

Process Evaluation on Community Health Information System in South-East Zone Tigray 2016

Mesaoud Mohammedbirhan Adem (✉ mesaud2000@yahoo.com)

Tigray Regional Health Bureau

Tesfay G Gebrehiwot

Mekelle University College of Health Sciences

Mengistu H Tequar

Mekelle University College of Health Sciences

Taddele W Awalom

Mekelle University College of Health Sciences

Research article

Keywords: CHIS, HMIS, Ethiopia, Tigray, South east zone

Posted Date: August 12th, 2020

DOI: <https://doi.org/10.21203/rs.3.rs-48946/v1>

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Abstract

Back ground: As per the world health organization (WHO), Health Information System (HIS) is one of the six building blocks of the health system. Nations establish their HIS as per their context. Generally HIS regarding data management (the ability to collect, store, analyze and distribute data) is limited in Sub Saharan African countries (1). However, literatures found were not able to show the magnitude of the problems of the program implementation status.

As the result of the announcement of WHO “health for all”, global health initiatives started to improve community health aligned with millennium development goals which emphasized the need to strengthen the primary health care to decrease child mortality, improve maternal health, and combat HIV/AIDS, malaria, and other communicable and non-communicable diseases. So community health information System became public health issue in Ethiopia (2).

Cognizant of the importance of health information Federal Ministry of Health (FMOH) started reform of health information system and monitoring and evaluation (M&E) components to solve the data collection, reporting gaps and to strengthen the information Utilization (2).

As the result of the above scenario, FMOH started to strengthen the HMIS and its principles standardization, specification, integration so as to improve the data collection, summation, analysis and dissemination for decision and action. Here Community Health Information System was scaled-up along with HMIS (2).

Community Health Information System (CHIS) was designed to standardize data collection and integrate data systems to provide relevant information for decision-making at the health posts and to feed the HMIS on a regular basis. Family folder is a pouch, which is the main part of CHIS, is a data collection tool designed by the FMOH for Health Extension Workers (HEWs) to document both individual and household level data to be utilized as a source of information at the grass root level(3)

Unlike the health centers and *hosptals* in health post there were different types of unorganized registers which were used to collect information on services provided within a single health domain, sometimes requiring a large group of registers to cover all health domains related to population. In addition, there was no any mechanism to identify which group of people needs, which type of health care services .But family folder informs patient care through the data contained in individual and family records, identifies patients in need of care through a set of tickler files, and enables reporting through supplementary tally sheets and family folder cards. The overall design of the FF innovation was to simplify the workflow of the community health worker and focus health care delivery at the community level (4).

Methods: The study focused on process evaluation, on the implementation of CHIS in South-East Zone in Tigray. South East Zone was purposely selected due to the short distance to Mekelle that indirectly helped to reduce cost. Process evaluation, normative evaluation approach was used; Quantitative data was used to assess the implementation of CHIS in south east zone Tigray. A descriptive evaluation designs also used to describe activities which the program carried out. The sampling area was health posts found in south-east zone Tigray which were randomly selected from the nearest kushet to the health post and the Sample size was 634 family folders & respective houses. The dimensions used for the evaluation were: availability, compliance, completeness and consistency. These dimensions were helped to assess the CHIS implementation status in the south-east zone in Tigray.

Results: Generally the result of this study is very good (87.48%), the availability of CHIS tools is 88.7%, compliance 92.54%, completeness 95.8% & consistency is 68.16%. The availability of Inks & brushes was 29% which is very low. 30% of the HEWs were using field book as a replacement of FF, 64.7% of health posts used more than 10 parallel recording and 76.4 % of health posts used reporting formats. In some health posts there was difference between expected and actual households registered in family folder. The consistency of the data between family folder and master family index was 97.7% and between family folder and households was 80%.

Conclusion & recommendation: the implementation status of CHIS is very good but TRHB & stakeholders should give attention to strengthen the program and to stop parallel recording & reporting tools and CHIS should be revised and transformed in to e-

CHIS.

1. Back Ground

1.1. Need of the Program

As per the world health organization (WHO), Health Information System (HIS) is one of the six building blocks of the health system. Nations establish their HIS as per their context. Generally HIS regarding data management (the ability to collect, store, analyze and distribute data) is limited in Sub Saharan African countries (1). However, literatures found were not able to show the magnitude of the problems of the program implementation status.

As the result of the announcement of WHO “health for all”, global health initiatives started to improve community health aligned with millennium development goals which emphasized the need to strengthen the primary health care to decrease child mortality, improve maternal health, and combat HIV/AIDS, malaria, and other communicable and non-communicable diseases. So community health information System became public health issue in Ethiopia (2).

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Unlike the health centers and hospitals in health post there were different types of unorganized registers which were used to collect information on services provided within a single health domain, sometimes requiring a large group of registers to cover all health domains related to population. In addition, there was no any mechanism to identify which group of people needs, which type of health care services .But family folder informs patient care through the data contained in individual and family records, identifies patients in need of care through a set of tickler files, and enables reporting through supplementary tally sheets and family folder cards. The overall design of the FF innovation was to simplify the workflow of the community health worker and focus health care delivery at the community level (4).

1.2. Statement of the Problem

Federal ministry of health took the lead in giving a due attention on implementation of CHIS and it also engaged various partners at country level; mainly John Snow, Tulane University, Italian Cooperation and World Health Organization (WHO) - in supporting the scale-up of HMIS in the regions (5). According to the health sector monitoring and evaluation strategic plan (Health Sector Transformation Plan) 2016-2020 (6), there were identified challenges of the CHIS implementation: Though Integrated child case management (ICCM) register is the only register permitted at health post level, some health posts use other registers like outpatient department (OPD), Expanded Program on Immunization (EPI), etc, incomplete and inappropriate recording and lack of updating FF data at health post. There was also inconsistent use of FF cards during service provision at health post and lack of FF tools revision to capture data of newly implemented services including EPI, nutrition. In addition, there was also shortage of pre-requisites required for CHIS implementation including cards, pouch, shelf and tickler file box, due to lack of knowledge and skill. Most health posts were not performing Lot Quality Assurance Sampling (LQAS) as per the standard; poor utilization of tickler file system for client monitoring (6).

Accordingly assumptions have been focused on how well the CHIS is Implemented. However, there are no scientific evaluations which can quantify the magnitude of the gaps of the system listed above. Moreover, there is limited information on the dimensions of the evaluation of CHIS (Completeness, Consistency, compliance and availability) in the study area. Therefore this study was conducted to fill the gaps by exploring the magnitude of the problem and status of the system regarding evaluation dimensions in the study area.

1.3. Rationale for evaluation

At the time of the evaluability assessment in Enderta woreda, the stake holders identified problems such as parallel reports & multiple reporting formats (not related to CHIS) that gives a burden to the HEWs and leads to ineffective implementation of CHIS.HMIS/CHIS. The stakeholders include: experts, planning process owner in Tigray regional health bureau, woreda health office heads, HMIS focal persons and HEWs. They discussed and accepted the evaluability assessment and on how they would use the findings and results of this study. So during the assessment there were shortage of CHIS tools and in appropriate reporting and recording procedures that were also identified during integrated supportive supervision in the Tigray rural health posts. In the region about 98% of rural health posts have implemented the community health information system starting from December 2013 (5). Hence, it was very important to make a process evaluation on it.

This study described the scale-up (implementation) status of CHIS in four districts and clearly indicated the achievements, challenges, and experiences which were captured from the documents during the assessments. The assessment was considered as helpful to implement CHIS in the other zones. Thus, it would help decision makers at different level to minimize the problems, to improve the status of implementation of CHIS (program improvement) and ultimately to improve service delivery. In addition it would also be important as an input to expand the lessons learned in to the urban CHIS. Generally the rationale of this evaluation has an implication in improving the data collection & information use at grass root level. Moreover, it would be used as an input for other evaluators/researchers and for vital event registration especially for births and deaths.

1.4. Description of the Program under the Evaluation

Globally, Health information systems serve multiple users and a wide array of purposes that can be summarized as the generation of information to enable decision-makers at all levels of the health system to identify problems and needs, make evidence-based decisions on health policy and allocate scarce resources optimally. Data from different sources are used for multiple purposes at different levels of the health care system (7).

The countries in the developing world face a wide variety of health-related challenges, and the health systems that address those challenges are struggling with limited resources and capability. Health leaders must therefore focus on maximizing the value of scarce resources and finding ways to make health systems operate as efficiently as possible. Having reliable data on the performance of different parts of the health system is the only way to devise, execute, and measure health interventions. Successful strengthening of health systems will require relevant, timely, and accurate information on the performance of the health system itself. The goal of a health information system (HIS) is to provide that information (8).

Ethiopia has established to have a nationally standardized comprehensive health management information system (HMIS) which is one of the cross cutting attributes in the health systems strengthening framework. HMIS is a broad system for collection, compilation, analysis and utilization of routine health service data at all level. Similarly CHIS is a system for collection, compilation, analysis and utilization of routine health service data at community (grass root) level. In the perspective of this setting, the government committed to promote a household centered health care through the community based health extension program (HEP). As part of strengthening the community health information system, the Federal Ministry of Health used the family folder (FF) as a tool of data collection and for grasping essential information at the family level. This collected information is used for decision making in terms of health promotion and disease prevention at the grass root level (9).

CHIS has different components. These are family folder pouch, Cards (Health and Integrated), Tally Sheets, Reporting Formats, MFI, Field Book, Tickler file and Shelves. The family folder pouch is a collection of individual records at the family level that encompasses the primary health domain. It has two pages (Front and Back) with five basic parts:

- (1) Identification, (Region, woreda, kebele, Kushet, name of head of the family, household number)
- (2) Household description, (list of the names of each individual member of the household/family)
- (3) Household characteristics, (latrine, Hand washing facility, waste disposal system, drinking water source and LLITN issued)
- (4) HEP training status, (training status based on the model household training schedule, training start & completion dates.)
- (5) Household implementation status (the HEP Package registration, training, graduation and advance training dates.) (10).

Health cards are usually used when a client is sick and came to health post seeking medical service and be kept inside the family pouch. In addition we can record information regarding family planning services. It can be divided in to two types called Male Card which is colored by blue and Female Card which is colored by Yellow. Every member of the family who is ≥ 5 years of age is issued a health card; for those < 5 years, their records are kept in their mother's Health Card till they reach the age of 5 years. Integrated Card is used to record services such as ANC, Delivery, PNC, New Born Care, and Immunization and so on. And it is issued to a mother who is pregnant, laboring or lactating mother and her new born (11).

A tickler file is one component of the FF shelf which is essential for CHIS implementation. It is used for tracing the defaulters from the appointment. Family folder shelf used to contain the family folder pouches and segregated into different kushets and house numbers. It holds also tickler file.

Tally sheets used for tallying the diseases and service delivered. There are four types of tally sheets service, disease, family planning dispensed count and tracer drug tally sheets.

Reporting formats used to collect the monthly and quarterly data are out patient (OPD) and Service delivery reporting formats.

Master family index is also one component of CHIS which is important for recording the house hold heads alphabetically and use to retrieve the family folder from the shelf.

Field book used to record the identification details and service data of clients receiving service at household or outreach and for whom the HEW did not carry the Family Folder.

Completing all components of the CHIS is a simple HMIS recordkeeping and reporting procedure that feeds community level health information (11).

1.4.1. Goal of Community Health Information system

The goal of the program is improving availability, quality and utilization of information so as to ensure quality of service delivery at community level.

1.4.2. Program Specific Objective

The specific objectives of CHIS are:-

1. Promoting a family-centered health care at community level through an innovative community health services extension program (HEP)
2. Ensuring standardized recording & reporting tools at health post level and produce quality information.
3. Strengthen information use at grass root level

4. Minimize duplicate & parallel report

1.4.3. Expected effect of CHIS

The expected effect of the CHIS is to register or enumerate all households in the Tabia throughout the region in family folder in order to minimize parallel recording and reporting formats. And the health extension workers also use all the CHIS tools in recording and reporting activities. It also helps to have improved family centered health service. In addition, information use at grass root level will be maintained. Besides, CHIS would support the vital event registration by providing information about births and deaths.

1.4.4. Program Resources and Activities of Community health information System

1.4.4.1. The resources needed to implement and run community health information system

Resources are very crucial to implement and run any program, so the resources needed for implementation and run community health information system include: family folder/pouch cards (male, female and integrated cards), master family index, guidelines, and field books. On top of that standardized shelves with tickler files, inks & brushes for coding house number, four types of tally sheets (service delivery tally sheet, disease tally sheet, tracer drug tally sheet and family planning tally sheet) and reporting formats are also required as part of resources. Skilled information experts, HEWs and supervisors including the capacity building are also vital components of the human resources. As part of the infrastructure and furniture, buildings (health posts), chairs and tables, bags are other important resources.

1.4.2.1. Major activities of Community health information System

To overcome the goals and objectives of a program, certain activities should be performed according to its guidelines and principles. The major activities of CHIS are registering or recording of households, coding the household number in FF and in houses, and preparing MFI for all HHs & all kushets in the Tabia. The CHIS is also designed for organizing the family folder according to their house numbers and kushets, use the family folder and its cards (Male, Female and Integrated cards), tally sheets in their daily activities. In addition it is also used for reporting to next level and using the family folder information at grass root level for different purposes. For example, preparing Tabia profile, use tickler files for appointment and tracing defaulters, use field books during their outreach and updating the FF (new births, new deaths and for new household).

1.4.5. Stage of Community Health Information System

CHIS has been implemented in Tigray region starting from May 2013 in 712 health posts found in 34 rural woredas of Tigray. More than 770,000 rural households were registered and have issued a family folder. House numbering and registration was carried out mainly by the health extension workers. In Tigray recording and reporting of data through cards was introduced in the beginning of the fiscal year 2013/14. Full implementation of CHIS was started after preparing Tabia profile; Master Family Index and Tickler file.

Currently 2016, Data recording and reporting using CHIS tools (full implementation) were completed and scaled up in to 646 (98%) health posts. More than 831,141 rural Households were registered and have issued a family folder (5). CHIS implementation in south east zone Tigray is 99.0% more than 112747 households were registered in family folder in 87 health posts.

1.4.6. Program Logic Model of Community Health Information System

The graphical representation and linkage between/ among the components of the CHIS/Family folder program Input , Activities /Process , output , outcome and impact of the program to depict the monitoring and evaluation activities clearly. (See Figure 1)

Methods

The study focused on process evaluation, on the implementation of CHIS in South-East Zone in Tigray. South East Zone was purposely selected due to the short distance to Mekelle that indirectly helped to reduce cost. Process evaluation, normative evaluation approach was used; Quantitative data was used to assess the implementation of CHIS in south east zone Tigray. A descriptive evaluation designs also used to describe activities which the program carried out. The sampling area was health posts found in south-east zone Tigray which were randomly selected from the nearest kushet to the health post and the Sample size was 634 family folders & respective houses. The dimensions used for the evaluation were: availability, compliance, completeness and consistency. These dimensions were helped to assess the CHIS implementation status in the south-east zone in Tigray.

1.1. Sampling Size Determination

During the study the total households registered for family folder program in the zone were 109,523. The sample size estimation was calculated by using $n = Z^2 p (1-q) / w^2$. The study used 95% confidence interval and a significance of 0.5 to calculate the sample size. 50% P was taken because there was no specific research evidences related to the research area. Therefore the calculated sample size was 384 family folder cards and households. Hence, considering a design effect of 1.5 and non-response rate of 10%, the total sample size was 634. And these 634 FF cards and households were proportionally allocated to each health posts in each woreda households that have family folder and were selected randomly from the nearest Kushet in each health post.

1.2. Sampling Technique

South east zone was selected purposely from the six zones in Tigray. There are four woredas in south east zone: HintaloWajarat, SahartiSamre, DoguaTembien and Enderta with 25, 21, 24, and 17 health posts respectively. About twenty percent of health posts of each woreda were taken according to similar previous studies. The calculated frequency of the districts is counted to 5, 4, 5, and 3 health posts respectively, so total of 17 health posts were summed up to be included under the study in the zone. (See Figure 2)

The total number of family folders implemented in the south east zone is 109,523 family folders. In the respective districts, 33619 (HintaloWajarat), 26408 (SahartiSamre), 27129(DoguaTembien)and 22367(Enderta) family folders are recorded under the jurisdiction of the health posts. The total sample size, which was calculated as 634 family folders, were proportionally allocated to the respective districts (figure 4). The allocated family folders were divided among the selected health posts: HintaloWajarat 39 FF for 5 HPs, SahartiSamre 38 FFs for 4 HPs +1 catrd, Dogua Tembien31 FFS for 5 HPs+2 cards and Enderta 43 FF for 3 HPs. (See Figure 3)

1.3. Study area

Tigray is one of the nine national regional states of Ethiopia. It is bordered in the north by Eritrea, in the south by Amhara region, in the East by Afar region and in the west by Sudan. The region is administratively divided into six Zones and (1 special zone), 52 Woreda (34 rural and 18 urban) and 814 Kebeles (753 Rural and 61 Urban).

According to the 2007 census projection, the region has a total population of 5,055,999 in 2015. Agriculture is the main means of subsistence for 85% of the Region's population. Irrigation and terrace farming are used on the steep slopes producing teff,

wheat, barley, beans, lentils, onions and potatoes. The annual population growth rate for Tigray is 2.5% and the total fertility rate is 4.5 children/woman of reproductive age (mini-EDHS 2014).

Public health care services in Tigray are delivered through 1 specialized hospital, 15 general hospitals, 20 primary hospitals, 204 health centers and 712 health posts. The primary M&E tool used in the Region is the Health Management Information System (HMIS), which draws its data from routine services and administrative records.

Tigray has an estimated number of 930,135 rural households. There are more than 660 rural health posts working with 210 HEW supervisors and more than 1430 HEWs. Rural health requires a specialized approach, therefore, CHIS was designed to make the health information and decision-making effective and successful at the grassroots level.

The TRHB HMIS unit established a monthly reporting system at all levels, starting from the last quarter of 2012 on a monthly basis, each health post reports to the respective Health center, and each Health center reports to their respective Woreda health office. Every Woreda and hospital in the region reports aggregated data to the Regional Health Bureau on a monthly basis. The TRHB then sends a complete report monthly to the FMOH. The timeliness of the monthly HMIS report as a region is 81.7%, which is an improvement from 2013, but still below the standard of 90% (5). (See Figure 4)

1.4. Study period

The study was conducted from January 2016 to June 2016.

1.5. Study design

The study was conducted using cross sectional study design at facility and household level.

1.6. Source population

The source population was all family folders in south east health posts, Tigray from 2013 to 2016.

1.7. Study population

The Study population was all family folders in the south-east zone from the selected health posts from 2013 to 2016

1.8. Study Unit

The study units were the selected family folder in the south-east zone from the selected health posts.

1.9. Inclusion and exclusion Criteria

1.9.1. Inclusion Criteria

All health posts that have implemented family folder in south east zone were included in this evaluation.

1.9.2. Exclusion Criteria

Health posts that do not have their own health posts (building) were excluded from the evaluation study.

1.10. Evaluation Type

A process evaluation type was used to assess the implementation status of community health information system in the study area. Descriptive evaluation design was used to check and describe whether the family folder activities were carried out based on the guidelines or not. Furthermore, the evaluation design checked the strengths and weaknesses of the implementation of family folder program.

1.11. Evaluation approach

The approach for evaluating the implementation of the community health information system program was normative approach. Normative approach was an appropriate approach of evaluation to assess if there is an improvement undergoing in a program which is under implementation. And it has used the compliance data quality dimension to check whether they used the guideline or not and, availability dimension was used to check the availability of all necessary CHIS tools.

1.12. Evaluation focus

The study has mainly focused on process evaluation which measures the implementation of the program & described how the program was delivered. It looked to uncover management problems by discovering how a program was implemented and whether it was implemented as planned or met specifications.

1.13. Data collection Tool and Data collection procedure

A self-administered questionnaire adopted from similar studies was used to assess knowledge of HEWs about the utilization of CHIS tools and check list was used to assess the availability and consistency CHIS tools. The quantitative data was collected using the questionnaire and check list from the HEWs and different documents. The data collection method had also included observation of shelf and tickler, reviewing family folders, guide lines, and visiting households. The data was collected by health information technicians (HIT) and HMIS focal persons. The data collectors trained for two days on how to review documents, visiting households. The principal investigator had supervised the data collectors and makes data quality checkups on daily basis. The compliance of all the health posts was assessed to check if the community health information system program was implemented according to the guideline or not as part of improving the documentation and the data base. A check list was used to assess the availability of all the necessary tools for implementing the program in all 17 health posts. Completeness of the registration of households in the family folder was also checked if the health posts have registered all the household heads of their respective catchment area. Consistency of the family folders was assessed by cross checking the data recorded in the family folder with the actual household data of 634 HH by using check list.

1.14. Data Management and Quality Control

The data was collected from 17 health posts and 634 households using self-administered questionnaire which customized from reviewed literatures. Data collectors were given training on how to collect the data from family folder and how to visit households. The questionnaire was designed in EPI-data version 3.1 to enter the collected data for analysis. The quality of data was checked by cross checking the collected and entered data during both the data collection and data entry by the principal investigator. The collected data was entered in to statistical software (epi-data) to check its completeness and consistency.

Data analysis

The data cleaned in EPI-data was exported to SPSS 20 for further analysis purpose. A descriptive analysis was done to show the frequencies and percentages of the observations. Tables and cross tabulation was used to describe the characteristics of

the health posts with respect to the evaluation dimensions. Finally the results of the analysis was compiled and summarized for reporting.

2. Results

A total of 17 health posts were visited in this study to evaluate the implementation of the program, from these 17 health posts 634 family folders with their respective households were assessed in the four woredas of south east zone. The dimensions of the evaluation of the implementation of CHIS were 88.7, 92.54, 95.8, and 68.16 for availability, compliance, completeness and consistency respectively. In general, the implementation status of CHIS in south east zone, Tigray region was averagely very good (87.48%).

2.1. Availability of CHIS Tools

The availability of family folders/pouches in the selected health posts of the woredas was 100%, which indicates no shortage of family folders in south east zone. But The CHIS Tigrigna manual was not available in some of the health posts and its availability was 76% in south east zone in general. There were no shortage of Tigrigna manual in all health posts of degua tembien woreda and one of the health posts in Enderta woreda had no Tigrigna manual. Regarding to the availability of health cards (male card, female card & integrated cards), most of the health posts have had it and it was 88% in general in the study area. The four types of CHIS tally sheets (service tally sheet, diseases tally sheet, family planning service delivery tally sheets and family planning dispensed count tally sheet) were also 100% available. Similarly, the availability of CHIS reporting formats (service delivery & outpatient reporting formats), shelves for family folder, tickler files and MFI was 100% in the HPs. The availability of field books in the study area was 94% in general all woredas, where as specifically with a less availability (80% (4/5)) in the HPs of woreda DoguaTembien. But the availability of Inks & brushes used for coding HH number in health posts of the study area was 29% which is very low. Specifically, it was 0%, 50%, 40% and 33.3% in HintaloWajirat, SamreSaharti, DoguaTembien, Enderta respectively. In general, the average score of availability of CHIS tools in the south east zone Tigray was 88.7%.

Table 1
Availability CHIS Tools by woreda& indicators

Indicators		Wereda				Total	% by indicators
		HintaloWejerat	SamreSaharti	Dogua Tembien	Enderta		
The health posts that have family folders /pouchs	Yes	5	4	5	3	17	100
		100%	100%	100%	100%	100%	
	No	0	0	0	0	0	
		0%	0%	0%	0%	0%	
The health posts that have CHIS manual Tigrigna version	Yes	3	3	5	2	13	76
		60%	75%	100%	67%	76%	
	No	2	1	0	1	4	
		40%	25%	0%	33%	24%	
The health posts that have Health cards (male/Female) & Integrated cards	Yes	4	3	5	3	15	88
		80%	75%	100%	100%	88%	
	No	1	1	0	0	2	
		20%	25%	0%	0%	12%	
The health posts that have 4 types CHIS Tally Sheet	Yes	5	4	5	3	17	100
		100%	100%	100%	100%	100%	
	No	0	0	0	0	0	
		0%	0%	0%	0%	0%	
The health posts that have CHIS reporting format(Service, OPD)	Yes	5	4	5	3	17	100
		100%	100%	100%	100%	100%	
	No	0	0	0	0	0	
		0%	0%	0%	0%	0%	
The health posts that have shelf	Yes	5	4	5	3	17	100
		100%	100%	100%	100%	100%	
	No	0	0	0	0	0	
		0%	0%	0%	0%	0%	
The health post that have tickler file	Yes	5	4	5	3	17	100
		100%	100%	100%	100%	100%	
	No	0	0	0	0	0	
		0%	0%	0%	0%	0%	
The health posts that have Field books	Yes	5	4	4	3	16	94
		100%	100%	80%	100%	94%	

	No	0	0	1	0	1	
		0%	0%	20%	0%	6%	
The health posts that have Master Family index (MFI) for each kushet/kebele	Yes	5	4	5	3	17	100
		100%	100%	100%	100%	100%	
	No	0	0	0	0	0	
		0%	0%	0%	0%	0%	
The health posts that have inks & Brushes	Yes	0	2	2	1	5	29
		0%	50%	40%	33%	29%	
	No	5	2	3	2	12	
		100%	50%	60%	67%	71%	
Sum availability		42	36	46	27	151	887
Availability (%) by woreda		84	90	92	90	89	88.7

2.2. Compliance

According to the result of the study, 94% (16) of the health posts had provided family folder to their respective households found their catchment area. But only three of the four (75%) of the health posts in woredas Saharti-Samre provided family folder to their households in their catchment area.

The family folder/pouch were organized and shelved according to HH number & kushet which was aligned with the standard and its compliance was 100% in 17 of the health posts.

About 65% (11) of the health posts had provided health cards to their clients (providing health cards to a client when he/she came to health posts seeking treatment) according to the guideline. Specifically, the provision of health cards to clients was 40% in Hintalo Wajarat, 25% in Saharti Samre and 100% in Dogua Tembien and Enderta woreda. All HPs in all woreda were retrieving FF from the shelf using MFI by his/her name, which was done according to the guideline and its compliance was 100%.

Regarding to the registration of household heads in the MFI, all household heads were recorded in the MFI alphabetically in all HPs and its average compliance was 100%.

During the study period all health posts have had tally sheets and were using it appropriately. They had used house number to record the services and diseases in both the service and disease tally sheets respectively according to the guideline and its average compliance was 100%.

According to the CHIS guideline, house number should be given 5 and 7-digits for each household member. In all HPs the house hold number was given 5-digits, and 82% of the HPs had given 7-digits to their household members. Particularly, health posts in Enderta and Saharti Samre woredas were using 7-digits to their household members with a compliance of 66.7% (2) and 75% (3) respectively. 80% (4) of the health posts in dogua temben were using 7-digits for individual members.

According to the guide line tickler file has to be used for appointment & for tracing defaulters not for appointment only, so 94% of all health posts used tickler file for both purposes. This achievement was attributed to the health posts in Saharti Samre woredas where one health post used tickler file for appointment only. Family folder should be updated for all new births and deaths, and for all newly emerged households in the catchment area of the health posts. Accordingly, all HPs had updated their

family folders but one health post from Dogua Tembien had updated family folder only for new births and deaths. Consequently, an average of 94% of the HPs updated FF to all new HHs, new births & deaths.

In general, the average compliance of all the health posts in south east zone was 92.54% during the study period.

Table 2
the Compliance dimension result table.

Indicators		Woreda				Total	% by woreda
		HintaloWejerat	SamreSaharti	Dogua Tembien	Enderta		
Family folder / pouch provided to all HH in the kebele	Yes	5	3	5	3	16	94
		100%	75%	100%	100%	94%	
	No	0	1	0	0	1	6%
		0%	25%	0%	0%		
The family folder / pouch organized and shelved according to HH number &kushet	Yes	5	4	5	3	17	100
		100%	100%	100%	100%	100%	
	No	0	0	0	0	0	0%
		0%	0%	0%	0%		
The health cards provided to clients	when a member comes to hp	2	1	5	3	11	65
		40%	25%	100%	100%	65%	
	to all members	3	3	0	0	6	35%
		60%	75%	0%	0%		
FF retrieved if a client comes to this health post	By name from MFI	5	4	5	3	17	100
		100%	100%	100%	100%	100%	
	no mechanism	0	0	0	0	0	0%
		0%	0%	0%	0%		
All house hold head recorded in the MFI alphabetically	Yes	5	4	5	3	17	100
		100%	100%	100%	100%	100%	
	NO	0	0	0	0	0	0%
		0%	0%	0%	0%		
The health posts used tally sheets	Yes	5	4	5	3	17	100
		100%	100%	100%	100%	100%	
	No	0	0	0	0	0	0%
		0%	0%	0%	0%		
The service provided to a client has tallied using	hh number	5	4	5	3	17	100
		100%	100%	100%	100%	100%	
	by vertical line	0	0	0	0	0	0%
		0%	0%	0%	0%		
In disease tally sheet has tallied using	hh number	5	4	5	3	17	100
		100%	100%	100%	100%	100%	

Indicators		Woreda				Total	% by woreda	
		HintaloWejerat	SamreSaharti	Dogua Tembien	Enderta			
	by vertical line	0 0%	0 0%	0 0%	0 0%	0 0%		
5-digits has used for HH number	5 digit	5 100%	4 100%	5 100%	3 100%	17 100%	100	
		7 digit	0 0%	0 0%	0 0%	0 0%		0 0%
	7-digits has used for individual number	7 digit	5 100%	3 75%	4 80%	2 67%	14 82%	82
			5 digit	0 0%	1 25%	1 20%	1 33%	
Tickler files used for appointment & tracing defaulters	For appointment & defaulter tracing	5 100%	3 75%	5 100%	3 100%	16 94%	94	
	for appointment only	0 0%	1 25%	0 0%	0 0%	1 6%		
FFs should be updated for new HHs, births & deaths	for all(new HH, new birth & death)	5 100%	4 100%	4 80%	3 100%	16 94%	94	
	For new birth and death only	0 0%	0 0%	1 20%	0 0%	1 6%		
HEWs didn't use field books instead of FF(dependent/independent of FF)	independently	3 60%	3 75%	3 60%	3 100%	12 74%	74	
		dependently	2 40%	1 25%	2 40%	0 0%		5 26%
	Average Compliance		92.31	86.54	93.85	97.46	92.54	92.54

2.3. Completeness

The completeness of FF was 96.8%(8269/8541*100)in HintaloWajarat,85%(4655/5472*100),in SahartiSamreand96.9%(3756/3873*100)in Enderta. But in DoguaTembien the FF registered was greater than the catchment population (7889/7753*100=101.75%). In health posts from DoguaTembein (Aynimbrkekin and Michael-abyi) and from Enderta (Endamaernet), the completeness of family folder registration was more than 100%.And in some health posts the difference between the expected family folders and registered family folders was very high, particularly in Adi-Awso HP (expected=1795 and FF registered =1507, difference=288), Debre-Kebie (expected=1493 and FF registered=833, difference=660), which shows

that only 56% of the house hold heads were registered. But in most of the health posts the completeness of FF registration was 80%-100%. In summation, the average completeness of the implementation of the program was 95.83%.

Table4:
Family folder registration Completeness by woreda in south east zone.

		Catchment population by (CF)	Total HH FF registered in the catchment	Difference	Completeness in %
		Mean	Mean		
Woreda	HintaloWejerat	8541.00	8269.00	272.00	96.82
	SamreSaharti	5472.00	4655.00	817.00	85.07
	DoguaTembien	7753.00	7889.00	-136.00	101.75
	Enderta	3873.00	3756.00	117.00	96.98
Total		25639.00	24569.00	1070.00	95.83

Table 4.1:
Family folder registration Completeness table by health posts in south east zone.

Woreda	Health Post	Catchment population by (CF)	Total HH FF registered in the catchment	Difference	Completeness in %
D/Tembien	limat	1287	1156	131	89.82
	sisemat	1825	1785	40	97.81
	aynbirkekin	2085	2253	-168	108.06
	michaelabiyi	1423	1626	-203	114.27
	mahberesilase"	1133	1069	64	94.35
Enderta	KedamayWeyane	1359	1352	7	99.48
	Endamaernet	1021	1571	-550	153.87
	DebreKebie	1493	833	660	55.79
H/Wajirat	Mesanu	1397	1239	158	88.69
	Melbe	2226	2118	108	95.15
	Mai Nebri	1509	1509	0	100
	Tsehafti	1866	1866	0	100
	Freweyni	1543	1537	6	99.61
S/Samre	weyinjeba	1034	779	255	75.34
	maitekli	1560	1560	0	100
	Adiawso	1795	1507	288	83.96
	Dekera	1083	809	274	74.7
Total		25639	24569	1070	95.83

2.4. Consistency

In this study the consistency of data between FF and MFI, and consistency of data between FF and household data was checked. Accordingly, the consistency of data was 97.9% and 80% respectively. The Lots quality assurance sampling (LQAS) documents of each health post were reviewed to check whether the HEWs were doing LQAS at monthly basis or not. Accordingly, 84% of them have done LQAS at monthly basis while the rest of them have done not regularly up on the schedule (monthly). All the HEWs have had good knowledge about the cut point of data consistency (>85%). Finally the average consistency of the program implementation was 83.5%.

Table 5:
Consistency table by woreda and indicators

Indicators		Wereda				Total
		HintaloWejerat	SamreSaharti	DoguaTembien	Enderta	
LQAS done every month after a report compiled	every month after a report	195	115	94	129	533
		100.00%	75.20%	59.90%	100.00%	84.10%
	Sometimes	0	38	63	0	101
		0.00%	24.80%	40.10%	0.00%	15.90%
Data element selected randomly for checking consistency in the LQAS method	Randomly	117	77	157	87	438
		60.00%	50.30%	100.00%	67.40%	69.10%
	Guessing	78	76	0	42	196
		40.00%	49.70%	0.00%	32.60%	30.90%
The good cut point for data consistency is >85%	> 85 %	195	153	157	129	634
		100.00%	100.00%	100.00%	100.00%	100.00%
	<80%	0	0	0	0	0
		0.00%	0.00%	0.00%	0.00%	0.00%
The records consistent between MFI & FF(HH head, father grandfather names, house number, gote code)	Yes	192	152	152	125	621
		98.50%	99.30%	96.80%	96.90%	97.90%
	No	3	1	5	4	13
		1.50%	0.70%	3.20%	3.10%	2.10%
The HH head name was the same in FF and in house	Yes	191	152	157	129	629
		97.90%	99.30%	100.00%	100.00%	99.20%
	No	4	1	0	0	5
		2.10%	0.70%	0.00%	0.00%	0.80%
The house number was the same in FF and in house	Yes	162	142	152	126	582
		83.10%	92.80%	96.80%	97.70%	91.80%
	No	33	11	5	3	52
		16.90%	7.20%	3.20%	2.30%	8.20%
The number of HH members were the same in FF and in house	Yes	153	118	133	124	528
		78.50%	77.10%	84.70%	96.10%	83.30%
	No	42	35	24	5	106
		21.50%	22.90%	15.30%	3.90%	16.70%
The availability of latrine was the same in FF and in house	Yes	150	122	132	92	496
		76.90%	79.70%	84.10%	71.30%	78.20%
	No	45	31	25	37	138
		23.10%	20.30%	15.90%	28.70%	21.80%

Indicators		Wereda				Total
		HintaloWejerat	SamreSaharti	DoguaTembien	Enderta	
The availability of hand wash was the same in FF and in house	Yes	108	100	123	65	396
		55.40%	65.40%	78.30%	50.40%	62.50%
	No	87	53	34	64	238
		44.60%	34.60%	21.70%	49.60%	37.50%
The availability of wastage removal was the same in FF and in house	Yes	128	109	135	73	445
		65.60%	71.20%	86.00%	56.60%	70.20%
	No	67	44	22	56	189
		34.40%	28.80%	14.00%	43.40%	29.80%
Health posts didn't do additional reports(CBN, HIV, TB,OTP, EPI, CHD, IVR, surveillance)	Yes	3	2	0	0	5
		60.00%	50.00%	0.00%	0.00%	27.50%
	No	2	2	5	3	12
		40.00%	50.00%	100.00%	100.00%	72.50%
Health posts didn't do additional pages for additional reports(min1-max15 pages)	Yes	2	2	0	0	4
		40.00%	50.00%	0.00%	0.00%	22.50%
	No	3	2	5	3	13
		60.00%	50.00%	100.00%	100.00%	77.50%
Health posts didn't spend additional days for additional reports(min1-max3)	Yes	2	2	0	0	4
		40.00%	50.00%	0.00%	0.00%	22.50%
	No	3	2	5	3	13
		60.00%	50.00%	100.00%	100.00%	77.50%
Health posts didn't use parallel registration(OTP, Health education, IMNCI/ICCM, CBN,CHD,ANC,CBDDM)	Yes	2	3	0	2	7
		40.00%	75.00%	0.00%	66.70%	45.43%
	No	3	1	5	1	10
		60.00%	25.00%	100.00%	33.30%	54.58%
Average Consistency		71.14	73.95	63.33	64.51	68.16

Table 6:
The total evaluation result of the program by dimension& woreda

Evaluation Dimensions					
Woreda	Availability	Compliance	Completeness	Consistency	Average
H/wajirat	84	92.31	96.82	71.14	86.07
S/samre	90	86.54	85.07	73.95	83.89
D/tembien	92	93.85	101.75	63.33	87.73
Enderta	90	97.46	96.83	64.51	87.20
Average	89	92.54	95.12	68.23	86.22

Table 7:
The total evaluation result of implementation status of the program by dimension

Dimensions	Average results	Expected Value		Observed Value		Standard/ Judgment Parameter		Final Judgment
		W	%	W	%	W	%	
Availability	88.7	30	100	30	26.6	100	88.7	Very good
Compliance	92.54	20	100	20	18.51	100	92.54	Very good
Completeness	95.8	30	100	30	28.74	100	95.8	Excellent
Consistency	68.16	20	100	20	13.63	100	68.16	Poor
Total		100	100	100	87.48	100	87.48	Very good

Based on the evaluation dimensions Availability=88.7, Compliance=92.54,

Completeness=95.8, Consistency=68.16, completeness is excellent but consistency is poor and the overall evaluation is very good.

Discussion

In this study, the four dimensions, availability, compliance, completeness and consistency were used to assess the implementation status of CHIS/FF in south east zone. They were graded as 30%, 20%, 30% and 20% respectively.

According to the standard of HSTP II under the information revolution transformation the availability of CHIS guidelines is considered as excellent if it scores above 95% but in this study the availability of CHIS guidelines was 76%, which was marked as good. Specifically, it was, in Hintalo wajorat in 3/5 HPs, in Saharti Samre 3/4 HPs, in Dogua Tembien 5/5 HPs, and in Enderta 2/3 HPs are available in each woreda. Even though, it was not stated in percent, in a study conducted in Amhara region by JSI and FMOH recognized the availability of guidelines was important for implementing the FF on a large scale (21). This might be due to the guidelines were not distributed from woreda to each health posts and the HEWs were new and not trained on CHIS manuals. The availability (88.7%) in this study was consistent as compared to a case study conducted in Bungoma County Kenya which was 88.7%. The reason why the results of this study are similar with the study conducted in Kenya might be due to that they were conducted at a similar time and, the geographic and economic status of the countries is similar. The availability of shelves (100%) in this study was also consistent with a pilot test study entitled as "From Multiple Register to Family folder" (100%) and conducted in Ethiopia. And this achievement may be due to the concern of the government and stakeholders in providing the required amount of shelves to each health post.

Though the availability of health cards and integrated cards were good (88%) but it is still low as compared to the national CHIS guideline which suggested that all health posts must have all health cards. This indicates that there was a gap in registering all the needed information of clients, and under reporting & LQAS inconsistency. This might be due to the failure in distributing of all the necessary health cards from the districts to the health posts.

The availability of four types of CHIS tally sheets (service tally sheet, diseases tally sheet, family planning service delivery tally sheets and family planning dispensed count tally sheet) was 100%. The availability of CHIS reporting formats (service delivery & outpatient reporting formats) was also 100% in all HPs. This implies careful planning of the HEWs in requesting the required tally sheets and better communication between district health office managers and health extension workers. And also it implies that all services provided by the health posts were tallied and registered and reports were generated fully. Furthermore, the availability of shelves for family folder and tickler files also showed the endeavor of the district office in furnishing the health posts with the required facilities. This further indicates that all the family folders in each health posts were handled according to the standard.

Regarding the availability of field books in each HPs was 94%, specifically, in Hintalo wajarat 5/5 HPs, in Saharti Samre 4/4 HPs, in Dogua Tembien 4/5 HPs, and in Enderta 3/3 HPs. This shows that the HEWs were well aware about the importance of field book. The availability of MFI for each health posts for each kushets was also 100%. But the availability of Inks & brushes used for coding HH number was 29% which is very low. This might be due to the failure of distribution of brushes and inks during the study period. And, this leads not to provide household number for the new HHs and not to update the old household numbers.

Compliance: About 65% of the health posts were providing health and integrated cards to their clients when they visit the health posts for treatment. And the 82% of all health posts were using 7-digits to register individual number. But, according to the CHIS guideline individual number of the household must be provided CHIS card and given in 7-digits in the family folder. Regarding the utilization of field book, 30% of the HEWs were using it as a replacement of FF, while they were expected to use it independently. This shows that the HEWs were not well aware about the utilization of field book.

In this study 94% of the respondents explained that they used tickler file system to order patient records according to the future date that requires a follow-up visit. After each household visit the HEW records a date for the next follow-up visit for the specific household member. The health card is removed from the FF and placed in a box corresponding to the month of the next appointment. At the beginning of each month, the HEW reviews the cards in the box and prepares an agenda that includes providing appointment reminders or conducting household visits (Regional Health Bureau 2014). In complement to the above guideline, this shows that almost all the HEWs were using tickler files appropriately.

In this study, all health posts used tally sheet and 5-digits for house numbers in service and disease tally sheets. But only 82% of all HEWs used 7-digits for individual number. This might be because of the misunderstanding of tallying between house number and individual number.

Parallel registration books & reports were their main burdensome in their daily recording & reporting activities. More than 65% of the health extension workers used other registration books than family folder like CBDDM, OTP, CBN, IMNCI/ICCM, EPI, ANC, CBD, HAD, Development army log book, health education, environmental etc. and their reports too. Seventy six percent (76%) of the health extension workers do other reports than CHIS reports. Additionally the HEWs were using reports like: CBN, HIV, TB, Health education, environmental/ hygiene, births & deaths, Outpatient therapeutic program (OTP), expanded program on immunization (EPI), Community health day (CHD), Interactive voice record (IVR), surveillance. Additional 1 to 3 days were spent by the HEWs to generate the report and a minimum of one page and maximum fifteen pages were required. But the main objective of the CHIS is to minimize parallel recording and reporting. So, this miss-use of the CHIS tools may be due to that the CHIS is not revised recently in a way that it could incorporate the interest of other stakeholders recording and reporting system.

As the study by Oslo University in Tanzania and Mozambique explained there were no standardized recoding and reporting formatting tools which resulted for preparing local recording and reporting tools and leading to duplication (14). The data

collection tools do not meet either the report requirements or health facilities day-to-day functioning requirements. This implies when it is compared with CHIS in Ethiopia, it is lacking behind because CHIS has standardized recording and reporting formats but not meet all the requirements as in the case on Tanzania & Mozambique. And what is filled in the form is sometimes what the health worker thinks was done during the day, this contradicted with the assumption that tally sheets should be tallied daily (14).

Completeness: As this study revealed in some health posts Aynimbrkekin, Michael Abyi (D/Tembie) and Endamaernet (Enderta) the completeness of family folder registration was more than 100%. This achievement may be due to that the estimated households given by bureau of finance were less than the actual number of households in the tabia. And it may be also due to that the average fertility rate in the tabias was less than the actual fertility rate in the specific tabias. And in some health posts the difference was very high for example, Adiaawso HP in SahartiSamre (expected=1795 and FF registered =1507, difference=288), DebreKebie/enderta (expected=1493 and FF registered=833, difference=660), 44% house hold heads were not registered. In contrast to a study conducted in Kenya which revealed that completeness of registration was 74.6%, the completeness in this study was very high (95.8%). This might be due to that the average household members of the population in the study area were less than the conversion factor. In general the implementation status was excellent 95.8% according to the standard stated by stakeholders.

Consistency: In this study a large number (64.7%) of health posts were using other recording and reporting tools in addition to the standard CHIS tool. So this may contribute to the inconsistency of data recorded and reported in all the tools.

According to a study conducted in the SNNPR, the English family folder had translated in to Amharic to ensure correct recording of data and then MFI was prepared and Tabia profile. The Master Family Index, which is a village-wise list of the household heads in alphabetic order helps identify the household number of the family, and thereby retrieve the family Folder from the shelf. In this study, the HEWs use a tally sheet for recording the services they provide daily and about 97.9% of data between MFI and FF were consistent (21).

As the CHIS scale up project study mentioned that importance of tally sheet in data consistency, recording of the HH number against the services provided by the HEW, is proving very valuable in assuring data quality. Likewise, this study has also revealed that all the HEWs of health posts had tallied the health service using house number. This implies that the quality of data in the health posts is assured as a result (21).

As an evaluation conducted in Kenya the proportion of households with latrines was 87.7% in the intervention sites and 84.4% in the comparison sites, but in this study, the proportion of health posts with latrine was 78.2%, which is low as compared with intervention site but good form the comparison sites (23).

The case study gave more emphasis on the data collection and reporting tools used by HEWs at community level. HEWs were used exercise books to capture data in health posts & during outreach. As stated in a case study from multiple register to family folder conducted in-Ethiopia: It was noted that HEWs have used notebooks to record the health service given during home visiting. They transfer data from their notebooks to the main register at the health post. But in case of this study field book was used to capture the activities done during outreach. In the visited health posts, there were many registers ranging from 7 to 12 to document different health services. For instance, in one of the visited health posts, there were 10 registers of which only three were readymade to document specific health services whereas others were bare exercise books that need to be tailored as a register. Similarly the findings of this study showed that more than 64.7% of health posts used more than 10 parallel recording and 76.4 % of health posts used reporting formats; in addition they were also preparing additional 1 to 15 pages by spending 1 to 3 days for doing these parallel reports (17).

As the study conducted in Oromya region, accuracy or consistency has expresses as the consistency between the records of births and deaths in family folder and the number of births and deaths in the community or households. But this study has used HH head name, house number, number of HH members' e.t.c. and consistency of the records in MFI and FF, the records in the FF and information in houses, the parallel recording and reporting tools used to assess the overall consistency of the

program. Hence, the average consistency of the program implementation was 68.16% and it was judged as very good implementation status (20).

Conclusion

According to the results revealed from this study, it can be concluded that the overall implementation status of community health information system/FF in south east zone was acceptably improved. Based on the grades labeled for each of the four evaluation dimensions, the implementation status of CHIS was very good (87.48%) according to the judgment criteria's.

In general the overall availability of necessary resources for the implementation of CHIS was very good implementation status according to the judgment criteria's. It can be said that most of the CHIS materials were available in all health posts of all woredas. However the availability of some of the resources was low, for e.g. Tigrigna manual and inks and brushes were very less available. So the implementation of the CHIS system was affected directly by the unavailability of these resources.

Regarding the compliance of utilization of the available resources according to the standards, most of the health posts were utilizing their resources according to the standards. Most of the health posts in the study area had provided FF to the population in their catchment area. But there was less achievement in the utilization of health cards i.e. in providing cards to each member registered in the FF when they came seeking treatment. The utilization of MFI and organization of FF in the shelves using HH number and kushet in all health posts were very appropriate. So, we can conclude that, this achievement can be taken as good utilization of the resources according to the standard guidelines and has contributed to the very good implementation of the CHIS system.

The completeness of, in general, the implementation of the system was also very adequate seeking slight improvements. Most of the health posts in the study area have provided FF to the HHs in their catchment area. In some of the health posts the registered number of households in family folders was greater than the expected number of households to be registered in the health posts. While in some of the health posts was vice-versa.

Regarding the consistency of the data elements in the family folder and the actual information in the households, we can conclude that it was good which needs notable improvements, especially in updating of family folder information and assigning numbers to newly registered household members. The study has revealed also that data quality assurance was done in most of the health posts, which indicates that the HEWs in most of the HPs were well aware of data quality.

In general, according to the standard of HSTP II 2016-2020, the implementation status of CHIS in south east zone, Tigray region was very good.

Abbreviations

CBN-Community based nutrition, CBDDM-Community Based Data for Decision Making, CHD-Community health day, CHIS-Community Health Information System, BES-Boletin Epidemiological Semanal, DHIS -District Health Information Software, eHMIS-Electronic Health Information Management System, eCHIS-Electronic Community Health Information System, EPI-Expanded Program on Immunization, FF-Family Folder, FGD-Focused group discussion, FMOH-Federal Ministry of Health, LQAS-Lot Quality Assurance Sampling, M&E -Monitoring and Evaluation, MFI-Master Family Index, SNNPR-Southern nations, nationalities and peoples region, SSA-Sub Saharan Africa, TRHB-Tigray Regional Health Bureau, WDA-Women Development Army, WHO-World Health Organization, WOrHO-Woreda Health Office.

Declarations

Ethics approval and consent to participate

Ethical clearance and official letter were obtained from the Mekelle University College of health sciences. Permission letter was then received from Tigray Regional Health Bureau and woreda health offices in south east zone Tigray to collect data from

health posts.

Consent for Publication

Not Applicable

Availability of data and materials

All the data supporting the findings is contained within the manuscript, no additional data are needed.

Competing interests

The authors declare that they have no competing interests.

Funding Statement

The research was self-sponsored by the authors and there was no institutional fund to support the research.

Authors' contributions

MM was the primary author responsible for all the conduction of the research starting from its conception, design, data collection, analysis, interpretation, and write-up of the manuscript. TG & MH have also contributed in the data analysis, interpretation, and write-up of the manuscript. TW was also a Co-author who have significantly participated in the data analysis and write up of the manuscript. All authors have read and approved the final manuscript submitted for publication.

Acknowledgement

My gratitude and appreciation goes to my advisors Dr.Tesfay G/egzabiher and Mr. Mengistu Hagazi for their unreserved encouragement, constructive comments and guidance from the beginning of my proposal development until the completion of the thesis.

I would like to extend my heartfelt thanks to HMIS unit of regional health bureau for they help in providing necessary information, documents and comments on the proposal.

I am also grateful to Tigray regional health bureau and respective selected woredas (Enderta, HintaloWajarat, DoguaTembien and SahartiSamre) HMIS focal persons that they permit to principal investigator to overcome the evaluation on the selected health posts.

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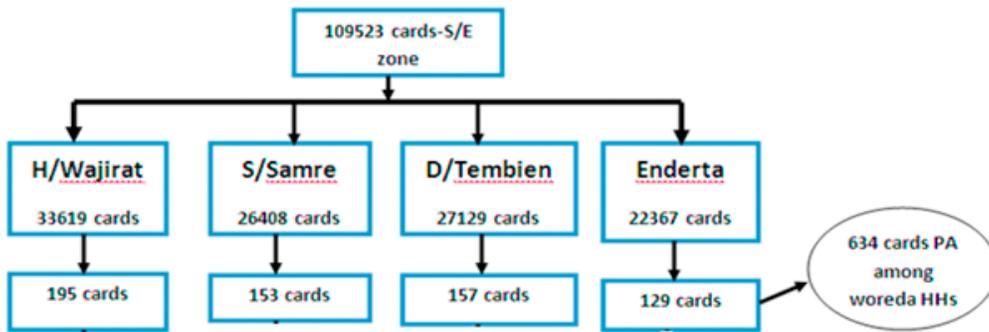


Figure 3

proportionally allocation of Family Folders among health posts in south east zone.

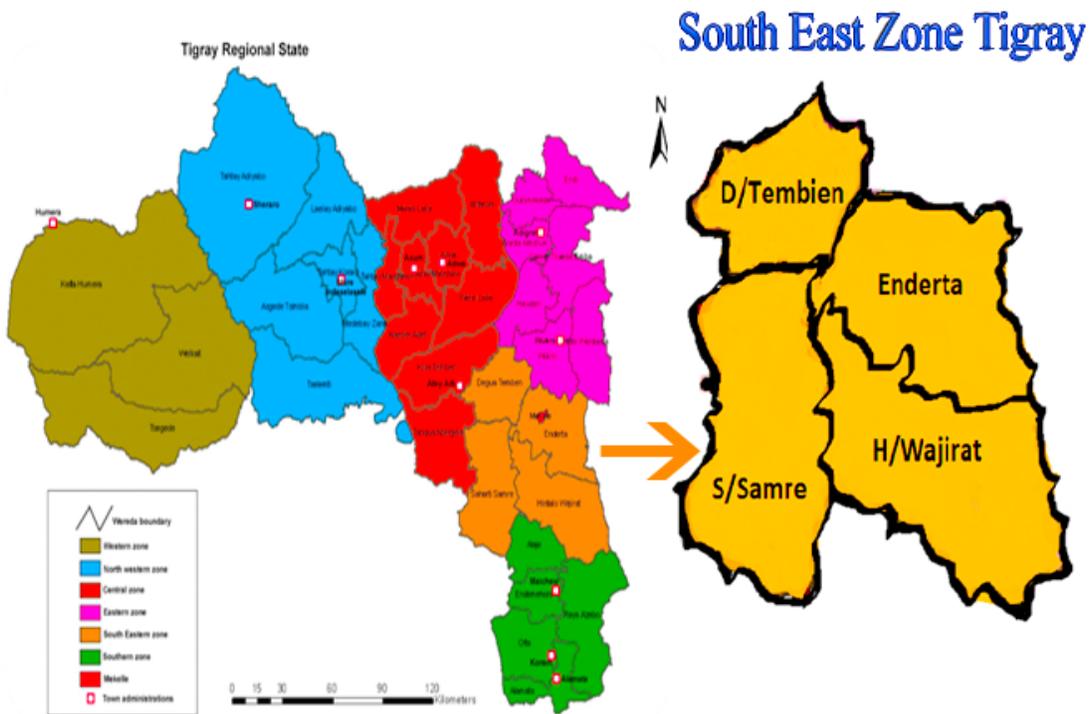


Figure 4

Map of South East Zone, Tigray