**Original Research Article**

**Utilization of Health Management Information Systemand Associated Factors in Health institutions of Kembata Tembaro Zone, Southern Ethiopia**

**Abstract**

**Background:** Health Management Information System (HMIS) isone of the six building blocks of a health system designed toprovide important data for continuous quality improvement at all levels of health care administration. It is a major source of information for monitoring and adjusting policy implementation and resources use.Study conducted in East Gojam showed that 45.8% of the health workers had a good level of routine health information utilization. To ensure the effective and efficient utilization of a system, periodic assessment is necessary in each level of health sector. Considerable study has been conducted in health data collection and ways to improve data quality, but little is known about utilization of HMIS in health services organization. Therefore, this study is aimed to assessthe utilization of HMIS and associated factorsin the study area.

**Methods**: A facility-based cross-sectional study design was employed in public health institutions of Kembata Tembaro zone from March 1 to 30, 2018. The sample size was calculated using single population proportion formula,and a total of 317 heads of units/departments of woreda health offices and health facilities were included.Quantitative and qualitative data were collected using structuredquestionnaires, observational check-lists and interview guide by trained data collectors. Multivariable logistic regressions were performed using Enter method to identify factors independently associated with dependent variable.Statistical significant variables were declared at P-value less than 0.05 and Odds ratio with 95% confidence interval were used for data interpretation.

**Result:**In this study, over all data utilization was 131(41.59%)with 95% CI of 38.9-46.1%.The data utilization was found to be 98(38.73%) and 33(53.23%) in the health facilities and health offices respectively. Training for HMIS[AOR (95% CI) =3.06(2.15-6.75)],availability of procedure manuals[AOR (95% CI) =3.67(1.78-9.01)],and Supportive supervision[AOR (95% CI) =5.30(3.05-11.53)]were found to be significantwith HMIS utilization.

**Conclusion:**Utilization of HMIS in public health institution was lower compared to previous studies. HMIS training,supportive supervision and Availability of procedure manuals were positively associated with utilization of HMIS. Health facilities and offices should avail HMIS manuals and capacity building of health workers through training and supportive supervision was recommended.

**Key words:**Ethiopia,HMISutilization,Kembata Tembaro, Public health institutions

# Introduction

Health management information system (HMIS)is defined as collective effort to collect, process, reportand use health information and knowledge to influence policy making, programmeaction andresearch(World Health Organization(WHO), 2011). The purpose of HMIS is to routinely generate quality health information that provides specific information support tothe decision-making process at each level of the health system for improving the health system performance, to respond to emergent threats, and to improve health(Health Metrics Network/World Health Organization, 2012).Utilization of data from HMIS is the practice of maintenance and care of health records bytraditional (paper-based) and electronic means in hospitals, health administrative office, healthdepartments, health insurance companies, and other facilities togenerate quality health information and use that information for management decisions to improve the performance of health services delivery(Belay, Azim and Kassahun, 2014a).Utilization of data from HMIS at all level of health services organizationsis used to improve health services effectiveness and efficiency(WHO), 2014).

Despite the credible use of data from HMIS for evidencebased decision making, countries with the greatest burden of ill health andthe most urgent needs for gooddata have the weakest utilization of health data in the vastmajority of world’s low income countries(Adane, Tadesse and Endazenaw, 2017).Although high effort to improve the efficiency of data utilization in the past few years, low andineffective data utilization practicingfrom HMIS,poor utilization of data at the local leveland inadequate knowledge and interest of health service providers in HMIS was seen in health system(Michelle Li, 2018).

Poor/absence of data utilization will result in occurrence of inadequate transparency between health administrative units and health care providing centers, which encounter unfair allocation of resources according to their need and interrupt supplies within the organization. As a result, it can frustrate the health staffs in health facilities compromising the attention paid to successful application of the system(Ruiling Guo, Tracy J. Farnsworth, 2016).

In Ethiopia, HMIS has been implemented since 2008 to capture and provide core indicators used to improve the provision of health services, and ultimately, to improve health status of the population (Ethiopian Federal Ministry of Health (FMOH), 2015).Government of Ethiopia gives due recognition to HMIS as a management supportsystem for improving the health system in Ethiopia by providing continuousinformation support todecision making processat each decision-making(Ethiopia, 2013).Federal Ministry of Health(FMOH) emphasized HMIS as a key to a successfulimplementation of the Health Sectors TransformationPlan (HSTP) and used information revolution for transformation agenda(Shiferaw *et al.*, 2017). HSTP underlined that routine data generated at district health facilities should beconsidered as the entrance to utilizing health information and a primary source of informationfor continuous monitoring of health services in the country, and that data should be utilized at theplace where it was generated(Ethiopian Federal Ministry of Health (FMOH), 2015).

Even though the FMOH has made tremendous effortson initiative of HMIS and reform changes, data/information utilization remains weak, particularly at district health offices and primary health care facilities, which have primary responsibility for operational management and decision making(Federal Ministry of Health Republic of Ethiopia, 2012).According to study conducted in public HCs of Addis Ababa, Ethiopia, level ofHMISutilization was 41.7%(Adane, Tadesse and Endazenaw, 2017).Other study donein East Gojam showed that 45.8% of the health workers had a good level of routine health information utilization(Shiferaw *et al.*, 2017).AccordingtoHMIS performance base line survey conducted in Southern Nations Nationalities and People Republic(SNNPR) of Ethiopia, the utilization of information was found to be limited in the assessed zones/special woreda.The use of HMIS information in the discussion and decisions taken are observed in few of the health facilities’ performance review minutes and lack of problem solving skills might account for most decisions being referred to higher authorities by the health facilities. Absence of guidelines and limited information feedback to health facilitieswere thecontributing factors for the observed minimum use of HMIS(Belay, Azim and Kassahun, 2014b). Considerable study has been conducted in health data collection and ways to to improve data quality, but little is known about utilization of HMIS in health services organization.Therefore, this study was designed to greatly signal the current status of HMIS utilizationand assessed its associated factors in the study areawhich can strengthen the communication channel for timely delivery of services.

**Methods and Materials**

**Study area and period**

A facility based cross-sectional study design using both quantitative and qualitative study was employed in public health institutions of Kembata Tembaro zone from March 1 to 30, 2018**.**The Zone is located in Southern Nations, Nationalities and People Republic of Ethiopia and its capital town, Durame, which is located 293 kilometers(KM) farfrom Addis Ababa and 118 KM farfrom Hawassa, capital town of S/N/N/P/Rgovernment of Ethiopia.In thiszone, there are 8 woreda health offices and 4health administrativehealth units, 1 general and4 primary hospitals,33 governmental and 3 non-governmental health centers, 136 health posts and 1170different types of health professionals.

**Source and study population**

The source population wereall health units/departments of Zonal health department,district health offices and Health facilities (HF) while study population were randomly selected units/departments of Zonal health department, district health officesand HF in the zone.

**Sample size determination and sampling technique**

The sample size was calculated using single population proportion formula, assuming 5% precision, 95% confidence interval and 32.9% proportion of overall utilization of HMIS in Jimma zone at district level(Sultan Abajebel et al., 2011).The population correction formula was used since the source population was less than 10,000(Glenn D. Israel, 2003) and byassuming10% non-response rate,the final sample size was 317.

Since all health facilities in the Zone currently were implementing HMIS, all units/departmentsheads from all health facilities and offices were includedin the study. In the study area, there were 633 units/departments from all health facilities and health offices.Simple Random Sampling (SRS) was used to select 64 and 253 study participants from health administrative units/health offices and health facilities respectively.. For qualitative study,heads of health offices, hospital and health centres, HMIS focal persons and case team leaders were selected purposively forin-depth interview.

**Data collection tools and techniques**

Data were obtained from heads of units/departments of health facilities and health offices of the zone. A face-to-face interview was conducted using self administered structuredquestionnaires that were developed after reviewing different relevant literatures (Sultan Abajebel et al., 2011; Teklegiorgis *et al.*, 2014; Abera *et al.*, 2016; Adane, Tadesse and Endazenaw, 2017)and observational checklists in the study units/departments to identify how data and information is generated like observation of registration books, monthly and annual reports, and graph, charts and Maps. Six Bsc nurses and one health officer were recruited to collect the data and supervise data collection process respectively.

**Data Quality control**

The quality of data was assured by proper designing of the questionnaires and by training the data collectors and supervisors for two days before the data collection. Every day after data collection, questionnaires were reviewed and checked to maintain its accuracy and completeness by supervisors.The English version questionnaires were translated into Kambatissaand Amharic languages (local languages) and again translated back to English version and comparisons were made on the consistency of these versions.Data collection tools were pretested at 5% of samplesize in shone primary hospital and East Badawacho health office, outside of the study areaprior to its actual use in data collection.

**Data management and statistical analysis**

Quantitative data were checked for completeness, inconsistency then coded and entered into epidata version 3.1 and exported to SPSS version 21 for analysis. Descriptive statistics were computed and tables, graphs and numerical summary presented the results*.* Bivariate analysis was carried out to see the association of each independent variable with utilization of HMIS. Variables with p-value less than 0.25 in bivariate analysis were considered as candidates for multivariable logistic regression analysis. Multivariable logistic regression analysis was performed using Enter method to identify factors independently associated with dependent variable. Statistical significance was declared at P-value less than 0.05 and the strength of statistical association was measured by adjusted odds ratios and 95% confidenceintervals.The qualitative data were transcribed and coded then merged in their thematic areas and a thematic framework analysis was employed manually. Finally, the descriptive summaries were made based on what participants explained. They were used assupplementation for quantitative data to verifyevents.

**Ethical consideration**

The study was conducted after getting permission from the institutional review board (IRB)of Jimmauniversity institute of Health(letter No: IRB/205/10 and date: 18/01/2018). Letter of cooperation was obtained from kembeta Tembero zone health department and woreda health offices. After clear discussion about the actual study or explaining of purpose of the study, verbal informed consent was obtained from each study subjects.

**Operational definition**

**Utilization of HMIS: -** Utilization of data from HMIS was assessed by using matrixes such as information for decision making to take immediate action, feedback from respective supervisors, calculation of area coverage and preparation of maps, presentation of key indicators with charts or tables and presentation of achievements of targets. Based on these criteria, the respondents were considered as utilized the data when they practiced a minimum of three out of five criteria (Sultan Abajebel et al., 2011; Adane, Tadesse and Endazenaw, 2017).

**Completeness:** - completeness is measured as filling in all data elements in the facility report
form, and also as the proportion of facilities reporting in an administrative area. Completed if > 85 % of them were filled

**Consistency:-** Is correspondence between data reported and data recorded in registers and
patient /client records, as measured by a Lot Quality Assurance Sample (LQAS) checked by allunits /department.Consistency >90%

**Results**

**General characteristics of the respondents**

In this study,315 study participants responded to the questionnaires with a response rate of 99%.Out of total respondentswho responded to the questionnaires, sixty two were selectedfrom health administrative units(health offices) while 253 wereselected from hospitals and health centers.Out of total respondents, majority of them, 138(43.8) were within the age range of 25-30 with a mean and standard deviation age of 27.24 and 5.4 respectively. The sex distribution of individuals working in the study units showed that about two third of them, 197(62.5%) were males. About two fifth, 131(41.6%) respondents’service year was2-4 years. Regarding educational status of respondents,198(62.9%) were diploma holders. (Table-1)

**Table-1:- General characteristics of respondents in Kembata Tembaro zone, 2018**

|  |  |  |
| --- | --- | --- |
|  Variables | Frequency | Percent |
| Age | 19-24 | 18 | 5.7 |
| 25-30 | 138 | 43.8 |
| 30-34 | 82 | 26.0 |
| 35-39 | 60 | 19.1 |
| ≥40 | 17 | 5.4 |
| Sex | Male | 197 | 62.5 |
| Female | 118 | 37.5 |
| Service year | 6m-2yrs | 65 | 20.5 |
| 2-4 years | 131 | 41.6 |
| 4-6 years | 99 | 31.4 |
| 6 years and above | 20 | 6.3 |
| Salary in ETB | < 1249 | 29 | 9.2 |
| 1250-2249 | 148 | 47.0 |
| >2250 | 138 | 43.8 |
| Level of education | Diploma | 198 | 62.9 |
| Degree | 113 | 35.9 |
| Master | 5 | 1.6 |
| Occupation in the organization | Health officers | 78 | 24.8 |
| Medical Doctors | 8 | 2.5 |
| laboratory technologists/technicians | 50 | 15.9 |
| pharmacists/pharmacy technicians | 56 | 17.8 |
| public health specialists | 5  | 1.59 |
| HIT professionals | 8 | 2.5 |
| All types of nurses | 110 | 34.9 |

**Organizational characteristics**

Among 315 observed units/departments, 99(31.4%) of them had computers. Based on organizational classification, 50(15.9%) and 49(15.6%) units/departments in health facilities (health centers and hospitals)and health officeshad computers respectively.

Regarding supervision,127(40.3%) units/departments were supervised at least once by higher bodies to provide and support directions of healthservices in the last six months. Among them, about one quarter,33(26%) were supervised irregularly while42(33%), 32(25%)of them were supervised once,twice and 3timesrespectively.

One of HMIS focal persons from health center said that*“... supervision wasconducted poorly and itwasirregular, and not planned, supportedby check list and well organized. Although, it was conducted as supportive, wassimply traditional type and conductedduring seasonal programs like campaigns.”*

About two third of the observed units/departments, 204(64.8%)had Health Information System (HIS) multi-disciplinary committee for over all design and directionusers of information.Among them,60(19%) of units/departmentsdidn’t have schedule for meeting any more.

One of key informant from head of health offices said that*“...there weremeetings in the departments/unitsfor reviewing performance.They were conducted not according to planandschedulesetted butthey were conducted as needed and not problem solving and some times corrections were not given on the pointsthat were mentioned and discussed during the meetings”*

Regarding HMIS training and technical support, 168(53.3%) staffs working in the units/departments received training. (Table-2)

Table-2: Organizational characteristics of the study subjects in health institutions of Kembata Tembaro Zone, 2018

|  |  |  |
| --- | --- | --- |
| Variables | Frequency | Percent |
| Availability of computers and computer programs | Yes | 99 | 31.4 |
| No | 216 | 68.6 |
| Supportive supervision within the six months | Yes | 127 | 40.3 |
| No | 188 | 59.7 |
| Receiving of training on HMIS including in-service training | Yes | 168 | 53.3 |
| No | 147 | 46.7 |
| Presence of multi-disciplinary committee | Yes | 204 | 64.8 |
| No | 111 | 35.2 |
| Frequency of meeting within the last six months | None | 60 | 19 |
| Monthly | 106 | 51.9 |
| Quarterly | 158 | 77.5 |
| Presence of health information system steering committee | Yes | 168 | 53.3 |
| No | 147 | 46.7 |
| Presence of data collection standards including case definitions | Yes | 289 | 91.7 |
| No | 26 | 8.3 |
| Adapt national target to local situation | Yes | 296 | 94.0 |
| No | 19 | 6.0 |
| No | 28 | 8.9 |
| Had monthly and quarterly reporting formats and tally sheets | Yes | 190 | 60.3 |
| No | 125 | 39.7 |
| Had standard HMIS registers | Yes | 162 | 51.4 |
| No | 153 | 48.6 |
| Had HMIS procedure manuals | Yes | 191 | 60.6 |
| No | 124 | 39.4 |

**Quality dimension of study subjects**

In this study,almost allthe units/departments prepared reports to submit next higher officials on weekly, monthly, quarterly and annual basis. Out of total units/departments, 301(95.6%) had data transmission, processing, and reporting rules.Among the totalunits/departments, 248(78.7%) keep their reports and registrations in well organized hard copy form while 56(17.8%) keep their reports in both hard and soft copy form. Regarding submission of reports, 117(37.1%) submit reports within 20-24 days. (Table-3)From the total interviewed respondents in the units/departments, 186(59.1%), 58.7%, and 46.7% revealed ambiguityand absence of WHO codes, redundancy and incompleteness of reporting formats respectively.

*One of the HMIS focal person from the health centers said that “…routine data was collected from both individual and working unit level but the tally process was laid to the HMIS focal person. Therefore, the data were not tallied in daily basis due to negligence, shortage of tally sheets and problem of awareness on reporting formats …*.”

Table-3: Quality dimensions of the study subjects in health institutions of Kembata Tembaro Zone, 2018

|  |  |  |
| --- | --- | --- |
|  Variables | Frequency | Percent |
| Prepared reports to higher officials | Yes | 312 | 99.05 |
| No | 2 | 0.95 |
| Keep their reports and registrations | In organized hard copy | 201 | 63.81 |
| Both hard and soft copy form. | 88 | 27.94 |
| Didn’t organize at all | 26 | 8.25 |
| Converted data into information | Yes | 225 | 87.31 |
| No | 90 | 12.69 |
|

|  |
| --- |
| Completeness of data |
|  |

 | Yes | 249 | 79.05 |
| No | 66 | 20.95 |
| Consistency of data with register book, tally sheets and reporting formats. | Yes | 198 | 62.86 |
| No | 117 | 37.14 |

**Data utilization**

More than half of the units/departments, 182(57.8%) calculated area coverage. Regarding receiving of feedback to recommend future action, more than half, 162(51.4%) of the units/departments received feedback. Most of the units/departments, 287(91.1%) had key indicators and about half of the units/departments presented their achievement of the targets. Moreover, about half of the studyunits/departments utilized information for decision making to take immediate action.

Based on measurement criteria, the overall data utilization was131(41.59%) with 95% CI:(38.9-46.1%). The data utilization was found to be 98(38.73%) and 33(53.23%) in the health facilities and health administrative units/health offices respectively (Figure-4).

Figure 1 Utilization of data from HMIS in different health services organizations

One of the head of health centers saidthat*“...the utilization of data was gearing back ward totraditional type since there was inappropriate data management due to inadequate investment and attention given in the data utilization andmanagement from concerned bodies.Most of the health workers consideredthedata utilization asresponsibilities of heads and HMIS focal persons...”*

One of HMIS focal person of woreda health office said that…. *“Most reports were aggregated but not analyzed and interpreted in work unitsat health center level. But this was relatively better worked in Woreda health offices and zonal health department; the problem is due to the complexity of reporting formats,miss matching of calculation indicators and understandinglevel of health workers.”*

**Factors associated with data utilization**

Among sixteen variables in bivariate logistic regression analysis, sevenof them had a p-value less than 0.25; hence, they were candidates for multivariable logistic regressions. The candidate variables were again entered in to multivariable logistic regression model to obtain variables which were independently associated withoutcome variable, utilization of data.

The variables with p-value less than 0.05 in multivariable logistic regression analysis were takenas significant predictors of outcome variable. Supportive supervision, availability of procedure manuals,and receiving of HMIS trainingwas found to be significantly associated with data utilization. Health units/departments, whichhadtrained staffs were 3.06times more likely utilizing routine data as compared to the units/departments without trained staffs[OR (95%CI) =3.06(2.15, 6.75)]. Health units/departments,whichhadHMIS procedure manuals were3.67times more likely utilizing data as compared tounits/departmentswithout HMIS procedure manuals[OR (95% CI) =3.67(1.78, 9.01)] (Table-4).

Table-4:Multivariable logistic regression analysis showing predictors of data utilization in units/ departments of healthsectorsin Kembeta Tembero Zone 2018

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Variables | Category | Utilization of HMIS | COR | AOR(95% CI) |
| Utilized | Not utilized |
| HMIS training | Yes | 107(63.7%) | 61(36.3%) | **2.40** | **3.06(2.15, 6.75)** |
| No | 62(42.2%) | 85(57.8%) | 1 | 1 |
| Availabilityofproceduremanuals | Yes | 98(51.0%) | 94(49.0%) | **2.73** | **3.67(1.78, 9.01)** |
| No | 34(27.6%) | 89(72.4%) |  | 1 |
| Supportive supervision | Yes | 101(79.5%) | 26(20.5%) | **17.60** | **15.30(13.05, 21.53)** |
| No | 34(18.1%) | 154(81.9%) |  | 1 |
| Keep their reports and registrations | In organized hard copy | 106(52.7%) | 95(47.3%) | 1 | 1 |
| In organized hard and soft copy | 58(65.9%) | 30(34.1%) | 1.73 | 2.03(0.98, 6.78) |
| Didn’t organize at all | 12(46.2%) | 14(53.8%) | 0.77 | 0.58(0.49, 2.43) |
| Availability of computers and computer programs | Yes | 65(65.7%) | 34(34.3%) | 2.21 | 2.64(0.78, 6.67) |
| No | 100(46.3%) | 116(53.7%) | 1 | 1 |
| Service years respondents in the units/departments | 6m-2 years | 28(43.1%) | 37(56.9%) | 1 | 1 |
| 2-4 years | 74(56.5%) | 57(43.5%) | 1.72 | 3.52(0.64, 2.78) |
| 4-6 years | 63(63.6%) | 36(36.4%) | 2.31 | 2.12(0.61, 5.43) |
| 6 years and above | 12(60%) | 8(40%) | 2.01 | 4(0.133, 7.09) |
| Presence of data collection standards including case definitions | Yes | 176(60.9%) | 113(39.1%) | 1.82 | 1.42(0.78, 4.32) |
| No | 12(46.2%) | 14(53.8%) | 1 | 1 |

**Discussion**

Sound and reliable information has remarkable importance on decision-making across all health system buildingblocks, and it is essential for health system policy development and implementation (WHO, 2008).The finding of this study revealed that utilization of HMIS was 41.6% in all study units/departments. This findingwas comparable with study conducted at public health centers in Addis Ababacity that reportedthe data utilization of 41.7%(Adane, Tadesse and Endazenaw, 2017). However,it was lower than what was documented in studies conductedin East Ethiopia, 53.1% (Teklegiorgis *et al.*, 2016) and East Gojam Zone of Northwest Ethiopia, 45.8% (Shiferaw *et al.*, 2017).This variation might be due to inadequate capacity building of health professionals with training and supportive supervision in this study than previous studies.

In this assessment, health units/departments, which used HMIS manuals as reference and guidelines were more likely utilizing routine data as compared to units/departments, whichdidn’t use HMIS procedure manuals for data utilization.This finding was comparableto study conducted in Addis Ababa city and S/N/N/P/R (Belay, Azim and Kassahun, 2014b; Adane, Tadesse and Endazenaw, 2017). This might be due to utilizing HMIS procedure manual may guide the operation and used asreference for routine health data generated from daily health care service in health facility level(Measure Evaluation, 2010).Receiving of training on HMISwas an important predictor that was significant with utilization of HMIS. Health units/departments, which had trained staffs, were more likely utilizing routine data as compared to units/departments without trained staffs. This finding was supported by studies conducted in different regions of Ethiopia(Teklegiorgis *et al.*, 2016; Shiferaw *et al.*, 2017; Wude *et al.*, 2020).Staff training is the most important motivatorand could improve the potential of health workers to analyze and make evidence-based decision(World Health Organization (WHO), 2014). It is known that continuous training as a part of capacitydevelopment is important to create awarenesson data utilization and decrease datamisinterpretation due to the lack of the right capacity, which is experienced in alldeveloping countries(Archangel, 2007).In this study, supportive supervision was anotherimportant factor that was significant with utilization of routine data.This finding was supported with study conducted in Northwest Ethiopia(Shiferaw *et al.*, 2017).This might be due to the fact that supervision has a significant role in identifying the gaps of routine health data use and provides feedback on identifiedproblemsand improving health workers’ performance.Availing of manuals for HMIS and capacity building of health workers through training and supportive supervision was recommended.

Limitation of the study was relatively small sample size which might reduce the power of the study and increase margin of error.

**Conclusion**

Utilization of HMIS in public health institution was lower compared to previous studiesfor decision making in health institutions of Kembata Tembaro Zone. Therewas poor capacity building of health workers in HMIS training and inadequate and irregular provision of supportive supervision to service units/departments from higher officials. Among many factors affecting the utilization of HMIS, only receiving of training for HMIS, availability of procedure manuals and supportive supervision were found to be significantly associated.Woreda health offices should avail the procedure manuals for the units/departments of both health facilities and heath offices. SNNPR health bureau should arrange HMIS training for health workers in the study area.

**Data availability**

The data sets used and/analyzed during this study are available from the corresponding author up on reasonable request.

**Acknowledgement**

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**Competing Interests**

There is no competing interest with the presented data as external data collectors collected it. There was not financial interest between the funder and the research area, community and us. We, the researchers, have no any form of competing financial and non-financial interest between ourselves.

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