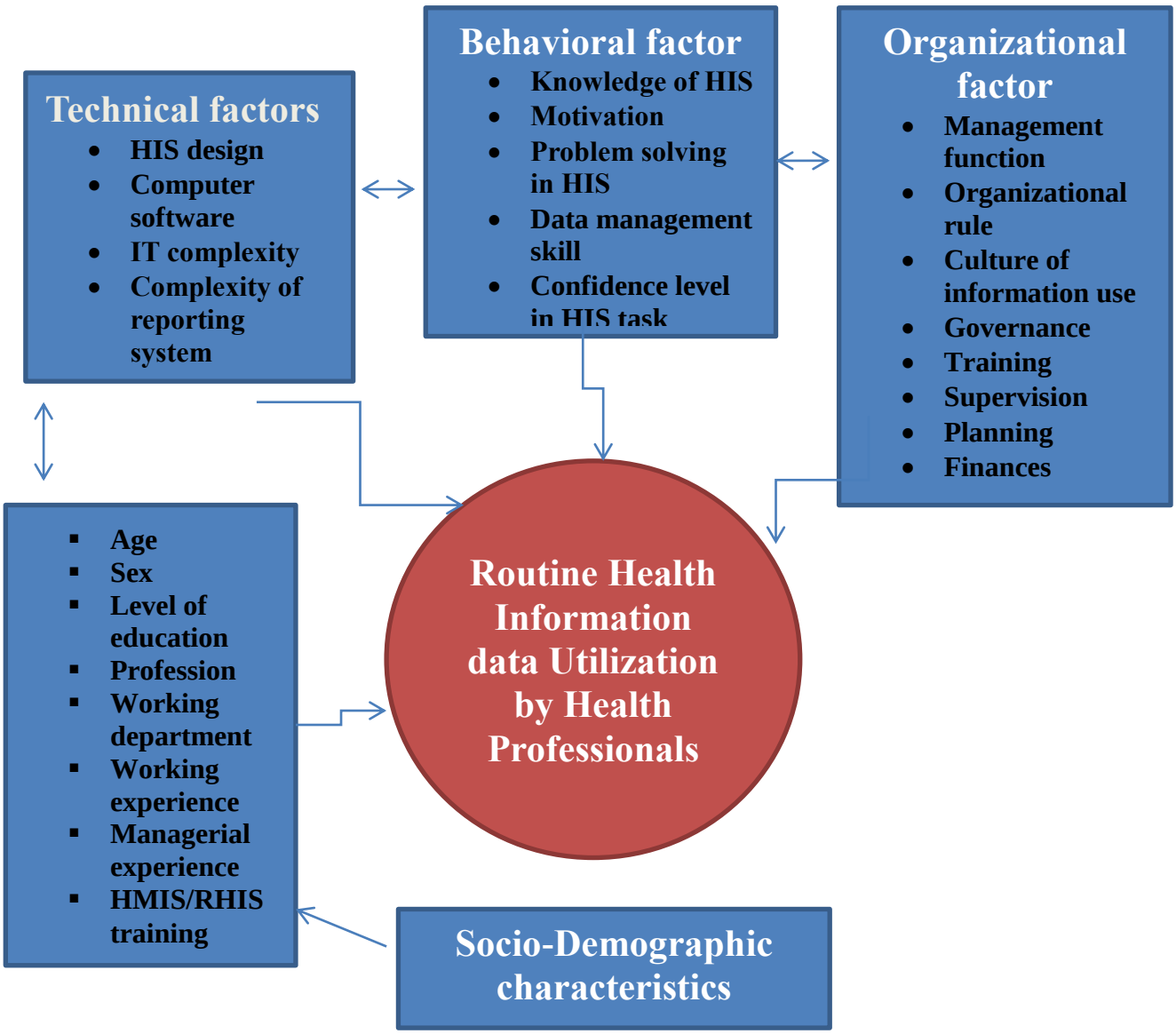

Figure 1. Schematic representation of the Conceptual framework of RHIS data use among health professionals in Addis Ababa, Ethiopia; 2020

3. Objectives

3.1.General Objective

To assess the routine health information use and its associated factors among health professionals of public health centers in Addis Ababa, 2020

3.2.Specific objectives

1. To determine routine health information use among health professionals of public health centers in Addis Ababa, 2020.
2. To identify factors affecting routine health information use among health professionals of public health centers in Addis Ababa, 2020.

4. Methods and Materials

4.1.Study Area and period

The study was conducted in Addis Ababa, a capital city of the Federal Republic of Ethiopia from March to April 2020. The city is situated at the heartland of Ethiopia, in an area of 540 square kilometers, with latitude 90 North and longitude 380 East. Addis Ababa has a total population 2,738,248 of whom 1,304,518 (47.6%) were men and 1,433,730 (52.4%) women. The city is divided into 10 sub-cities, 99 kebeles, and 116 Woreda for administrative purposes. Addis Ababa Health Bureau is responsible for the overall Health activity in the city. The city has 98 functional health centers of which 86 are governmental and the rest are owned by NGO, 52 hospitals (13-governmental, 35-private, and 4 NGO) and 534 clinics out of which 34 are owned by NGOs. There are around 12,104 identified health professionals in health centers of all sub-cities such as Arada, Addis ketema, Kolfie/keranio, Bole, Gullele, Yeka, Kirkos, Nifassilk/lafto, Lideta, and Akaki/kality. The study area was chosen because the poor functioning of the system in such an area will enable us to see how severe the problem will be in the rural areas of the country.

4.2.Study Design

A facility-based cross-sectional study was conducted to assess the routine health information utilization and its associated factors among health professionals in Addis Ababa city.

4.3.Population

4.3.1. Source population

The source population for the study was all health professionals, who are currently working at the public health center of Addis Ababa city administration.

4.3.2. Study population

The study population was randomly selected health professionals, who are currently working in public health centers in four sub-cities.

4.4. Inclusion and exclusion criteria

4.4.1. Inclusion criteria

- All the unit's/department representatives in health centers.
- Health professionals including Nurses, Laboratory technicians, Midwives, Doctors, Health officers, Pharmaceutical professionals, HIT professionals.

4.4.2. Exclusion criteria

- Newly employed health professionals with six and fewer months'.

4.5.Sampling

4.5.1. Sample size determination

The sample size was determined by a single population proportion technique using the following assumptions (confidence interval of 95% and Zα/2 is the value of the standard normal distribution corresponding to a significant level of alpha (α) of 0.05, which is 1.96. A 6% margin of error (d=0.06), P = 41.7% which is the current utilization rate of routine health information system among health professionals of Addis Ababa health centers (15). This yields a sample size of 259. A design effect of 1.5 added due to stratified sampling procedure used in our study and 5% non-response rate added, and then the total sample size became 408.

$$n = \frac{(z\alpha/2)^2 * p * q}{d^2}$$

$$n = \frac{(1.96)^2 * (0.417) * (0.583)}{(0.06)^2}$$

n = 259 Plus 5 % non-response rate and design effect of 1.5, the final sample size equals

n = (259 * 1.5) * 0.05 = 408

4.5.2. Sampling procedure

The multi-stage sampling technique was used to select samples for this study. The 10 sub-cities in Addis Ababa have similar health structures. So, 4 sub-cities were selected randomly using the lottery method. And each selected sub-cities have 10 health centers (Addis ketema, Gullele, and Kolfie) except Yeka sub-city which has 15 health centers that yield a total of 45 health centers. Then, half, a total of 22 health centers were selected by using a simple random sampling method. The sample size was allocated proportional to each sub-city, and the corresponding sample size was allocated proportionally to each health center. The respondents identified by using a stratified sampling method by profession in selected health centers.

Within each health center, health professionals were stratified by profession; Nurses, Laboratory technicians, Midwives, Doctors, Health officers, Pharmaceutical professionals, HIT professionals, and the sample size allocated to the facility were proportionally distributed to the profession group. Accordingly, 408 samples were collected from 22 health centers by allocating a proportional number from each health profession. Eleven departments/units were included in each health center as mentioned previously: namely;

Outpatient Department (OPD); Inpatient department (IP); Laboratory; Pharmacy and Store; Delivery and ANC service unit; Tuberculosis unit; HIV/AIDS (ART) and voluntary counseling and testing (VCT) departments; Family planning and comprehensive abortion care (CAC) unit; Emergency unit, HMIS room and management/administrative unit. The heads of each department/unit were included in the study.

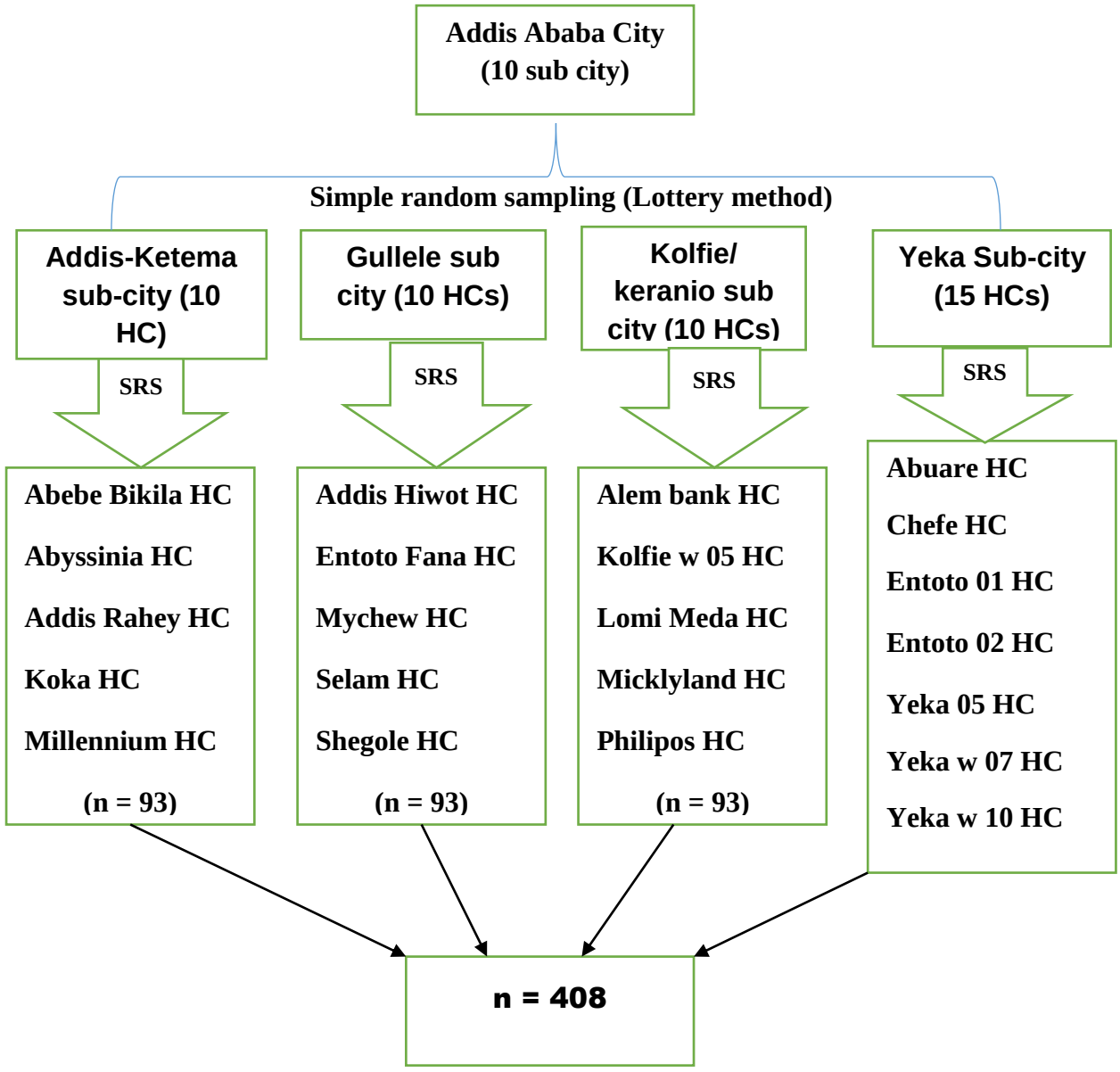

Figure 2. Schematic presentation of sampling procedure and technique of public health centers; Addis Ababa, 2020

- At all stages; the 4 sub-cities, 22 health centers,
- 408 health professionals within the 22 health centers were selected using a stratified sampling method among professions.
- 18 health professionals have participated in each health center.
- Total ss = 408

4.5.3. Data collection tool and procedure

Data were collected using a pre-tested questionnaire. The questionnaire was developed based on the revision and findings of the above relevant literature review and PRISM assessment tool in which technical, behavioral and organizational factors were the major determinants of utilization of routine health information system (7). The tool comprises an information sheet and self-administered questionnaire which had three sections. The first section had background information of participants like sex, age, educational status, the field of study, working department, year of experience, managerial experience, and training in RHIS. The second section comprises questions of technical, organizational, and behavioral factors. And, the third section holds the dependent variable with around sixteen questions. The questionnaires were prepared in the English language and there was no need to translating into local language due to the reason that all the respondents were health professionals who have had an educational level of at least diploma and almost masters. The questions and statements were grouped and arranged according to the particular objectives. Data collected using a structured questionnaire and direct observational checklist among health professionals to identify how information was generated and used as an observation of registration books, tallies, monthly and annual reports, and graphs, charts, and Maps in the health institutions. Four health professionals recruited for data collection and one Master of Public Health holder recruited to supervise the overall data collection processes.

4.6.Variables

4.6.1. Dependent variable

- Routine health information utilization

4.6.2. Independent variables

- Socio-demographic characteristics(sex, age, educational status, field of study, working department, year of experience, managerial experience and training in RHIS)

- Technical factors(RHIS software, data entry personnel, data collection tools, training, feedback, data management skill)
- Organizational factors(organizational rule, human and financial resource, supervision, the culture of information use, being superior directive, motivational incentives)
- Behavioral factors(level of knowledge, confidence, competence, attitude, and beliefs, problem-solving skill)

4.7.Data Analysis Procedures

After data collection, each questionnaire was checked for competence and code given before data entry. The data thoroughly cleaned and carefully entered into the computer for the beginning of the analysis. Data cleaning was performed by generating frequencies table to check, accuracy, consistencies, missed values, and variables. Errors identified during data entry were corrected after the revision of the originally completed questionnaire. Data were cleaned and entered into the computer by using EpiData version 3.1 and the analysis was done using SPSS version 20.

Frequency, percentage, and descriptive summaries were computed and used by the logistic regression model to describe the study variables for the assessment of RHIS use. Data was described and presented using tables, charts, and graphs. The odds ratio and confidence interval was calculated to show the association between the utilization of health information and exposure variables.

Binary logistic regression was carried out to identify factors associated with the utilization of the routine health information system. The Bivariable analysis was conducted and variables with $p < 0.2$ selected as candidate variables for multivariate analysis. Finally, variables with $p<0.05$, during multivariable analysis were considered as significant.

Odds ratios used to measure the strength of the association between dependent and independent variables and 95% CI used to determine the significance of associations. Both Crude Odds Ratio (COR) and Adjusted Odds Ratio(AOR) with 95% confidence interval were estimated to show the strength of associations.

4.8.Data quality management

Data quality assurance was done before, during, and after data collection. Standardization of data collectors on RHIS use was done during training, before actual data collection. A two

days practical and theoretical training was given for the data collectors on RHIS and data collection techniques and procedures based on the questionnaires and also about the purpose of the study. The training was given by the principal investigator.

The questionnaires were pre-tested in a similar study population in Lideta sub-city taking five percent of the actual sample size before the final work and appropriate measures taken before it finalized. On the spot-checking and review of completed questionnaires to ensure completeness and consistency of the information done and immediate action was taken. To keep the accuracy of data, data entry was done by the principal investigator. After data collection, data entered and cleaned using EpiData version 3.1 and completeness and consistency was checked.

The outcome variable which is the utilization of Routine health information was measured and its data quality was checked out by "The PRISM assessment Tools" which are:-

1. RHIS Performance Diagnostic Tool: - This determines the overall level of RHIS performance by looking separately at the use of information to identify weak areas. This diagnostic tool identifies strengths and weaknesses. The other three tools identify the underlying technical, organizational, and behavioral reasons for those strengths and weaknesses.

2. RHIS Overview and Facility/Office Checklist:-This examines technical determinants such as the structure and design of existing information systems in the health sector, information flows and interaction between different information systems. This tool is used to understand the availability and status of RHIS resources and procedures used at health offices and facilities.

3. Organizational and Behavioral Questionnaire:-This looks at behavioral and organizational factors that affect RHIS performance. Do staff members have the necessary knowledge, skills, Problem-solving ability, confidence, and motivation? Does the organization promote a culture that values information quality and use? Comparing these factors with RHIS performance identifies gaps and opportunities for improvements.

4. RHIS Management Assessment Tool:-This is designed to rapidly take stock of the management and supportive practices of RHIS and to aid in developing recommendations for RHIS management.

4.9.Operational Definitions

Routine health information utilization; the dependent variable**,** was measured by the PRISM conceptual framework on the system. It was defined as the use of routine health information for treating patients, disease prioritization, drug procurement, the day-to-day monitoring of health service activities, planning, department performance evaluation, evaluation of staff performance, selection of best experience within the health facility, sharing of health data to other facilities and stakeholders, decision making and community mobilization and discussion. All these components of the assessment tool have Likert scale measures, ranging from "strongly disagree" to "strongly agree". 1 for Strongly Disagree, 2 for Disagree, 3 for Neither Agree nor Disagree, 4 for Agree and 5 for Strongly Agree. The dependent variable has a total of sixteen questions. Finally, health workers' considered as "has good routine health information utilization" when they scored equal or greater than 64, or "has poor routine health information utilization" when they scored below 64.

Health care professionals in this study were defined as any health personnel who were collecting health data while working to utilize the information for the improvement of health status.

Data: Unprocessed raw health data or facts which were ready to be used or processed.

Determinants: The elements guiding and limiting the use of routine health data and information.

Information: In this study, information refers to collected and effective, processed data for use.

Health Information System: A set of component and procedures organized to generate information which improves health care management decisions at all levels of the health system. Health information System integrates data collection, processing, reporting, and use of the information necessary for improving health services effectively and efficiently through better management at all levels of health services

Health Information Management System: A system designed to produce information to be presented to the management to assist in decision-making and to enable it to ascertain the progress made by the health facility in the achievement of its major objectives.

Routine Health Information system: Ongoing data collection on health status, health Interventions, and resources.

4.10. Ethical consideration

Ethical clearance was obtained from the ethical clearance committee of Addis Ababa College of Health Sciences. A formal letter from Addis Ababa College of Health Sciences was submitted to Addis Ababa public health research and emergency management directorate. Also, ethical clearance was obtained from Addis Ababa's public health research and emergency management directorate. All participants' right to self-determination was respected. All study participants informed about the purpose of the study and participated by signing the written consent form.

4.11. Dissemination of Results

After all, the results of this study/research will be disseminated to Addis ketema, Gullele, Kolfie/Keranio and Yeka sub-cities with their correspondence selected health centers. Also, the result of the study will be disseminated to Addis Ababa public health research and emergency management core process. We will also present the findings to the national scientific conference.

5. Result

5.1 Socio-demographic Characteristics of Health professionals

A total of 402 respondents have participated in the study with a response rate of 98.5%. Most of the respondent's ages were within the range of 24-35(85.3%), with a mean age of 29.65 with SD of 5.464. More than half, 205(51%) study participants were female. Distribution by the level of education shows that 108(26.9%) were diploma holders, 266(66.2%) bachelor degree holders and 28(7%) were post-graduates.

About 138(34.3%) respondents were health professionals working in OPD/IP (Outpatient department/Inpatient department). Around 55(13.7%) were staffs working in the Dispensary unit. About 70(17.4%) of health professionals work in the Maternity room and around 43 (10.7%) respondents currently work in the Laboratory room, 49(12.2%) were work at the emergency unit, and 23(5.7%) were work at HMIS room.

Around 299(74%) of the respondents have work experience of between 7 months-5 years. The maximum registered experience is 24 years while the minimum is 10 months with an average of 4years experience. Out of total health professionals, 26.9% of participants have had managerial experience and only 25.6% of participants have received RHIS/HMIS related training in the past 6 months.

Table 1. Socio-demographic characteristics of respondents in public health centers of Addis Ababa, Ethiopia, 2020[n=402]

Variables	**Category**	**Response**
Sex of respondents	Male	197(49%)
	Female	205(51%)
Age of respondents	20-24	37(9.1%)
	25-29	204(50.6%)
	30-34	96(32.8%)
	35-39	44(10.9%)
	Above 40	21(4.9%)
Educational status	Diploma	108(26.9%)
	Degree	266(66.2%)
	Postgraduate	28(7%)
Working department	OPD/IP	138(34.3%)
	Dispensary	55(13.7%)
	Maternity	70(17.4%)
	Laboratory	43(10.7%)
	Emergency	49(12.2%)
	HMIS room	23(5.7%)
	Core processor unit	24(6%)
Year of experience	7 months -5 years	299(74%)
	Above 6 years	103(25.3%)
Managerial experience	Had experience	108(26.9%)
	Not experienced	294(73.1%)
Training in HMIS	Trained	103(25.6%)
	Not trained	299(74.4 %)

Of the total respondents; about 117(29.1%) of respondents were nurses, about 96(23.9%) were Health officers, and around 61(15.2%) were Midwives.

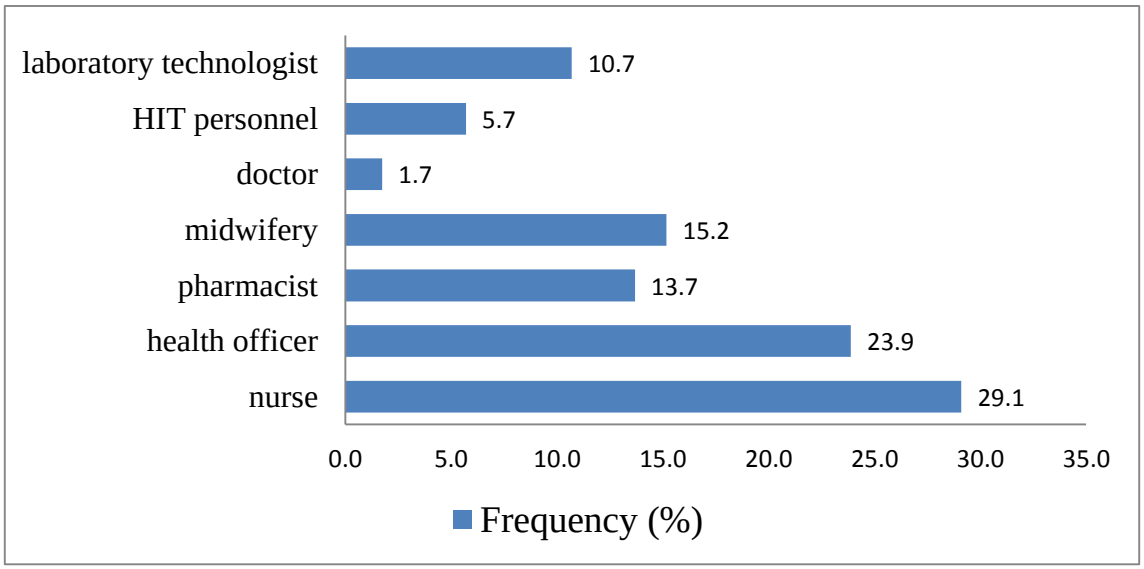

Figure 3. Schematic presentation of Health professional's Distribution in Addis Ababa public health centers, 2020

5.2. Technical factor

Of all respondents, 225(55.9%) respondents believed that IT (Information Technology) is easy to manage on health facility-related activities and 209(52%) of health professionals responded that the system design software used in data management is user-friendly. Half of them knew RHIS implementation formats and had common understandings of data management and information use. About 168(41.4%) of the respondents complained that the complexity of routine health information systems makes it hard for them to utilize the system and found out that the entire system was suited for their daily health activities within the health center. Around 172(42.7%) health professionals complained that some of the software for running the system of data management is also scarce, expensive, and complex. A total of 218(54.2%) participants responded that most health information systems require the employment of special personnel for the entry of data. The remaining respondents disagreed with this idea because they believed that by giving some training, any health professional can perform routine HIS activities.

0nly 131(32.6%) respondents believed that data collection tools are difficult to understand. Most respondents found out data collection tools like tally, register, and formats were easy. About 205(55%) participants replied that the use of only manual paper file recording makes

information to be poorly managed for use and appreciates the use of electronic media in collaboration with paper-based data collection and management tend. In this study, 44.5% of respondents agreed that data collection done by untrained personnel about RHIS related activities lead to poor information use and management, but 35.3% of respondents disagree on this idea.

How skills in data collection, data analysis, information presentation, and use affect routine health information use was assessed among health professionals and 216(53.7%), 225(56%), 230(57.2%) and 228(56.7%) of participants claimed that good RHIS will be practiced due to presence of good skill in data collection, data analysis, information presentation and use respectively.

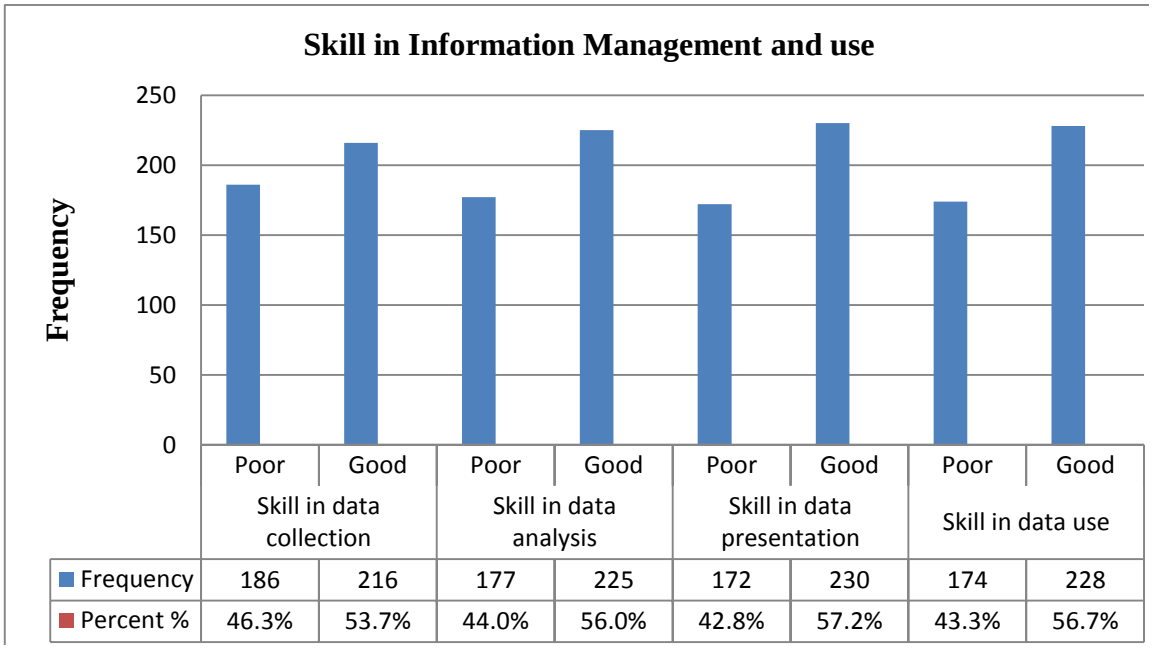

Figure 4. Presentation of how health professionals level of skill in data management and use affect RHIS information use

Generally, the overall technical factors yield good Routine health information utilization among health professionals to be 81(20.1%) (Table.2).

Table 2. Summary of the level of Technical factors that affect Routine health information use among health professionals of Addis Ababa public health centers, central Ethiopia, 2020

	Information use	Frequency	Percent (%)
Technical factors	Poor	321	79.9%
	Good	81	20.1%

5.3. Organizational factors

Of all respondents; 242(60.2%) responded that the presence of organizational rules, values, and practices affect RHIS positively by creating a suitable environment in health facilities to practice and monitor different available health information technologies among health professionals. About 227(56.5%) of respondents agreed that inadequate human resources are the main organizational obstacle for effective use of Routine HIS in health centers. Even in this study during data collection, there were health centers without health information technologist personnel and the data compilation was done by other representative health professions. A total of 224(55.7%) respondents agreed that insufficient financial resources allocated to run RHIS related activities diminish the performance of routine health information utilization and the health system will be dragged to the former traditional way of data management and handling. About 219(54.5%) professionals claimed that poor leadership and low management support of health facility is the main reason for poor HIS practice. Health Centers that had good management support team and core processor heads, there will be effective data utilization of health professionals for patient treatment and decision making.

A total of 242(57.5%) respondents agreed that poor information use culture at health facilities is the main obstacle to the effective implementation of routine health information systems. In almost all health centers; health professionals only collect and report data to a higher level and they even did not know about data processing trends and what “information use” means. Also besides 232(57.7%) of respondents agreed that well-streamlined health information system policies improve information use. About 233(57.9%) of respondents replied that the process of routine health information compilation and supervision increases routine health information use. Health professionals who were supervised and monitored regularly about their daily work on data collection, registration, and use of different RHIS formats will perform effectively in information use and management. 62.7% and 63% of the total respondents replied that the presence of access to timely reporting and timely feedback increases the effective utilization of routine health information systems respectively. If no system appreciates the communication of reporting to a higher level and receiving feedback in return, there will be a poor and inaccurate practice of RHIS.

By accessing information used for the decision-making process, out of all respondents, only 193(48%) of participants agreed that being superior directive (working in administrable related position) influences information used for the decision-making process and claimed that those who are in an administrative position and department heads practice RHIS data use and management well. About 225(56%) respondents agreed that staff rewarding for their good work facilitates effective information use for the decision-making process. Around 246 (61.2%) of the respondents responded that having trained staff in data management had a better result in health information use.

About 228 (56.7%) of the respondents agreed that sharing data with other stakeholders improves information used for the decision-making process. About 247(61.4%) of the respondents replied that gathering evidence-based data to find the root cause of the problem is the best practice in routine health information used for the decision-making process. About 236(58.7%) of the total participants replied that the use of RHIS data for community education and mobilization affects information used for the decision-making process by increasing awareness of the community about their health and by strengthening the RHIS of the facility.

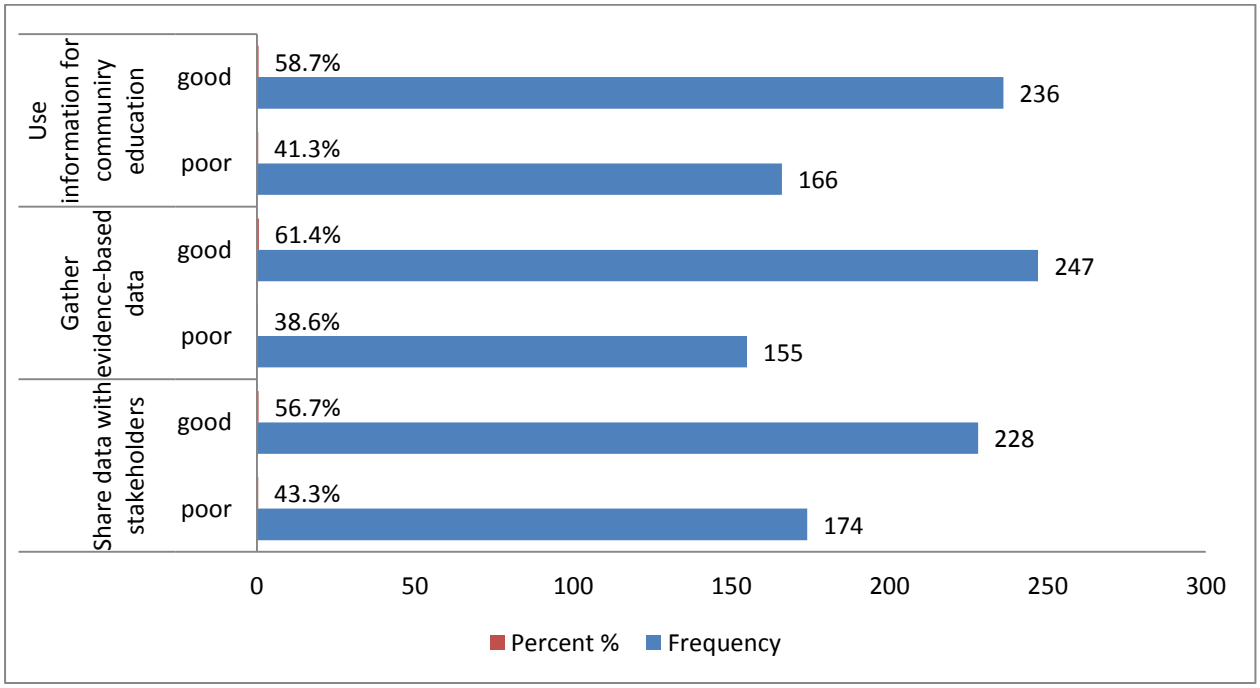

Figure 5. Schematic presentation of how gathering evidence-based data and use of information for community education affect routine health information use

Generally, the overall organizational factors yield good Routine health information utilization among health professionals to be 130(32.3%) (Table.3).

Table 3. Summary of the level of organizational factors that affect Routine health information use among health professionals of Addis Ababa public health centers, central Ethiopia, 2020

	Information use	Frequency	Percent (%)
Organizational factors	Poor	272	67.7%
	Good	130	32.3%

5.4. Observation of Routine Health Information Utilization status at health centers

From the 22 health centers observed; routine HIS mission was displayed at an appropriate position in only 13(59.1%) health centers, updated District HMIS organizational chart showing functions related to RHIS/Health information was present only in four health centers (18.2%). Health facility RHIS targets were displayed in HMIS room of only 10 health centers, accounting for 45.5% of the health centers. Health facility performance indicator tools such as charts, graphs, and tables were displayed and assessed in only 5 (22.7%) health centers. Reports reflecting staff meetings, data, and feedback from health facility or district discussed and availed in all the 22 health facilities. A total of 13(59.1%) health centers have an action plan relating to identified data gaps and how they were addressed.

Performance improvement tools like flow charts and projects were present in 13(59.1%) health centers. The presence of Routine HIS standards at the facility is only 2(9.1%), the presence of RHIS training manual and guide is only 9.1%, RHIS supervisory checklist availability is about 21(95.5%), Routine HIS supervisory report was present in 9(40.9%), data quality assurance checklist present in all 22 health centers. The updated database for monthly reports submitted to the district was found only in 6 (27.3%) health centers. A functioning HIS software was available in all health centers during observation and about 14 (63.6%) health centers had received feedback from health offices and other stakeholders in the last three months.

Table 4. Summary of status of Routine health information use at Public health centers of Addis Ababa, Ethiopia, 2020

Variables	Category	Response
Presence of Routine HIS mission displayed at an appropriate position	No	13(59.1%)
	Yes	9(40.9%)
Presence of updated District HMIS organizational chart	No	4(18.2%)
	Yes	18(81.8%)
Presence of health facility RHIS targets displayed	No	10(45.5%)
	Yes	12(54.5%)
Presence of health facility indicator performance charts, graphs, and table	No	5(22.7%)
	Yes	17(77.3%)
Presence of staff meeting reflecting reports, data, and feedback	Yes	22(100%)
Presence of action work plan relating identified data gaps	No	13(59.1%)
	Yes	9(40.9%)
Presence of performance improvement tools like flow charts and projects	No	13(59.1%)
	Yes	9(40.9%)
Presence of RHIS standards at the facility	No	2(9.1%)
	Yes	20(90.9%)
Presence of RHIS training manual and guide	No	2(9.1%)
	Yes	20(90.9%)
Presence of RHIS supervisory checklist	No	21(95.5%)
	Yes	1(4.5%)
Presence of RHIS supervisory report	No	9(40.9%)
	Yes	13(59.1%)
Presence of data quality assurance checklist	Yes	22(100%)
Presence of updated database for monthly reports submitted to the district	No	6(27.3%)
	Yes	16(72.7%)
Existence of functioning HIS software	Yes	22(100.0%)
Presence of any feedback which received in the last 3 months	No	8(36.4%)
	Yes	14(63.6%)

5.5. Behavioral factor

A total of 233 (58%) participants reported that staff good level of attitude towards data collection and recording influence use of RHIS positively, they claimed that most health professionals did not have a good attitude about RHIS because they have considered data collection and recording was not their duty, they thought their duty is only patient treating.

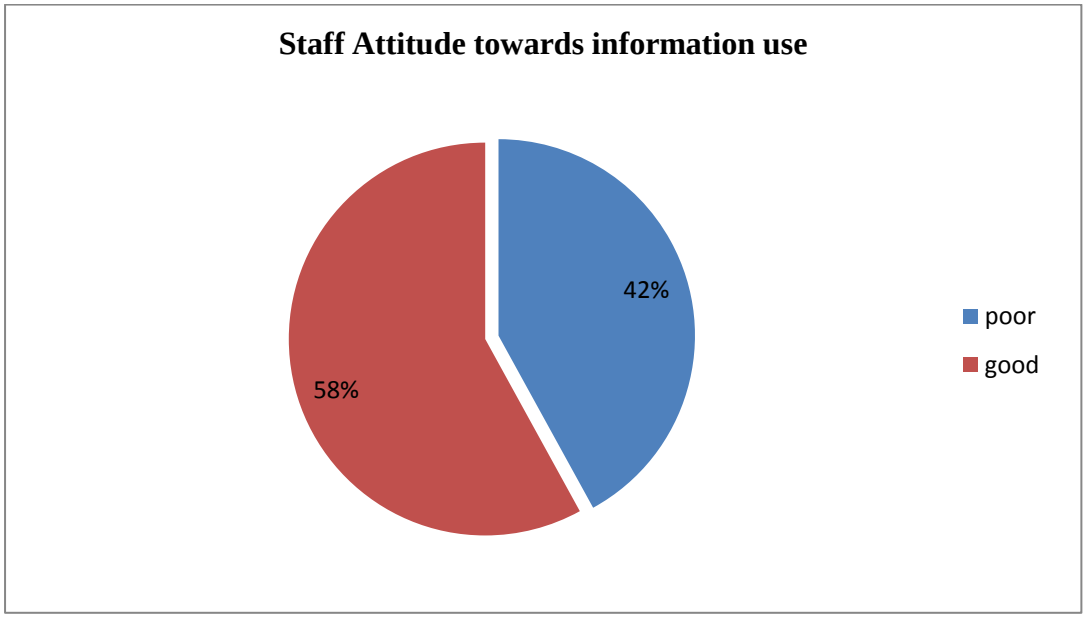

Figure 6. Schematic presentation of how health professionals level of attitude affect Routine health information use at health centers, Addis Ababa, Ethiopia, 2020

About 165(41%) of respondents believed that collecting and recording routine health information data which is not used for evidence-based decision making are useless. Practically in most health facilities, even if data were collected and recorded by health professionals daily, converting this raw data into information to identify gaps and prioritize the root problems of the health system for the benefit of patients was poor and even under-practiced.

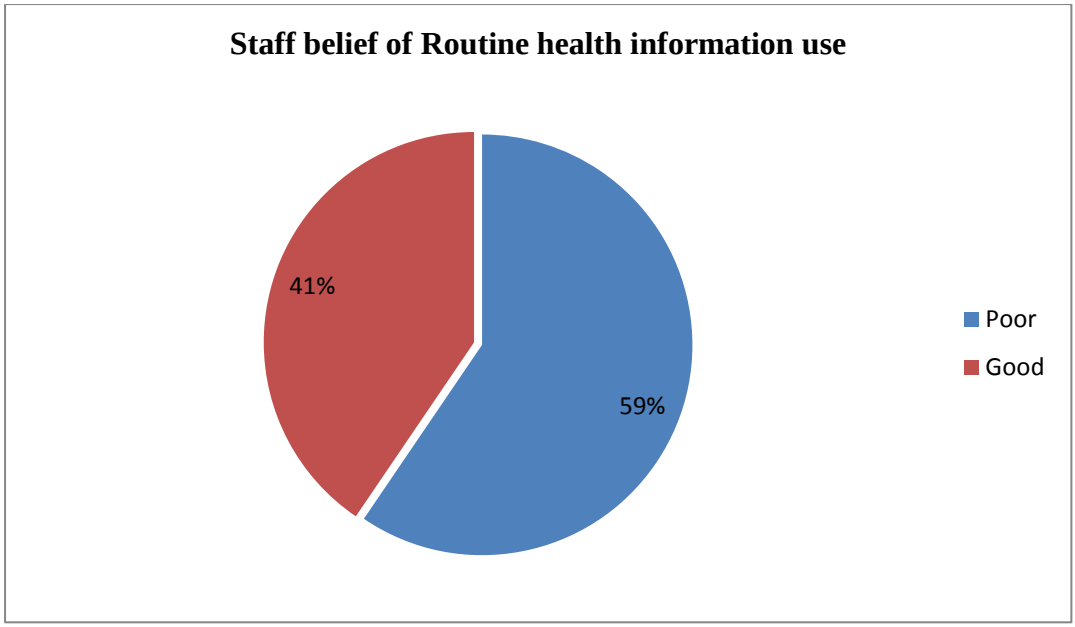

Figure 7. Schematic presentation of health professional's belief on how data collection not used for decision-making affects Routine health information use at public health centers of Addis Ababa, Ethiopia, 2020

Out of the total participants, 238(59.2%) of them had good level of knowledge of HIS forms which positively influence the utilization of RHIS. Those who had a good level of knowledge and practice about routine health information implemented well in effective utilization of health information and in reverse, those with poor knowledge did not have any potential and confidence to perform RHIS activities. A total of 59.5% of respondents replied that the Problem-solving skill of health professionals is one of the vital wealth for effective utilization of Routine health information within health centers.

Around 59.9% of the participants complained that having good confidence to use the generated information by the HMIS management team increases the utilization rate of routine health information and health professionals who did not have any confidence to generate and use health information contributes for under-utilization of existing information. So, the level of confidence of health professionals was a great influencing factor and knowledge without confidence was nothing. About 58.7% of the participants explained that performing their HIS tasks competently contributes to the good and effective utilization of routine health information. So, a health professional who was competent in RHIS related activities perform well and those with low competency add no value in routine health information use.

A total of 204(50.7%) of the respondents agreed that lack of motivating incentives to staff during data collection reduces the performance of Routine health information use, most health professionals consider data collection and management as someone else's job (HIT Personnel's job), they were not interested to do this activity without additional salary or incentives. So, lack of incentives during data collecting negatively affects the routine health information use. In this study, only 102(25.4%) of participants believed that the absence of incentives during data collection does not affect their Routine health information use.

In the study, only 130(32.3%) of respondents respond data collection does not make them bored. Majority 170(42.2%) of the respondents explained that data collection was a boring process. Around 262(65.2%) participants explained that collecting data gives them the feeling that is needed for planning and monitoring facility performance. Out of 186(46.3%), respondents complained that collecting information not used for decision-making is discouraging. Barely collecting and putting data on the shelf without addressing the real gap of the facility and the patient is discouraging. Only 168(41.8%) of participants felt that collecting data is not a burden on them and interested in RHIS related activities besides their clinical work at the health center. Around 258(64.2%) of respondents understand and appreciate their roles and responsibilities regarding health information management.

In this study, 191(47.5%) of the total participants, believed that being superior directive (in a managerial position) positively affects Routine health information useful for decision-making because those in a managerial position and head of departments /units practice health data management well and had many opportunities in presenting and sharing data with other stakeholders, plus had access for training.

Generally, the overall behavioral factors yield good Routine health information utilization among health professionals to be 77(19.2%) (Table 5).

Table 5. Summary of the level of behavioral factors that affect Routine health information use among health professionals of Addis Ababa public health centers, central Ethiopia, 2020

	Information use	Frequency	Percent (%)
Behavioral factor	Poor	325	80.8%
	Good	77	19.2%

5.6. Routine Health Data utilization of Health Professionals

In this study, a total of 402 health professionals from 22 health centers participated in a response rate of 98.5%. The study revealed that the utilization of Routine health information among health professionals was 150(37.3%) (Table 6).

Table 6. Summary of Routine health information utilization status among health professionals of public health centers in Addis Ababa, Ethiopia, 2020

		Frequency	Percent (%)
Routine health information use	Poor	252	62.7%
	Good	150	37.3%

5.7. Bi-variable and multivariable binary logistic regression analysis results of Routine health information use

There were eight socio-demographic characteristics of participants (Age, Gender, Level of education, Job title, Working department/unit, Working year, Managerial experience, and Training in RHIS related activities). In descriptive, chi-square tests Gender, Level of education, Working department, Managerial experience and Training in RHIS/HMIS related activities were significant. However by the logistic regression test none of them were found statistically significant except Gender which was the only significantly associated factor (p-value < 0.2) with the utilization of Routine health information at the bi-variable analysis was entered into the multivariate model. But, gender of respondents was not predictor of utilization of Routine health information.

The utilization of Routine health information was also compared with other important (key) selected variables from Technical, Organizational and Behavioral factors and also compared with the computed predictors. Among the variables that were considered to affect the utilization of Routine health information showed in crude odds ratio showed that it was highly significant in all cases. But the majority of those factors are not statistically significant after adjusted multiple logistic regression except Use of both manual paper files and

computer-based files for recording information[AOR= 1.474 95% CI (1.043, 2.082)] at p-value 0.028, Organizational rules, values and practices [AOR= 1.734 95% CI (1.212, 2.481)] at p-value 0.003, Inadequate Human resource [AOR= 1.494 95% CI (1.056, 2.114)] at p-value 0.023, Problem solving skill of health professionals on HIS tasks [AOR= 2.091 95% CI (1.343, 3.256)] at p-value 0.001, Belief on routine health information use [AOR= 0.665 95% CI (.501, .883)] at p-value 0.005, Collecting information used for planning and monitoring facility performance [AOR= 1.464 95% CI (1.006, 2.131)] at p-value 0.046 and Know roles and responsibilities in the facility [AOR= 1.525 95% CI (1.121, 2.073)] at p-value 0.007 that were highly statically significant and the above seven variables showed significant association with good routine health information utilization among health professionals at 95% confidence level (CI) (Table 7).

As the result indicates, Use of both manual paper files and computer-based files for recording information was found to be significantly associated with Routine health information use [AOR= 1.474 95% CI (1.043, 2.082)] at p-value 0.028. Those who use both manual paper files and computer-based files for recording information were 1.474 times more likely to practice and use good routine health information than those who use only paper-based files.

Organizational rules, values, and practices were found to be significantly associated with good Routine health information use [AOR= 1.734 95% CI (1.212, 2.481)] at p-value 0.003. The presence of Organizational rules, values and practices which support and give access to the practice of RHIS related activities among health professionals within a facility was found to be 1.734 times more likely to increase the use of good routine health information than the absence of Organizational rules and values.

Human resource at health center was found to be significantly associated with good Routine health information use [AOR= 1.494 95% CI (1.056, 2.114)] at p-value 0.023. In health centers which have inadequate human resource, health professionals was found to be 1.494 times less likely to use and practice RHIS than those primary health facilities with adequate human resource.

Problem solving skill of health professionals on HIS tasks was found to be significantly associated with good Routine health information use [AOR= 2.091 95% CI (1.343, 3.256)] at p-value 0.001. Health professionals with good skill of handling their RHIS tasks and work were found to be 2.091 times more likely to utilize RHIS at their health facilities than that of health professionals with poor skill related to HIS tasks.

Belief of health professionals on routine health information use was found to be significantly associated with good Routine health information use [AOR= 0.665 95% CI (0.501, 0.883)] at p-value 0.005. Health professionals who have positive and good belief about RHIS were 0.665 more likely to use RHIS than health workers who believed that "RHIS is totally useless and performing this system is waste of time".

Collecting information used for planning and monitoring facility performance found to be significantly associated with good routine health information use [AOR= 1.464 95% CI (1.006, 2.131)] at p-value 0.046. Health professionals who had a feeling that Collecting data is further needed for planning and monitoring facility performance rather than data collection is used only for recording purposes were 1.464 more likely to utilize good routine health information than those who feel that data collected only for recording purpose and putting on the shelf.

Knowing duties and responsibilities at health facility found to be significantly associated with good routine health information use [AOR= 1.525 95% CI (1.121, 2.073)] at p-value 0.007. Health professionals who knew their roles, duties and responsibilities at health facility according to HIS tasks was initiated to do better job and were found to be 1.525 more likely to use RHIS than those health professionals who did not know their roles, duties and responsibilities at health facility.

Table 7. Bivariate and Multivariable logistic regression analysis of factors associated with utilization of RHIS information among health professionals in Addis Ababa public health centers, central Ethiopia, 2020 (n 402)

Variables	Use of RHIS		Crude OR(95%CI)	Adjusted OR(95%CI)	P-value
	Yes	No			
Gender					
Female	77	128	1.500(.999, 2.251)	1.635(.913, 2.927)	.098
Male	73	124	1	1	
Information Technology is easy					
Yes	104.5	175.5	1.126(.943, 1.345)	1.058(.805, 1.392)	.684
No	45.5	76.5	1	1	
RHIS is complex					
Yes	125	210	1.205(.954, 1.521)	1.215().854, 1.728	.278
No	25	42	1	1	
HIS data entry require special personnel					
Yes	76.9	129.1	1.170(.980, 1.397)	.982(.748, 1.289)	.897
No	73.1	122.9	1	1	
Use of both manual and computer-based files					
Yes	112	188	1.622(1.272,2.070)	1.474(1.043, 2.082)	.028*
No	38	64	1	1	
Feedback to data collectors done routinely					
Yes	101.5	170.5	1.463(1.179, 1.815)	1.208(.874, 1.669)	.253
No	48.5	81.5	1	1	
Staff oriented about use of data collection tools					
Yes	66.8	112.2	1.116(.958, 1.301)	.849(.657, 1.097)	.210
No	83.2	139.8	1	1	
Discussion on monthly performance indicators					
Yes	92.2	154.8	1.579(1.313, 1.898)	1.143(.852, 1.534)	.371
No	57.8	97.2	1	1	
Skill in data collection					
Yes	80.6	135.4	1.370(1.146, 1.637)	1.449(.986, 2.131)	.059
No	69.4	116.6	1	1	
Skill in data analysis					
Yes	84	141	1.317(1.107, 1.568)	.705(.431, 1.155)	.165
No	66	111	1	1	

Skill in data presentation					
Yes	85.8	144.2	1.283(1.081, 1.523)	1.005(.649, 1.556)	.982
No	64.2	107.8	1	1	
Skill in information use					
Yes	85.1	142.9	1.297(1.095, 1.536)	.803(.559, 1.153)	.234
No	64.9	109.1	1	1	
Organizational rules, values, and practices					
Yes	125	117	2.322(1.827, 2.952)	1.734(1.212, 2.481)	.003*
No	25	135	1	1	
Human resource					
Yes	84.7	142.3	1.873(1.536, 2.284)	1.494(1.056,2.114)	.023*
No	65.3	109.7	1	1	
Inadequate Financial resources					
Yes	83.6	140.4	1.596(1.327, 1.918)	.901(.638, 1.272)	.554
No	66.4	111.6	1	1	
Leadership and management support					
Yes	81.7	137.3	1.350(1.150, 1.585)	.954(.706, 1.290)	.761
No	68.3	114.7	1	1	
Routine supervision					
Yes	86.9	146.1	1.931(1.565, 2.383)	1.246(.839, 1.851)	.275
No	63.1	105.9	1	1	
Access to timely reporting					
Yes	94	158	1.786(1.459, 2.185)	.785(.543, 1.135)	.198
No	56	94	1	1	
Timely feedback on RHIS					
Yes	94.4	158.6	1.650(1.358, 2.005)	.853(.595, 1.223)	.387
No	55.6	93.4	1	1	
Culture of information use					
Yes	90.3	151.7	1.547(1.284, 1.864)	.935(.666, 1.313)	.699
No	59.7	100.3	1	1	
Well streamed health information policy					
Yes	86.6	145.4	1.674(1.374, 2.038)	.850(.584, 1.236)	.394
No	63.4	106.6	1	1	
Regular staff meeting					
Yes	91	153	1.594(1.321, 1.923)	.940(.670, 1.318)	.719
No	59	99	1	1	
Being superior directive					
Yes	72	121	1.634(1.343, 1.987)	.843(.602, 1.182)	.322

No	78	131	1	1	
Share data with stakeholders					
Yes	85.1	142.9	1.949(1.573, 2.416)	1.316(.921, 1.880)	.131
No	64.9	109.1	1	1	
Aware of responsibility					
Yes	97.8	164.2	2.006(1.613, 2.494)	.896(.598, 1.343)	.595
No	52.2	87.8	1	1	
Trained in data management					
Yes	91.8	154.2	1.795(1.481, 2.174)	1.299(.890, 1.895)	.175
No	58.2	97.8	1	1	
Report data regularly					
Yes	95.5	160.5	1.920(1.557, 2.368)	1.116(.740, 1.684)	.599
No	54.5	91.5	1	1	
Rewarded for good work					
Yes	84	141	1.801(1.480, 2.193)	1.126(.772, 1.641)	.539
No	66	111	1	1	
Use HMIS data for facility management					
Yes	92.9	156.1	1.605(1.315, 1.959)	.713(.480, 1.057)	.092
No	57.1	95.9	1	1	
Gather evidence-based data					
Yes	92.2	154.8	1.594(1.314, 1.933)	.677(.456, 1.004)	.052
No	57.8	97.2	1	1	
Use information for community education					
Yes	88.1	147.9	1.661(1.374, 2.007)	1.357(.950, 1.940)	.094
No	61.9	104.1	1	1	
Understand HIS forms					
Yes	88.8	149.2	1.925(1.559, 2.377)	.759(.514, 1.122)	.166
No	61.2	102.8	1	1	
Problem solving skill on HIS tasks					
Yes	89.2	149.8	2.281(1.816, 2.864)	2.091(1.343, 3.256)	.001*
No	60.8	102.2	1	1	
Have confidence to use generated information					
Yes	89.9	151.1	1.935(1.571, 2.385)	1.090(.731, 1.624)	.674
No	60.1	100.9	1	1	
Have competence to perform HIS tasks					
Yes	88.1	147.9	1.860(1.516, 2.281)	.980(.655, 1.467)	.922

No	61.9	104.1	1	1	
Good attitude to data collection					
Yes	86.9	146.1	1.705(1.405, 2.070)	.918(.646, 1.305)	.633
No	63.1	105.9	1	1	
Belief on Routine health information use					
Yes	60.8	102.2	1.119(.960, 1.304)	.665(.501, .883)	.005*
No	89.2	149.8	1	1	
Motivating incentives during data collection					
Yes	76.1	127.9	1.545(1.287, 1.854)	1.115(.815, 1.525)	.497
No	73.9	124.1	1	1	
Collecting information is all staff duty					
Yes	60.1	100.9	1.313(1.111, 1.552)	1.236(.924, 1.653)	.153
No	89.9	151.1	1	1	
Being superior directive					
Yes	71.3	119.7	1.709(1.407, 2.074)	1.332(.936, 1.897)	.112
No	78.7	132.3	1	1	
Data collection is boring					
Yes	63.4	106.6	1.455(1.216, 1.739)	.777(.577, 1.046)	.096
No	86.6	145.4	1	1	
Data collection is meaningful					
Yes	91.8	154.2	1.824(1.501, 2.215)	1.219(.916, 1.622)	.174
No	58.2	97.8	1	1	
Collecting data used for P/M facility performance					
Yes	97.8	164.2	2.406(1.892, 3.060)	1.464(1.006, 2.131)	.046*
No	52.2	87.8	1	1	
Knowing duties and responsibilities					
Yes	72.4	121.6	1.769(1.461, 2.143)	1.525(1.121, 2.073)	.007*
No	77.6	130.4	1	1	
Information used for decision-making					
Yes	69.4	116.6	1.380(1.173, 1.624)	.805(.603, 1.075)	.141
No	80.6	135.4	1	1	
Data collection is burden					
Yes	58.6	98.4	1.306(1.118, 1.527)	1.220(.943, 1.577)	.130
No	91.4	153.6	1	1	
Understand roles and					

responsibilities					
Yes	96.3	161.7	2.186(1.736, 2.752)	1.093(.772, 1.548)	.615
No	53.7	90.3	1	1	
Technical factors computed					
Yes	30.2	50.8	3.123(1.819, 5.157)	1.565(.596, 4.115)	.363
No	119.8	201.2	1	1	
Organizational factors computed					
Yes	48.5	81.5	4.863(3.108, 7.610)	2.005(.769, 5.227)	.155
No	101.5	170.5	1	1	
Behavior factors computed					
Yes	28.7	48.3	5.601(3.254, 9.640)	1.348(.473, 3.838)	.576
No	121.3	203.7	1	1	

* shows predictor variables for Routine health information utilization at $p<0.05$

6. Discussion

This study has tried to assess how health information was generated, analyzed, presented, and used by health professionals at health centers by reviewing documents and associated factors that affect RHIS information use. There is lack of information available at the local level in the scientific literature that quantifies the utilization of information and implementation of health information system at district level to make comparison about some of the factors.

6.1. Utilization of Routine Health Information among Health Professionals

The value and effectiveness of health information were determined by its utilization by health professionals in decision-making. This study showed that health information use was wrongly understood in the health system as only data reporting, aggregating numbers and sending those to someone at a higher level and similarly, this idea was explained by a study done before in Addis Ababa health centers and in Ethiopian primary health facilities in which health information used was the process whereby health-related information analysis, interpreting and elaborating information and synthesizes for decision-making of concerned bodies (1, 15).

Routine health information utilization rate of health professionals in the selected health centers of this study is about 37.3%. This utilization rate is poorer than the Study done in health facilities of Korea, in which over 80% of the total respondents working the health facilities were positively evaluated on the utilization of routine health information (45). The reason behind this difference in utilization rate was that Korean primary health facilities were well organized and better than the Ethiopian health tier system.

The utilization rate of routine health information among health professionals of this study was better than a study done in North Gondar, NW Ethiopia; in which trend of routine health information utilization among health professionals was very low (23.1%) (2). And, this result showed that emphasis given for health professionals in North Gondar health facilities for improving their routine health information utilization was very low.

In our study, good routine health information utilization among health professionals of public health centers was 37.3%, which was slightly poorer than the two studies which were done in East Gojjam zone that showed 45.8% of the health workers had good routine health information system utilization (19). And, in northwest Ethiopia showed that the overall existing routine health information utilization in the study area was 46.5% (23). Even if our

study showed better utilization performance than North Gondar performance rate which is 23.1%, still health professionals of Addis Ababa public health centers had poor routine health information use rate than health professionals of East Gojjam zone and northwest Ethiopia health centers.

Also, health professionals' routine health information use rate in Addis Ababa health centers is better when compared to study done in Jimma zone where the cumulative utilization of routine health information among health professionals was only 32.9%(21). Generally, health information utilization rate among health professionals of Addis Ababa health centers was low as compared with Amhara region, and this implied emphasis given by health workers and district offices in Addis Ababa to strengthen RHIS was very low.

In this study, health information utilization of health professionals was poor than a study done in Hadiya zone which showed that the utilization of routine health information among health professionals was 69.3% (1). And, Hadiya zone got a better performance. The possible reason for their better performance was staff got good skills in data collection, data handling, information analysis, and presentation. Routine health information utilization status among health professionals of this study is different from a study done three years back that showed the utilization rate of routine health information among health professionals in Addis Ababa health centers was 41.7% (26). And, the utilization rate of good routine health information among health professionals of this study is 37.3%. This result is poorer than routine health information use among health professionals of the same study area that was done in Addis Ababa public health centers three years back, which was 41.7%. The possible reason for the low practice of health information use was that health professionals did not have skills in management, analysis, and use of information that they have in their hands. Also, health professionals thought that their work was only treating patients and reporting their findings to the next higher level, they believed that data handling and information generation was only the job of Health information technologist personnel. So, to alleviate this misunderstanding, complete changes have to be done in RHIS practice at a national level.

6.2. **Factors Associated with Routine Health Information Use**

In this study, about 205(55%) replied that the use of manual paper files recording makes health information to be poorly managed for use. A study done in public health sectors of South Africa revealed, about 55% of health professionals believed that the process that uses paper is more efficient than the use of electronics, which shows they were resistant to new processes of data entering and accessing from computer systems (34). So, health professionals in Addis Ababa health centers suggested the use of both manual and electronic methods and have better acceptance to use both paper and electronic-based RHIS to increase utilization status of routine health information than those of South Africa's health professionals.

In current study, of all respondents; 242(60.2%) responded that the presence of organizational rules, values, and practices affect RHIS positively by creating a suitable environment in health facilities to practice and monitor different available health information technologies among health professionals. A study done in central Ethiopia public health centers support this idea that 60% of the professionals explained that provision of new organizational practices and policy benefits for the maximum use of health information in the health facilities (28). Also, a study which was done in North Gondar, North West Ethiopia showed that 57% of the total participants in the health centers had good governance and organizational rules for routine health information system in their facilities (2). A study done in Ethiopian health sectors showed that organizational practices like managerial support, culture and practice to use health information technology, and implementation of RHIS rules in the facility contribute a lot for increment of routine health information use among health professionals (25). The above all studies suggest that organizational rules, values and practices are the milestone for the preparedness of health professionals to RHIS use.

About 227(56.5%) of respondents agreed that inadequate human resources are the main organizational obstacle for effective use of Routine HIS in health centers. Even in this study during data collection, there were health centers without health information technologist personnel and the data compilation was done by other representative health professions. Also, a study which was done in public health centers of Addis Ababa support the idea in which presence of only one HIT personnel in HMIS room cause poor management of health information and more than one HIT personnel should have employed in every health centers

(15). Moreover, studies done in Cameroon and Ghana claimed that data collection and entry was a laborious process and more personnel especially data clerks were needed for data collection and management (37, 43).

Odds of Routine health information use among Health professionals those who had Problem solving skill on HIS tasks were higher than those who did not have Problem solving skill on HIS tasks[AOR= 2.091 95% CI (1.343, 3.256)]. The result was supported by studies conducted in North Gondar, NW Ethiopia and Ethiopian health sectors in which more than two third of health professionals had no professional skill in RHIS, had no idea how to manipulate routine health information system activities and how to solve RHIS related problems(2, 25). This may be due to reluctant behavior of health workers to know and engaged in health information related activities because health professionals' intention is only performing their clinical related activities.

In the current study, 165(41%) of respondents believed that routine health information use is important in the health sector management process. Practically in most health facilities, even if data were collected and recorded by health professionals daily, converting this raw data into information to identify gaps and prioritize the root problems of the health system for the benefit of patients was poor and even under-practiced. Also, study done in Jimma zone revealed that majority of staffs believed that data analysis and utilization was left for higher level and health professionals felt that their job is only collecting and sending data to higher level managerial workers(17). A study done in Amhara national regional state in Ethiopia to assess the perceived knowledge of health professionals revealed that 85% of the respondents reported they believe the routine health Information System was important (22). In North Gondar, NW Ethiopia; More than half (58.6%) of respondents had a positive belief in routine health information utilization (2). Generally, the beliefs of health professionals in this study (Addis Ababa) were low as compared with rural health centers of North Gondar and Amhara regional health settings. And, the possible reason for Addis Ababa health professionals to had a poor believe in RHIS was that they thought that their job is only treating patient and data collection was HIT personnel's duty.

In this study, around 262(65.2%) participants explained that the collected data used for planning, monitoring and evaluating facility performance. Study which was done in North Gondar, NW Ethiopia suggested that around 51% of the participated health professionals use routine health information for planning of their routine health activities(2). But, only 27% of health professionals use generated health information for monitoring and evaluation of programs and for further planning purpose of RHIS activities in a study done public health centers of Addis Ababa(15). Status of utilization of health information data and information among health professionals in current study of public health centers of Addis Ababa was better than same study area which was done three years back. The possible reason for this increment was great emphasis have been given for monitoring and evaluation of the performance of health professionals in their work periodically. This in turn initiates health workers to use the generated health information for planning their next work.

Odds of routine health information use among Health professionals those who Know their duties and responsibilities in their work place were higher than those who did not Know their duties and responsibilities[AOR= 1.525 95% CI (1.121, 2.073)]. The result was supported by study conducted in public health centers of Addis Ababa three years back in which health professionals take data collection , registration , information analysis and use of the generated information for further activities as part of their duty(15).This predictor also suggested by the study done in Ethiopian health sectors in which around 84% of the respondents knew their roles and responsibilities in their health facilities(25).

Limitation of the Study

- Lack of local and national reference materials to make a comparison.

7. Conclusion and Recommendations

7.1.Conclusion

In general, the findings of this study showed that information was generated at the health institution from routine reports, vertical programs, and disease surveillance activities and collected using RHIS formats. Finally, that information was communicated to the next higher level. In general, good Routine health information utilization rate was found to be 37.3% in the study area. Among many factors expected to affect the utilization rate of a health information system; Use of both manual paper and computer-based files for recording health information, Organizational rules, values and practices, Human resource, Problem solving skill of health professionals on HIS tasks, Belief on routine health information use, Collected information further used for planning, monitoring and evaluating facility performance and Knowing duties, roles and responsibilities were found to be the only significant factors after adjusted odds ratio.

However many factors of Technical, Organizational and Behavioral were found to be significant factors before adjusted odds ratio, then became insignificant after adjusted odds ratio and must be investigated later on in the larger scale since they were expected the important factors obtained from other literature.

7.2. Recommendations

To improve the utilization rate of the health information system

1. Motivational incentives and training should be given to all individuals working in the health institution and Woreda health offices about the health information system.
2. A responsible person assigned in health centers and Woreda health offices to run and facilitate a routine health information system activity have to check health professionals' health information use periodically.
3. Uniform & Standard information analysis, generation, reporting, and use rules must be implemented in all public health centers & Woreda health offices.
4. Standard national instruction manual, principles, and guidelines about Routine health information systems have to be developed for health facilities.

8. References

1. Abera E, Daniel K, Letta T, Tsegaw D. Utilization of Health Management Information System and Associated Factors in Hadiya Zone Health Centers, Southern Ethiopia. Research in Health Science. 2016;1(2):98.
2. Dagnew E, Woreta SA, Shiferaw AM. Routine health information utilization and associated factors among health care professionals working at public health institution in North Gondar, Northwest Ethiopia. BMC Health Services Research. 2018;18(1):1-3.
3. Raban MZ, Dandona R, Dandona L. Essential health information available for India in the public domain on the internet. BMC Public Health. 2009;9(1).
4. WHO. Ethiopia Health Data Quality Review: System Assessment and Data Verification for Selected Indicators. 2016.
5. Mohammad Nabil Almunawar MA. Health Information Systems_HIS Concept and Technology. March 2012.
6. Zhdanov D, Zemtsov A, Ishchuk T, Vaganova E. Health Information Systems: Background and Trends of Development Worldwide and in Russia. 2017:424-8.
7. Aqil A LT, Hozumi D. Performance of Routine Information Systems Management (PRISM) Tools. Oxford University Press. 2009;24(3):217-28.
8. Grandia L. Healthcare Information Systems: A Look at the Past, Present, and Future. 2017
9. Kamper-Jørgensen F. Public health information systems – and EUPHIX. Scandinavian Journal of Public Health. 2008;36: 673–675.
10. Fritz F, Tilahun B, Dugas M. Success criteria for electronic medical record implementations in low-resource settings: a systematic review. Journal of the American Medical Informatics Association. 2015;22(2).
11. Asress BM. Health Information Systems in Ethiopia. September, 2011.
12. Health TFDRoEMo. HSTP. 2015/16 - 2019/20 (2008-2012 EFY), October 2015.
13. Tilahun B, Teklu A, Mancuso A, Abebaw Z, Dessie K, Zegeye D. How can the use of data within the immunisation programme be increased in order to improve data quality and ensure greater accountability in the health system? A protocol for implementation science study. Health Research Policy and Systems. 2018;16(1).
14. Asemahagn MA, Lee A. Determinants of routine health information utilization at primary healthcare facilities in Western Amhara, Ethiopia. Cogent Medicine. 2017;4(1).
15. Adane T. Assessment on Utilization of Health Management Information System at Public Health Centers Addis Ababa City Administrative, Ethiopia. Internet of Things and Cloud Computing. 2017;5(1):7.
16. Mulusew Andualem* GKaAK. Information needs and seeking behaviour among health professionals working at public hospital and health centres in Bahir Dar, Ethiopia. BMC Health Services Research 2013;13:534.

17. Sultan Abajebel1 CJ, Waju Beyene2. Utilization of Health Information System at District Level in Jimma Zone Oromia Regional State, South West Ethiopia. Ethiop J Health Sci. August, 2011;Vol. 21(Special Issue).

18. Tilahun B, Fritz F. Modeling antecedents of electronic medical record system implementation success in low-resource setting hospitals. BMC medical informatics and decision making. 2015;15:61.
19. Lippeveld T. Routine Health Facility and Community Information Systems: Creating an Information Use Culture. Global Health: Science and Practice 2017; | Volume 5 | Number 3.
20. Federal Minstry of Health. Health Management Information System / M&E. January 2008.

21. Gour N, Srivastava D. Knowledge of computer among healthcare professionals of India: a key toward e-health. Telemedicine journal and e-health : the official journal of the American Telemedicine Association. 2010;16(9):957-62.
22. Tan E, Yates KM. Use of information technology in New Zealand emergency departments. Emergency Medicine Australasia. 2007;19(6):515-22.
23. Farahat TM, Hegazy NN, Mowafy M. Information and communication technologies in primary healthcare facilities in Egypt. Primary Health Care Research & Development. 2017;19(01):88-95.
24. Atsede Mazengia Shiferaw1* DTZ, Solomon Assefa1 and Melaku Kindie Yenit2. Routine health information system utilization and factors associated thereof among health workers at government health institutions in East Gojjam Zone, Northwest Ethiopia. BMC Medical Informatics and Decision Making 2017;17:116

25. Eyilachew Dilu MGaMK. Human Resource Information System implementation readiness in the Ethiopian health sector: a cross-sectional study. Human Resources for Health 2017;15:85.

26. Biruk S, Yilma T, Andualem M, Tilahun B. Health Professionals' readiness to implement electronic medical record system at three hospitals in Ethiopia: a cross sectional study. BMC medical informatics and decision making. 2014;14:115.
27. Shiferaw KB, Mehari EA. Internet use and eHealth literacy among health-care professionals in a resource limited setting: a cross-sectional survey. Advances in medical education and practice. 2019;10:563-70.
28. Manyazewal T. Using the World Health Organization health system building blocks through survey of healthcare professionals to determine the performance of public healthcare facilities. Manyazewal Archives of Public Health. 2017.

29. Eley R, Fallon T, Soar J, Buikstra E, Hegney D. The status of training and education in information and computer technology of Australian nurses: a national survey. Journal of clinical nursing. 2008;17(20):2758-67.
30. J.H.Lungo. The reliability and usability of district health information software: case studies from Tanzania. Tanzania Journal of Health Research. 2008;Vol. 10, No. 1.
31. W. Maokola1 BAW, K. Shirima1, M. Chemba1, J. R. M. Armstrong Schellenberg1,2, H. Mshinda1,, P. Alonso3 MT, 5 and D. Schellenberg. Enhancing the routine health information system in rural southern Tanzania: successes, challenges and lessons learned. Tropical Medicine and International Health. june 2011;volume 16 no 6 pp 721–730.

32. William M Tierney JES, Lameck O Diero, Allan Sudoi, Jepchirchir Kiplagat, Stephen Macharia, Changyu Shen, Ada Yeung, Martin C Were, James E Slaven, Kara Wools-Kaloustian. Assessing the impact of a primary care electronic medical record system in three Kenyan rural health centers. August 2015.
33. Ebrahim Mohammed1† GA, Solomon Meseret2† and Eshetu Girma. Knowledge and utilization of computer among health workers in Addis Ababa hospitals, Ethiopia: computer literacy in the health sector. BMC Research Notes. 2013 6:106.

34. Adino Desale BT, Getachew Belay, Alemayehu Nigatu. Assessment of laboratory logistics management information system practice for HIV/AIDS and tuberculosis laboratory commodities in selected public health facilities in Addis Ababa, Ethiopia. Pan African Medical Journal. 08/06/2013.

35. Ranegger R, Hackl WO, Ammenwerth E. Implementation of the Austrian Nursing Minimum Data Set (NMDS-AT): A Feasibility Study. BMC medical informatics and decision making. 2015;15:75.
36. Luiz GBCaJM. Information technology systems in public sector health facilities in developing countries: the case of South Africa. BMC Medical Informatics and Decision Making. 2013.

37. Emmanuel Ngwakongnwi, Mary Bi Suh Atanga HQ. Challenges to implementing a National Health Information System in Cameroon. Journal of Public Health in Africa 4 February 2014; 5:322.

38. Stephanie Watson-Grant1 KXaJCT, 2*. Achieving sustainability in health information systems: a field tested measure of country ownership. Globalization and Health 2017;13:36.

39. Shiferaw F, Zolfo M. The role of information communication technology (ICT) towards universal health coverage: the first steps of a telemedicine project in Ethiopia. Global health action. 2012;5:1-8.
40. Patricia L Riley1* AZ, Stephen M Vindigni2,3, Neeru Gupta4, Andre R Verani1, Nadine L Sunderland1,, Michael Friedman1 PZ, Chijioke Okoro1, Heather Patrick1 and James Campbell5. Information systems on human resources for health: a global review. Human Resources for Health 2012;10:7.

41. LesleyDornan KP, Wichuda Jiraporncharoen, Ahmar Hashmi,, NisacholDejkriengkraikul aCA. Utilisation of Electronic Health Records for Public Health in Asia: A Review of Success Factors and Potential Challenges. Hindawi ,BioMed Research International. 8 July 2019;2019, Article ID 7341841:9 pages.
42. Emmanuel C. Meribole* OAM, ‡,§, AO, Kolawole Azeez Oyediran¶ AA, Fadeke A. Fadeyibi*, Aderemi Azeez*,, Duke Ogbokor** OA, Wura Adebayo*, Emmanuel Abatta*, Anthony Adoghe*,, Samuel Bolaji Adebayo‡‡ ZM, Greg Ashefor¶¶, Samson Babatunde Adebayo***,, Ibrahim Ozovehe Yisa††† AB, Ogochukwu Chukwujekwu‡‡‡, Ibrahim Dalhatu§§§,, et al. The Nigerian health information system policy review of 2014 : the need, content, expectations and progress. Health Information & Libraries Journal. 2014;35, pp. 285–297.

43. Kpobi L, Swartz L, Ofori-Atta AL. Challenges in the use of the mental health information system in a resource-limited setting: lessons from Ghana. BMC Health Services Research. 2018;18(1).

44. Luiz GBCaJM. Information technology systems in public sector health facilities in developing countries: the case of South Africa. Cline and Luiz BMC Medical Informatics and Decision Making 2013; 13:13.

45. Marie Paul Nisingizwe HSI, Modeste Gashayija, Lisa R. Hirschhorn, Cheryl Amoroso, Randy Wilson, Eric Rubyutsa, Eric Gaju, Paulin Basinga, Andrew Muhire, Agnès Binagwaho & Bethany Hedt-Gauthier. <Toward utilization of data for program management and evaluation quality assessment of five years of health management information system data in.pdf>. Global Health Action. 19 November 2014.

46. M. Noureldin RMaSZH. Quality of documentation of electronic medical information systems at primary health care units in Alexandria, Egypt. Eastern Mediterranean Health Journal. 2014;Vol. 20 No. 2

47. Kyunghwa Seo 1 H-NKaHK, *. Current Status of the Adoption, Utilization and Helpfulness of Health Information Systems in Korea. nternational Journal of Environmental Research and Public Health. 15 June 2019.

48. Lepore L, Metallo C, Schiavone F, Landriani L. Cultural orientations and information systems success in public and private hospitals: preliminary evidences from Italy. BMC Health Services Research. 2018;18(1).

49. Bhattacharyya S, Berhanu D, Taddesse N, Srivastava A, Wickremasinghe D, Schellenberg J, et al. District decision-making for health in low-income settings: a case study of the potential of public and private sector data in India and Ethiopia. Health Policy and Planning. 2016;31(suppl 2):ii25-ii34.

50. M. Almalki, 2, 2 GF, Clark aM. Health care system in Saudi Arabia: an overview. Eastern Mediterranean Health Journal. 2011;Vol. 17 No. 10.

51. J.H.Lungo. The reliability and usability of district health information software: case studies from Tanzania. Tanzania Journal of Health Research 2008;Vol. 10, No. 1.

52. Mahima VenkateswaranID1, KjerstiMørkrid1, Khadija Abu Khader3, Tamara Awwad3,, Ingrid K. Friberg1 BG, Taghreed Hijaz4, J. Frederik FrøenID1,2. Comparing individual-level clinical data from antenatal records with routine health information systems indicators for antenatal care in the West Bank: A cross-sectional study. November 27, 2018.

53. Misganu Endriyas1* AA, Emebet Mekonnen1, Sinafikish Ayele1, Temesgen Kelaye1,, Mekonnen Shiferaw1 TM, Teka Samuel1, Tesfahun Hailemariam2 and Samuel Hailu. Understanding performance data: health management information system data accuracy in Southern Nations Nationalities and People's Region, Ethiopia. BMC Health Services Research. 2019;19:175.

54. Solomon Shiferaw1* AW, Robel Yirgu1, Geert-Jan Dinant3 and Mark Spigt3,4. Designing mHealth for maternity services in primary health facilities in a low-income setting – lessons from a partially successful implementation. BMC Medical Informatics and Decision Making. 2018 18:96.

9. Annexes

Annex 1: Subject information sheet /Consent Form

Addis Ababa University

School of public health

Questionnaire for Health Workers, HIT Personnel's and in charge (Managers) of Public Health Facilities

Dear Sir / Madam,

My name is _____, I am a health professional working at the health center and now I am collecting data from health professionals for the research being conducted to assess Status of Routine Health Information System data use by health professionals and managers of public health centers in Addis Ababa, Ethiopia by Meskerem Mengistu who is working on her thesis for an award of Masters of public health in Addis Ababa University College of Health Sciences, School of Public Health. The information you will give is purely for academic purposes and will be treated with confidentiality.

Your participation is purely voluntary and has no monetary value. The report produced will be intended mainly for academic purposes shared with the University and Addis Ababa public health centers with their correspondence health offices to understand the constraints in data-information use for decision making to support the design for appropriate interventions. Thanks for taking 15 - 20 minutes and answering the questionnaire.

Are you willing to participate? ☐ Yes ☐ No

Annex 2: Informed consent (Participant Consent Form)

I_____ voluntarily agree to participate in this research study. I understand that even if I agree to participate now, I can withdraw at any time or refuse to answer any question without any consequences of any kind. I have had the purpose and nature of the study explained to me in writing and I have had the opportunity to ask questions about the study.

I understand that participation involves 15-20 minutes and I will not benefit directly from participating in this research.. I understand that all information I provide for this study will be treated confidentially. I understand that in any report on the results of this research my identity will remain anonymous.

I understand that under freedom of information legalization I am entitled to access the information I have provided at any time while it is in storage as specified above. I understand that I am free to contact any of the people involved in the research to seek further clarification and information.

Signature of participant_____ Date_____/_____/_____

Signature of researcher_____ Date_____/_____/_____

Annex 3. Part one
SECTION A: BACKGROUND INFORMATION

In the section below, tick the most appropriate option that best describes you

1. Age of the respondent _____

2. Gender of the respondent (a). Male ☐ (b). Female ☐

3. Level of education

Diploma ☐

Degree ☐

Postgraduate ☐

Masters and above ☐

4. What is your Job Title?

Nurse ☐

Health officer ☐

Pharmacist ☐

Midwifery ☐

Doctor ☐

Information Technologist ☐

Laboratory technician ☐
Other, specify _____

5. Department/Division of affiliation

a) OPD/IP ☐

b) Dispensary ☐

c) Maternity ☐

d) Laboratory ☐

e) Emergency ☐

f) IT room ☐

g) Core processor unit ☐

h) Other, specify _____

6. For how long have you been at the this facility _____ years

7. Did you have any past experience in managerial position? 1. Yes ☐

2. No ☐

8. Did you receive any training in HMIS related activities in the last six months? 1. Yes ☐

2. No ☐

SECTION B: INDEPENDENT VARIABLES

- **Technical factors**
- **Organizational factors**
- **Behavioral factors**

I would like to know your opinion on how you agree with the statements. There is no right or wrong answer, only express your opinion using the Likert scale; **1-Strongly Disagree, 2 Disagree, 3-Neither Agree or Disagree, 4-Agree 5-Strongly agree.**

Hint; HIS=Health Information System

HMIS=Health Management Information System

RHIS=Routine Health Information System

Please be open and flank to choose the answer honestly

i) TECHNICAL FACTORS

9. Indicate your level of agreement on the following statements regarding how technical factors influence the utilization of Routine health information in the public health centers					
Statement	(1)	(2)	(3)	(4)	(5)
9.1. Information Technology is easy to manage					
9.2. The system design used in data management is user-friendly					
9.3. The complexity of routine health information systems makes it hard for health workers to utilize the system					
9.4. The software for running the system of data management is scarce					
9.5. Most health information systems require the employment of special personnel for entry of data					
9.6. Data collection tools are difficult to understand					
9.7. Use of both manual paper and computer-based files for recording information					
9.8. Incomplete data					
9.9. Late data presented					
9.10. Provision of feedback to data collectors routinely done at all levels					
9.11. Staff oriented through the use of data collection tools					
9.12. Discussion on Monthly performance indicator to assess progress, for planning and decision-making					
Lack of skills among health workers in the following;					
9.13. In data collection					
9.14. Data analysis					
9.15. Information presentation					
9.16. Information use					

10. What other technical challenges do face in trying to the utilization of Routine Health Information decision making in the facility?

……

……

(ii) ORGANIZATIONAL FACTORS

11. Indicate your level of agreement on the following statements regarding how organizational factors influence the effective utilization of Routine health information in public health centers					
Statement	(1)	(2)	(3)	(4)	(5)
11.1. Organizational rules, values and practices					
11.2. Human resource					
11.3. Lack of sufficient financial resources					
11.4. Poor leadership and Low management support					
11.5. Routine health information compilation supervision					
11.6. Access to timely reporting					
11.7.Timely feedback on routine health information					
11.8. The level of culture of information use of a health facility					
11.9. Well streamlined Health information system policies					
11.10. Regular staff meetings to review action plans					
To what extent do you agree with the following statements on influencing information use for Decision making; at the organizational level					
11.11. Being superior directives					
11.12. Share data with other stakeholders					
11.13. Staff are aware of their responsibilities					
11.14. Staff are trained in data management and use					
11.15. Report on data accuracy regularly					
11.16. Staff are the reward for their good work					
11.17. Use HMIS data for day to day management of the facility					
11.18. Gather data to find the root cause of the problem					
11.19. Use HMIS data for education and community mobilization					

12. In your own opinion what other organizational factors influence the effective utilization of Routine health information use in this facility

……

(iii) BEHAVIORAL FACTORS

13. Indicate your level of agreement on the following statements regarding how behavioral factors influence the utilization of Routine health information.					
Statement	(1)	(2)	(3)	(4)	(5)
13.1. Level of knowledge of content of HIS forms					
13.2. Problem-solving skill for HIS tasks					
13.3. Confidence to use the generated information by HMIS management team					
13.4. Staff competence to perform their HIS tasks					
13.5. Staff attitude toward data collection and recording					
13.6. The belief about Routine HIS					
13.7. Lack of motivating incentives to staff during the data collection					
13.8. Collecting information that adds no value irritates me					
To what extent do you agree with following on influencing information use; using the scale 1-5 below. Decision making is based on; individual level					
13.9. Being Superior directive					
13.10. Data collection makes one bored					
13.11. Data collection meaningful to me					
13.12. Collected information used for planning, monitoring and evaluating facility performance					
13.13. Know duties, roles and responsibilities					
13.14. Collecting information not used for decision making is discouraging					
13.15. Collecting information gives a feeling that is a burden on me					
13.16. Understand and appreciate my roles and responsibilities regarding health information management					

14. Mention other behavioral factors that influence the effective utilization of Routine health information?

……

……

15. Which decisions have you made in the last six months using the routinely collected data – information?

……

SECTION C: DEPENDENT VARIABLE

ROUTINE UTILIZATION OF HEALTH INFORMATION

16. Indicate your level of agreement on the following statements regarding the effective utilization of Routine health information in the public health facilities					
Statement	(1)	(2)	(3)	(4)	(5)
Good quality data for use;					
16.1. There is the continuous use of the data collected for the benefit of patients as well as the health facilities					
16.2. Health facility gets feedback on the monthly health information report submitted					
16.3. Decision making regarding the quality of health information data is collected timely for the stakeholders					
16.4. Decisions made based on routine health information findings					
16.5. Good quality data used for Patient utilization					
16.6. Good quality data used for disease data and drug stock out					
16.7. Health facility data routinely used to monitor health facility indicator performance					
16.8. The information users seek feedback from the health facility staff regarding the data collected					
16.9. The facility administrators share data with other stakeholders for proper health service delivery					
16.10. Information based decision made at all levels of facility management					
16.11. Existence of facility action plan showing decision based on routine health information					
16.12. Review strategy by examining performance target and actual performance from month to month					
16.13. Health facility priority allocation of resources based on the evidenced data-based gaps					
16.14. The stakeholders, especially the health facilities rely on data for planning their service delivery					
16.15. Regular decisions review meetings about the use of information					
16.16. Decisions based on evidence improve services delivery					

17. Do you have any suggestions on how to improve routine health information use at the health facility?

…….....

……

Thanks for your time and cooperation!

Part two

Observation Checklist - Routine Health Information Utilization

Health Facility:		
Observer :	**Date:**	
ITEMS	No	Yes
1. Presence of Routine HIS mission displayed at appropriate position		
2. Presence of updated District HMIS organizational chart showing functions related to RHIS/Health information		
3. Presence of health facility RHIS targets displayed		
4. Presence of health facility indicator performance charts, graphs, and table displayed		
5. Presence of staff meeting reflecting reports, data and feedback from health facility or district discussed		
6. Presence of action work plan relating identified data gaps and how they were addressed		
7. Presence of performance improvement tools like flow charts and projects		
8. Presence of RHIS standards at the facility		
9. Presence of RHIS training manual and guide		
10. Presence of RHIS supervisory checklist		
11. Presence of RHIS supervisory report		
12. Presence of data quality assurance checklist		
13. Presence of updated database for monthly reports submitted to the district		
14. Existence of functioning HIS software		
15. Presence of any feedback which received in the last three months		