Factors associated with low level of health information utilization in resources limited setting, Eastern Ethiopia

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Abstract: Health information system (HIS) is a system that integrates data collection, processing, reporting and use of the information necessary for improving health service effectiveness and efficiency through better management at all levels of health services. Despite the credible use of HIS for evidence based decision making, countries with the highest burden of ill health and the most in-needs for accurate and timely data have the weakest HIS in the vast majority of world's poorest countries. The main of this study was to assess the level of information utilization and identify factors affecting information use in, Ethiopian, health facilities. A cross sectional study was conducted by using structured questioners in Dire Dawa administration health facilities. All unit/department heads from all government health facilities were selected. The data was analyzed using STATA version 11. Frequency and percentages was computed to present the descriptive findings. Association between variables was computed using binary logistic regression. Over all utilization of health information was found to be 53.1%. Friendly format for reporting and managers provide regular feed back to their staff were found to be significantly associated with health information utilization, and their strength were (AOR=2.796,95% CI[1.478,5.288]) and (AOR=2.195,95%CI[1.213,3.974]) respectively. Overall HIS utilization was found to be below the national expectation level. Low utilization of HIS was found in health posts than health centers and hospitals. There was also shortage of assigned HIS personnel, separate HIS office and assigned budget for HIS in majority of units/departments.

Keywords: HMIS, HIS, Ethiopia, Information Utilization

1. Introduction

A health information system (HIS) is a system that integrates data collection, processing, reporting and use of the information necessary for improving health service effectiveness and efficiency through better management at all levels of health services. Maintaining a good HMIS is an essential part in strengthening the health system (1, 2). In 2007, the World Health Assembly (WHA) passed a resolution on strengthening of HIS. The resolution acknowledges that sound information is critical in framing evidence based health policy and making decision and it is fundamental for monitoring program towards internationally agreed health related development goals. Although HMIS forms a backbone for strong health systems, most developing countries still face a challenge in strengthening routine health information systems (3, 4).

In a good HMIS, data collection should be similar with the data requirements of users (only relevant data) and to the available processing capabilities, also the information generated should be simple to obtain and only the minimum required information must be collected, so that analysis can be done quickly. Feedback to the providers of the health data is an essential component of any reporting system (5, 6). The Ethiopian Federal Ministry of Health (FMOH) has emphasized the HMIS as a key component for successful implementation of Health Sector Development Program (HSDP) strategic plan. The core health indicators come from routine health service and administrative records through HMIS and M&E and are complementary processes standardizing of indicator definitions and data recording and reporting forms; integration of data from different programs

into a shared channels improves health system efficiency and effectiveness (7-9).

The value of health information is determined by its utilization in decision-making. Public health decision-making is critically dependent on the timely availability of sound data. Developing countries are reported to have a large amount of unreliable health data, poor human resources and poor information technology infrastructure, hence effective HIS are needed to improve these problems. In Ethiopia data quality and utilization of health information remains weak, particularly at primary health care facilities and district levels and the major associated factors includes (10-15).

2. Methods and Materials

2.1. Study Setting

This study was conducted in Dire Dawa administration, Ethiopia, health facilities from March 01-31/2013. Dire Dawa is one of the two chartered cities in Ethiopia (the other being the capital, Addis Ababa). Dire Dawa lies in the eastern part of Ethiopia which is 501 km away from Addis Ababa. The administration has one governmental hospital, 16 health centers and 34 health posts. Except the regional health bureau, it has no zonal or district health bureau.

Based on the 2007 Census conducted by the Central Statistical Agency of Ethiopia (CSA), Dire Dawa has a total population of 342,827, of whom 171,930 were men and 170,897 women; 232,854 or 69.92% of the population are considered urban inhabitants, with an estimated area of 1,231.20 square kilometers [32].

2.2. Study Design

We used a facility based cross sectional study design; all department heads of health facilities have been interviewed at point in time, to assess the level of information utilization and associated factors.

2.3. Study Participants and Sampling

The source population was all governmental health facilities found in Dire Dawa administration. The study population was all unit/department head of hospital, health centers and health posts. Since all health facilities in the administration currently implement HMIS, all unit/department heads from all health facilities were included in the study. In Dire Dawa Administration, there are a total of 267 unit/department heads from all health facilities including health posts. We conduct a census of unit/department heads i.e. all department heads have been included in this study.

2.4. Data Collection Procedures, Instrument, and Quality Management

A face to face interview using structured questionnaires was employed to collect primary data among all unit/department heads of the health facilities. The questionnaire was adopted from the performance of routine information system management framework assessment tool version 3.1. This PRISM tool is useful to get detailed information on the strengths and weaknesses of HIS in its input, process and output and identifies factors affecting its performance. It was prepared in English, translated to Amharic and then back to English by another person to ensure consistency. Two health professionals who are members of HIS monitoring team were assigned as supervisors. Six health professionals who had basic HMIS training and had prior experience on data collection were assigned as data collectors. To maintain data quality, during data collection period, the two supervisors and the principal investigators performed the supervision of data collection procedures on daily bases. Checked every completed questionnaire and gave onsite technical assistance to the data collectors. The data was checked for any missing values and completeness.

2.5. Data Analysis

The Collected data was checked for completeness, coded, entered and cleaned using STATA version 11. Analysis of data was done using the same package. Since all the variables were categorical frequency and percentages was computed to present the descriptive analysis. Associations between the dependent and independent variables were computed using binary logistic regression. A p-value <0.05 was considered as cut-off point for statistical significance.

To check whether the fitted model predicted well or not, the ROC Curve was analyzed and also Hosmer-Lemeshow test used to test overall goodness of fit. Multicollinearity in the variables was checked using Variance Inflation Factor (VIF).Interaction was also checked during the analysis.

2.6. Ethical Issues

Institutional ethical clearance was first sought from Mekelle University, college of health science. Data was collected after written consent from Dire Dawa regional health bureau. During the interview each participant were informed about the aim of the study. The interviewer discussed the issue of confidentiality and. Participants were informed that they have full right to refuse or discontinue participating in the research.

3. Results

3.1. Descriptive Analysis

Out of the total 239 respondents 188(78.7%) were from 16 health centers, 28(11.7%) were from health posts and the remaining 23(9.6%) were from one referral hospital. Of the total departments included on this study 25(10.4%) were from adult OPD, 12(5%) were each from Emergency, Delivery and ART departments, 15(6.3%) were from TB and Leprosy departments, 10(4.2%) were from VCT departments and 15(6.3%) were from under 5 OPD (Table-1).

Table 1. *Distribution of units/departments heads of hospital, health centers and health posts in Dire Dawa Administration health facility, April 2013.*

Unit/departments	Frequency	Percent
VCT	10	4.2
Adult OPD	25	10.4
Under 5 OPD	16	6.7
Laboratory	16	6.7
Pharmacy	16	6.7
Family planning	15	6.3
ANC/PMCT	15	6.3
Emergency	12	5.0
Delivery	12	5.0
Environmental	15	6.3
EPI	15	6.3
TBL	15	6.3
ART	12	5.0
Ward/IPD	9	3.8
Statistics Unit	8	3.3
Health Facility		
Unit/departments of health centers	188	78.7
Unit/departments of hospital	23	9.6
Units of health post	28	11.7

3.2. HIS Input

Majority 150(62.7%) and 154(64.4%) of the respondents reported that there was no assigned HIS personnel and separate HIS office in their department respectively. Majority, 195(81.6%) department heads reported there was no specific budget assigned for HIS. Around 125(52.3%) of the respondents also revealed there was no legislative, regulatory and planning framework in their facility (Table-2).

Table 2. *Health facility department's HIS inputs in Dire Dawa administration, April 2013.*

HIS input	Yes Frequency (%)	No Frequency (%)
Personnel assigned to HIS	89(37.2)	150(62.7)
Separate unit assigned to HIS	85(35.5)	154 (64.5)
Availability of equipment for HIS	149(62.3)	90(37.7)
Adequacy of equipments	68(45.6)	81(54.4)
Specific budget assigned for HIS	44(18.4)	195(81.6)
Mechanism to facilitate HIS resource	117(49.0)	122(51.0)
HIS training for staffs	126(52.7)	113(47.3)
Planning framework to use HIS	114(48.0)	125(52.0)
Duration of training		
Less than 6 months	28(22.2)	
6 months - 1 year	30(23.8)	
More than 1 year	68(54.0)	

3.3. HIS Process

One hundred ninety one (79.9%) unit/department heads reported they collect health data on daily basis. Majority 196(82.0%) of departments also keep patient registration and HIS monthly reports. Among them 137(57.3%) revealed the records were easily accessible to their staffs. Majority 164(68.6%) of heads also reported that they received directives in the last 3 months to check data accuracy, to fill format completely and submit the monthly report timely. In this study 185(77.4%) department heads claimed they submitted HIS report timely (Table 3).

Table 3. *Health facility department's HIS process in Dire Dawa Administration, Apr. 2013.*

HIS process	Yes Frequency (%)	No Frequency(%)
Collecting data on daily activities	191(79.9%)	48(20.1%)
Keep registration and copies of HIS monthly report	196(82.0%)	43(18%)
Accessibility of records for staffs	148(62.0%)	91(38.0%)
Procedures for distributing and reporting data	178(74.5%)	61(25.5%)
Data put at administrative level	205(85.7%)	34(14.3%)
Criteria for verification of completeness and consistency	181(75.7%)	58(24.3%)
Receive directives in the last 3 month	164(68.6%)	75(31.4%)
Timeliness of reported data	185(77.4%)	54(32.6%)
Completeness of reported data	196(82.0%)	43(18.0%)
Consistency of reported data	188(78.7%)	51(21.3%)
Representativeness of data.	195(81.9%)	44(18.1%)

3.4. HIS Output

Compiling of HIS data and reports containing HIS information was reported in 170(71.1%) and 162(67.8%) department heads respectively. Display of key indicators was reported in 145(60.7%) and quarterly and any other feedback reports were also available in 138(57.7%) of departments. Regarding the use of health information for decision making, 156(65.3%) reported they use information to make decision. Among them 72(46.2%) use the information for future reference, 66(42.3%) use to observe trends of service delivery and 18(11.5%) to pass reports for other subsidy health offices respectively (Table -4).

Table 4. *Health facility department's HIS output in Dire Dawa Administration, Apr. 2013.*

HIS Output	Yes Frequency (%)	No Frequency (%)
Department compile HIS data	170(71.1%)	69(28.9%)
Compile any report containing HIS information	162(67.8%)	77(32.2%)
Display key indicators with tables	145(60.7%)	94(39.3%)
Presence of catchment area map	163(68.2%)	76(31.8%)
Display summery of demographic information	177(74.0%)	62(26.0%)
Availability of feedback or other report on HIS data	138(57.7%)	101(42.3%)
Use HIS data for decision making	156(65.3%)	83(34.7%)
Use HIS data for future reference	72(46.2%)	
Use HIS data to observe trends	66(42.3%)	
Use HIS data to pass for subsidy health office	18(11.5%)	
Present target & performance	147(61.5%)	92(38.5%)
Calculation of area coverage	92 (38.5 %)	147(61.5%)
Presence of routine review meeting	146(61.1%)	93(38.9%)
Incentive for information use	67(28.1%)	172(71.9%)
Policy for information use	87(36.4%)	152(63.6%)
Dissemination mechanism of health information	154(64.4%)	85(35.6%)

Based on the set criteria for HIS utilization, overall utilization rate was found to be 53.1%. Utilization of HIS was also compared based on health facility type and from the

analysis the highest utilization rate was 55.3% by the health centers and 52.2% in hospitals followed by 39.3% in health posts (Figure-1).

Technical determinant characteristics for HIS utilization.

Table 11 revealed that health departments which had standard set of indicators were 2.39 times (COR=2.390, 95% CI [1.294, 4.415]) more likely utilized HIS than those departments which did not have standard indicators. Departments which had well designed format were 2.85 times more likely utilized HIS than those departments which did not have well designed format (COR=2.857, 95%CI [1.448, 5.637]). Similarly departments with friendly format for reporting were 3.12 times more likely utilize HIS than departments without friendly format (COR=3.122, 95%CI [1.671,5.831]). Health departments which had trained staffs to fill format were 3.98 times more likely utilize HIS than

departments without trained staffs (COR=3.986,95%CI [1.981,8.020]). Similarly health departments which had skilled human resource were 2.61 times more likely utilize HIS than departments without skilled human resource (COR=2.611, 95%CI [1.442, 4.725]). Departments which use appropriate technology for data analysis were 92% more likely utilize HIS than those departments which did not use technology for data analysis (COR=1.928,95%CI [1.131,3.286]). However when they are adjusted with other predictor variables, only friendly format for reporting showed statistically significant association (AOR=2.796, 95%CI [1.478,5.288]). Hence, departments with friendly format for reporting

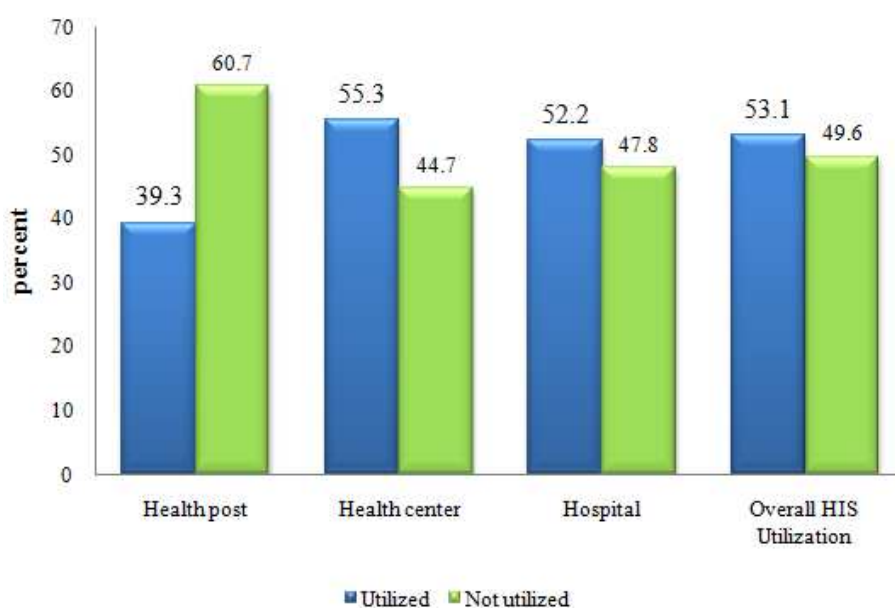Was 2.796 times more likely utilizing HIS than departments without friendly format.

Figure 1. *Utilization of HIS by health facility type in Dire Dawa Administration, Apr 2013.*

Table 5. *Associated Technical determinant characteristics for HIS utilization in all governmental health facilities at Dire Dawa Administration, Apr.2013.*

Technical characteristics	HIS utilization	COR	95%CI	AOR	95%CI
Standard set of indicator.	Agree Disagree	2.390 1^R	(1.294,4.415)	1.101 1^R	(0.514,2.391)
Well designed format.	Agree Disagree	2.857 1^R	(1.448,5.637)	1.388 1^R	(0.616,3.153)
Trained staff to fill format.	Agree Disagree	3.986 1^R	(1.981,8.020)	2.061 1^R	(0.911,4.661)
Skilled human resource.	Agree Disagree	2.611 1^R	(1.442,4.725)	1.404 1^R	(0.672,2.905)
Friendly format for reporting.	Agree Disagree	3.122 1^R	(1.671,5.831)	2.796 1^R	(1.478,5.288)*
Technology for data analysis.	Agree Disagree	1.928 1^R	(1.131,3.286)	1.293 1^R	(0.721,2.317)

CI= confidence interval *= p< 0.05, COR= Crude Odds Ratio, AOR= Adjusted Odds Ratio

3.5. Associated Organizational and Behavioral Characteristics for HIS Utilization

Health departments in which their decision was based on supervisor directives were 82% more likely utilize HIS than

departments in which their decision was not based on supervisor directives (COR=1.827, 95%CI [1.023, 3.261]). Managers who provide regular feedback to their staff were 2.42 times more likely utilize HIS than managers who did not provide feedback, (COR=2.420, 95%CI[1.362,4.302]).
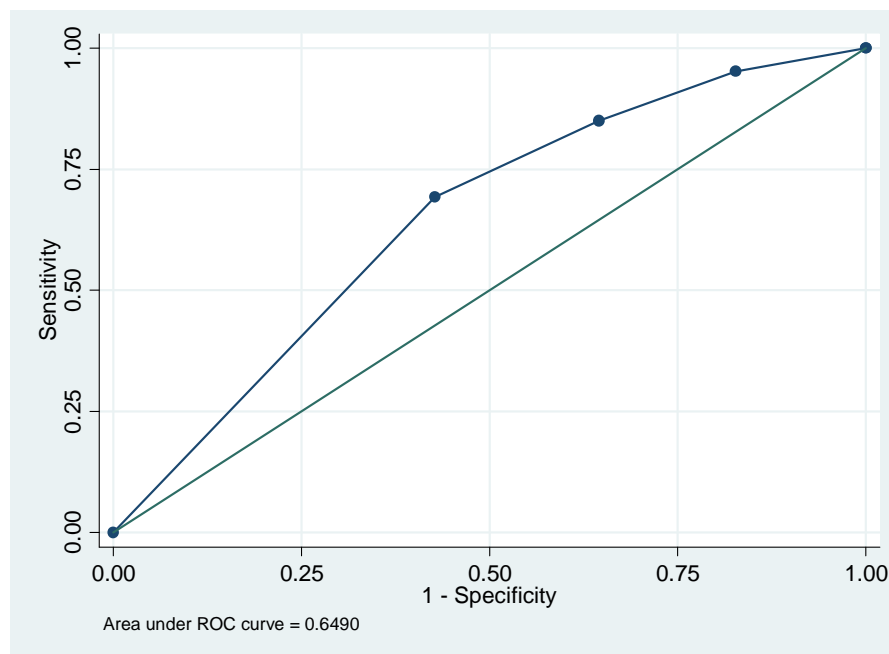
Similarly managers who report on data accuracy regularly were 94% more likely utilize HIS than those managers who did not report data accuracy, (COR=1.940, 95%CI [1.107,3.397]), however when they are adjusted with other variables only managers who provide regular feedback to their staffs was significantly associated with HIS utilization and these managers were 2.195 times more likely utilize HIS than managers who did not provide feedback(AOR=2.195, 95%CI[(1.213,3.974]).

Table 6. Associated organizational and behavioral characteristics for HIS Utilization in all governmental health facilities at Dire Dawa Administration, Apr.2013.

Possible Determinants	HIS Utilization	C OR	95% CI	A OR	95% CI
Decision based on supervisor directive.	Agree	1.827	(1.023,3.261)	1.256	(0.664,2.362)
	Disagree	1[R]		1[R]	
Managers provide regular feedback.	Agree	2.420	(1.362,4.302)	2.195	(1.213,3.974)*
	Disagree	1[R]		1[R]	
Manager report on data accuracy.	Agree	1.940	(1.107,3.397)	0.886	(0.773,2.312)
	Disagree	1[R]		1[R]	

CI= confidence interval *= p< 0.05, COR= Crude Odds Ratio, AOR= Adjusted Odds Ratio

Figure 2. Model Adequacy goodness of fit

The area under the ROC curve (Figure-2) was 0.649 which suggests that the logistic regression model fairly predict (cut-off point=0.50). The significance value of Hosmer-Lemeshow (Goodness-of-Fit) statistic was statistically insignificant (p=0.992) which indicated that the model adequately fit the data. multicolinearity in the variables was checked using Variance Inflation Factor (VIF) and the calculated VIF was 1.03 which is less than 10 and this indicates there was no a problem of multicolinearity.

4. Discussion

Based on PRISM framework using HIS performance diagnostic tools, this study tried to assess the current status of HIS performance at health facility's HIS input, process and output and also tried to identify possible determinant of technical, organizational and behavioral factors for HIS utilization and data quality.

From the findings of this study 75% of units/departments reported that they had trained staffs and skilled human resources who were capable of performing HIS tasks. Though only 37% of departments reported there were specifically assigned personnel for HIS activity. Similarly 35% and 19% of the facilities have separated HIS office and assigned budget for HIS. These finding was somewhat comparable with other similar study in Bahr-Dar where 45%, 43% and 21% was reported for availability of HIS personnel, HIS office and budget respectively in 2011[27], while only 23.8% was reported for trained staff in North Gonder in 2006 [29] .Regarding availability of HIS equipment, 63% had the necessary equipment. Whereas availability of coordination mechanism to facilitate the use of HIS resources and presence of regulatory and planning framework to use HIS were found to be below 50%. This may be due to less

concern given to these issues by majority of the facilities. Considering training on HIS activity, 53% responded for availability of training. It is known that continuous training on HIS activity is important to create awareness, to have trained staff and skilled human resource that are confident and motivated to perform HIS task. When compared to a similar study conducted in Jimma, HIS training was below 50% in 2009 [26].

In order to check the accuracy of the data collected and report at the origin of data source, patient registration and copy of HIS monthly reports should be kept well. According to this study 90% of departments collect health data on daily activity and 82% keep patient registration and HIS monthly reports. These records were also easily accessible to staffs and easily retrieved in 67% of the departments. A similar study done in Jimma reported that all health departments collect data on daily activity and 73% keep their registration and monthly reports. Whereas the study conducted in Bahr Dar revealed that only 77% collect data on daily activity. In this study more than 74% of departments had clear procedure for distributing and reporting the collected data, 85% put the data at administrative level and 75% used a set of criteria to verify completeness and consistency of data before reporting. Regarding availability of supervision 69% of units/ departments had received supervisor directives to check data accuracy, to fill format completely and submit monthly report timely. This was higher when compared with similar studies where availability of supervision was reported below 50% in Bahr-Dar and North Gonder respectively. This may be due to the fact that majority of the health facilities were easily reachable for supervision.

Accurate, consistent, complete and timely information is essential for public health decision-making and action-taking such as policy making, planning, programming and monitoring [13]. In this study 77.4% department heads agreed reports were submitted according to the schedule, which is within 20th to 22nd days of the month for health post and 20th to 24th for health centers and hospital. There was 82.0% department heads also claimed reports were completely filled before reporting while 78.7% of these reports was agreed to be consistent. A similar study in North Gonder showed only 50% HMIS reports were submitted timely while 96% of these reports were completely filled in 2006. Consistency of reports in this study area was slightly high compared to the study in Jimma where 62% of respondents claimed consistency of reports in 2009. This increment may be due to the fact that majority of units/departments had basic HIS training, which in turn had skilled human resource to perform HIS tasks in improving data quality and information use. Another reason could be due to availability of good supervision and feedback given by senior supervisors in this study area.

As originally proposed, HIS performance is defined as improved data quality and continuous use of information. In addition Use of information depends upon the decision power of the people and the importance given to other considerations despite the availability of information [15].

From the finding of this study 71.1% and 67.8% of units/departments compile HIS data and report containing HIS information respectively. It is known that health departments are the primary producers of data and are expected to change this data in to information at the site of data generation. This information is used for evidence based decision making for planning, budget allocation, monitoring and evaluation of program to take immediate action. So based on the set criteria for HIS utilization the overall utilization was found to be 53.1%. This finding was higher when compared with other similar studies in which only 22.5% HIS utilization was reported in North Gonder, 32.9% in Jimma, 45.6% in Bahr Dar, and 44.6% reported in Malawi. On the other hand this finding could be strengthened by the report of progress and lessons on HMIS/M&E implementation from pioneer regions (including Dire Dawa) in 2008 showed that health facilities implementing the new HMIS and M&E achieved considerably high improvements in data quality, information management, and reporting and information use [33].

About 61% units reported there was routine meeting for reviewing managerial and administrative matters. This was higher compared to the assessment report on data quality and information use in selected health facilities in 2011 where only 23.5% facilities had routine review meeting [30]. In this study availability of incentives and policy for information use were found to be below 40%. A similar finding was reported on the study conducted in Bahr Dar where only 18.3% and 42.9% reported for availability of incentives and policy respectively.

Although the PRISM framework allows identifying determinant factors for HIS utilization and data quality, due to lack of similar studies conducted using this framework, it did not allow comparison of the identified determinant factors between different studies.

Among the technical variables friendly format for reporting was found to be significant predictor for HIS utilization. This might be explained by friendly format increase the motivation and confidence of health professionals in performing HIS tasks and saves their time during reporting. Whereas among behavioral and organizational factors managers provide regular feedback to their staffs was also found to be determinant factors for HIS utilization. This might be due to the fact that if there is feedback mechanism, departments will identify their strength and weakness.

Acknowledgements

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