

# Health workers with good self-perceived competency have lower actual competency levels on HIS in Eastern Ethiopia: A cross-sectional study

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## Abstract

**Introduction:** Utilization of health information is critical to meeting service performance goals and for making informed decisions. However, in resource limited countries, health data is rarely used in decisions around program improvements. This study aimed to assess the determinants of competency levels for health workers who utilized data from health information systems in Eastern Ethiopia.

**Methods:** A cross-sectional study was carried out from April - May 2021 at selected public health facilities in the Dire Dawa city and Harar regions. A total of 129 health professionals were included in the study and simple random sampling techniques were used to select health facilities. Data was collected using face-to-face interviews and competency levels were measured using a tool adapted from the Performance of Routine Information Systems Management (PRISM) framework. STATA version 16 was used for data analysis. A linear regression model was applied to determine the linear relationship between self-perceived competency and the actual competency levels of the healthcare workers. Adjusted beta ( $\beta$ ) along with a 95% confidence interval (CI) was used to measure the strength of the association with a p-value  $< 0.05$ .

**Results:** The overall mean for the actual competency levels of health workers who utilized data was 20.45 [95% CI: 16.71, 24.19]. Being head of a hospital/health center ( $\beta$ : 19.24, 95% CI: 4.42, 34.06), perusing HIS training ( $\beta$ : 14.38, 95% CI: 6.10, 22.67) and good perceived competency to perform RHIS tasks ( $\beta$ : -12.96, 95% CI: -25.49, -0.43) were significantly associated with actual competency levels.

**Conclusion:** The Health workers with high perceived competency levels were found to have actual competency levels that were low. Health information system focused trainings were found to be positively associated with actual competency levels and being a hospital or health center head was found to be associated negatively to the actual competency levels of health workers. This research has found that providing health information system training for health workers could prove to be beneficial. There is also a need for initiatives aimed at enhancing competency in order to improve the health information systems related competency levels and data use. [*Ethiop. J. Health Dev.* 2022;36 (SI-1)]

**Keywords:** Competency, Data Use, Health Information System, Performance Monitoring Team, Ethiopia.

**Teaser Key Message:** There was significant discrepancy between actual HIS competency level of health workers and self-perceived competency. Attitude improving initiatives at health facilities have the potential to enhance data use.

### Key Findings

- There was significant discrepancy between actual HIS competency level of health workers and perceived competency level in the study area
- About half of the study participants have poor attitude towards data use
- Most capacity building activities focused on routine trainings

### Key Implications

- A favorable attitude towards data predicts actual HIS competency
- Data use level can be enhanced by incorporating attitude improving initiatives at health facilities
- Performance Monitoring Team focused capacity building activities including knowledge management, documentation and digital literacy have the potential to improve the actual competency of HIS professionals, and hence the data use level of the facilities.

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## Introduction

Data from Health Information System (HIS) is crucial for improving clinical and management decisions that help to provide high-quality health care services. It is designed to support planning, health research, human resources development, strategy development and implementation, and decision making in health facilities and organizations (1, 2). A strong and functional HIS is useful in providing the right information at the right time to support managers, and service providers in making the right decisions based on evidence (3-6).

Data use is the process by which decision makers and stakeholders explicitly utilize available information in one-or-more steps in the process of policymaking, program planning, management, and/or service provision. The use of health information is an essential component of the structural capacity of health departments, and public health performance depends on the effectiveness of information use (7,8). However, data use practices at lower-level is insufficient, especially in resource-limited settings (9-11). Overall, HMIS information use was 53% in South Africa, 38% in Cote D'Ivoire and 58% in Liberia (12,13). Competencies on HIS related tasks in many countries are often ill-defined at facility, regional, supervisory and service delivery levels (14).

Ethiopia introduced the Health Management Information System (HMIS) in 2008 as a key tool for enhancing the culture of information use for evidence-based decisions at the facility and lower administrative levels (15). In Ethiopia, studies indicated that 53.1% and 46% of the district health facilities and facility heads used routine HMIS records/data for decision making, respectively (16,17) and there was paucity of evidence regarding the use of health information for decision making in some facilities (18).

The information revolution (IR) is one of the four transformation agendas in the Health Sector Transformation Plan (HSTP) of Ethiopia. In order to bring about a fundamental cultural and attitudinal transformation regarding the practical use of information, IR necessitates a shift from traditional techniques of information consumption to a more data centered approach. Health information is generated at each level of the health system and then submitted to each subsequent level without adequate use for performance improvement at the lower levels (18,19). Reports indicate that data use for decision making is low due to organizational problems as well as due to the technical and behavioral characteristics of healthcare professionals (20).

A health worker skilled in generating, analyzing and using data is required at all levels of the health care system. Moreover, health workers who are competent in using HIS, can go on to make sound operational, tactical, and strategic decisions (14). However, in most health facilities that are in resource-limited countries, of which Ethiopia is one, health data is not utilized properly for decisions and program improvements mainly due to a shortage of health information system

specialists and a lack of capacity and confidence among the general health workforce in performing health information system tasks (14-21, 22).

Despite the above-mentioned facts, there is a scarcity of evidence on the determinant factors for the competence levels of health workers on HIS data use for decision making in Ethiopia. Therefore, this study aimed to assess the competency level of health workers on HIS data use and its determinants at public health facilities in Eastern Ethiopia. The findings will aid facilities in making informed decisions and will serve as a resource for health policymakers and other stakeholders in identifying challenges and the potential for improvement.

## Methods

**Study Setting:** This study was conducted at selected public health facilities in the Dire Dawa city administration and Harari region. Dire Dawa is around 515 kilometers from Addis Ababa, Ethiopia's capital, and has a population of 341,834 people, with 68.23% of them living in cities. There are about 15 health centers (8 urban and 7 rural), two hospitals, and 32 health posts under the city's administration. There are a total of 622 health professionals and 209 health extension workers, and these public facilities serve a total of 480,000 people. Harari is one of the ten regional states of Ethiopia, covering the homeland of the Harari people. Harar town is located 500 km east of Addis Ababa and 48 km south of Dire Dawa. Harari Region has a total population of 183,415 people, of whom 92,316 are men and 91,099 are women (23). The majority of its population lives in urban areas, which accounts for 54.18% of the population (24). There are three government hospitals, one university teaching hospital, two private hospitals, eight health centers, and 24 health posts.

## Study Design and Population

A facility-based cross-sectional study was carried out from April to May 2021. The population of interest for this study were all public health facilities, PMT members, health professionals, and the HIT of public health facilities found in Harari and Dire Dawa. In addition, selected health professionals, which included physicians, nurses, health officers, pharmacists, laboratory technicians, midwives, finance and human resource personnel, HMIS staff, psychiatry professionals, dentists, ophthalmology professionals, and other professionals working in the selected facilities were included.

## Sample Size and Sampling Procedure

The ideal sample size in linear regression depends on the number of independent variables in the models. A general rule of thumb is that the minimum sample size should be at least 10 observations per variable (25). According to the foregoing rule, the minimum sample size required was 120 ( $10 \times 12$ ) and after including a 10% non-response rate, the final sample size was 132 participants. A Simple random sampling method was used to select health facilities and accordingly all PMT

members from two hospitals and five health centers were included in this study.

### Measurements

The response variable that was measured using actual data was the competency level on HIS data use. Competency levels were measured by providing study participants with series of questions on knowledge on HIS, data analysis, presentation, and use of information for making decisions. A high score indicates high levels of competency. Factors related to actual competency levels were collected through face-to-face interviews using semi-structured questionnaires developed in English. This tool included questions related to socio-demographic characteristics, HIS training, knowledge, attitude and perception towards information use, and perceived competency level. Health Information System Training was assessed by asking “yes” or “No” questions on whether health workers took any HIS related training and then if their response is “yes” they were asked the type of training. Furthermore, facility-level information use was also assessed using a checklist. The investigators developed a questionnaire to collect data on socio-demographics and HIS training. Questions related to facility level information use, knowledge, attitude and perception towards information use, and perceived competency level were adapted from the Performance of Routine Information Systems Management (PRISM) framework (26).

### Data quality control

A pre-test was conducted on other similar health facilities (Addis Ketema health center), which was not included in this study. A trained MPH/MSc student in health programs was involved in the data collection. The data collection activities were supervised on a daily basis by the research team.

### Statistical Analysis and Data Processing

The data collected data was screened for completeness and consistency before being cleaned and entered into Epi Data version 4.5 and exported to STATA version

16 for analysis. Descriptive statistics and summary statistics were presented using texts, figures, and tables. A linear regression model was applied to determine the linear relationship between the dependent variable (actual competency level) and each independent variable. Independent variables with a p-value < 0.25 in the bi-variable linear regression were considered as candidates for a multivariable linear regression. Adjusted beta ( $\beta$ ) along with a 95% confidence interval (CI) was estimated to measure the strength of the association. The level of statistical significance was declared at a p-value < 0.05. Basic linear regression assumptions were checked.

### Ethics approval and consent to participate

The ethical clearance for this research was obtained from the Haramaya University College of Health and Medical Sciences, Institutional Health Research Ethics Review Committee (IHRERC) with reference number IHRERC/196/2020. Permission was sought from all concerned offices, including Dire Dawa Health Bureau and the health facilities. Prior to data collection, informed, voluntary, written and signed consent were obtained from the heads of each study public health facility and from the study participants. The information was kept confidential during and after the collection of data.

### Results

**Baseline Characteristics:** In this study, a total of 129 study participants were included from two hospitals and five health centers, with a response rate of 97.72%. The mean number of human resources was 359.5 ( $\pm 91.2$ ) and 84.5 ( $\pm 28.0$ ) for hospitals and health centers respectively. Among the respondents, more than half (53.49%) of them were females. More than three quarters (82.03%) of respondents have had a degree level of education, and more than half of them (57.81%) were nurses. The mean age of study participants was 32.39 (SD=7.58) years. The median work experience and duration with the current position were 8 (IQR=5.16) and 3 (IQR=2.02) years respectively (Table 1).

Table 1: Background characteristics of study participants (N=129).

Variable	Frequency	Percentages
<b>Gender</b>		
Female	69	53.49
Male	60	46.51
<b>Level of education</b>		
Diploma	18	14.06
Degree	105	82.03
Master's & above	5	3.91
<b>Type of facility</b>		
General Hospital	78	60.46
Health center	51	39.54
<b>Profession</b>		
Non HIT professionals	116	89.92
HIT/IT	13	10.08
<b>Title of the study subject</b>		
Healthcare provider	57	46.34
Case-team leader	20	16.26
Health center head	5	4.07
HMIS focal person	4	3.25
Hospital CEO	3	2.44

Health Extension Supervisors	2	1.63
Others	32	26.02

**Health information system training**

Nearly two-thirds (60.16%) of the participants received at least one type of health information system (HIS) related training. More than one-third of the training had

no post-training follow-up (38.33%). In terms of the types of HIS training they received, thirty-five (45.45%) took DHIS2 training and thirty-three respondents took HMIS training (**Figure 1**).

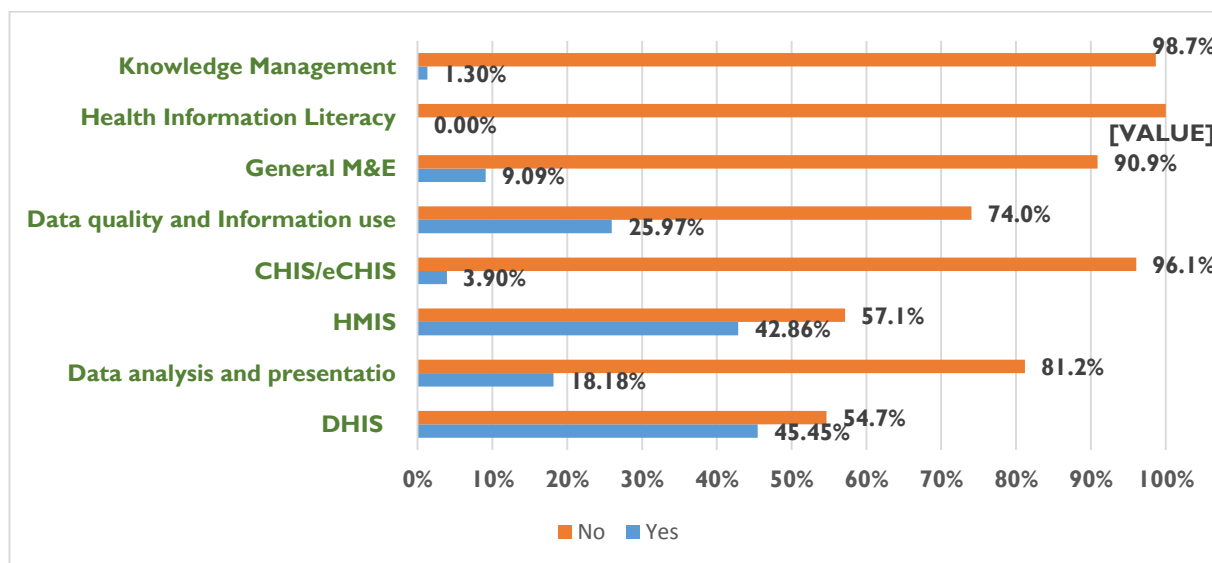


Figure 1: Health information system related training among heath facility workers.

**Knowledge, attitude and perception of health workers towards information use:**

The mean score of items were computed and then health workers who scored above the mean were classified as having good knowledge and attitude whereas those who scored below the mean were

classified as having poor knowledge and attitude (27, 28). Furthermore, half of the health workers (50.39%) had good attitudes towards information use, more than one third had a good perception. Regarding knowledge of HIS, a more than half (51.16%) had good knowledge (**Figure 2**).

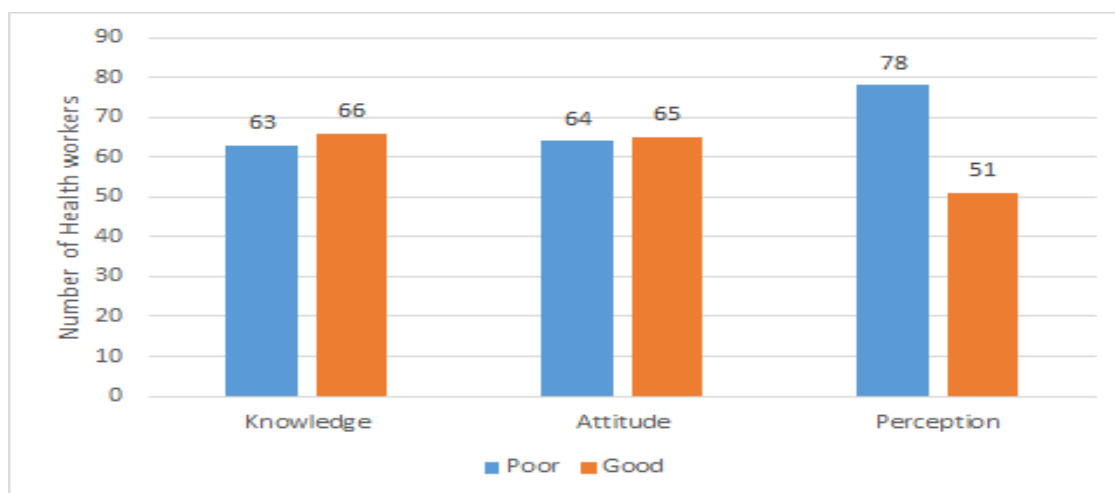


Figure 2: Knowledge, attitude and perception towards information use among heath facility workers.

**Perceived and actual competency level to perform RHIS tasks**

Health professionals who scored greater than or equal to 75% were considered as having good perceived and actual competency based on the recommendation of the PRISM framework (29). In this study, more than one-fourth (27.13%) had good perceived competency to perform RHIS tasks. However, the actual mean

competency levels of health workers were 20.45 [95% CI; 16.71, 24.19].

**Facility level information use**

**Planning and documentation:** All facilities included in this analysis had an annual plan, cascaded their annual plan to departments or case teams, and used their annual plan during bottlenecking and SWOT analysis. Only two facilities reported having a strategic

plan. All health facilities reported using data for target settings, using electronic systems for routine health data management, using DHIS2 for data entry and using excel based spreadsheets for data analysis. Almost all (six out of the seven facilities) used DHIS2 for analysis, whereas only three facilities used an excel-based spreadsheet for data entry.

#### Availability of up to date HIS documents and data visuals

Regarding the availability of up-to-date HIS documents, all facilities had an aggregated/summary

HMIS report and HIS guidelines. Five facilities had demographic data on their catchment population, whereas six facilities had up-to-date indicators, disaggregated data, and data over time on one of the key RMNCH-Y and disease prevention indicators. Two facilities prepared an annual bulletin/report that included discussions, decisions or recommendations on MCH, disease prevention and control, public health emergencies, human resource management, KPI, and hygiene and sanitation (Table 2).

**Table 2: Availability of up to date HIS documents/reports for selected health facilities.**

Variable	Category	Frequency (%)
<b>Demographic data</b>	Yes	5(71.43)
	No	2(28.57)
<b>Data over time on RMNCH-Y and disease prevention indicators</b>	Yes	6(85.71)
	No	1(14.29)
<b>Disaggregated data on RMNCH-Y and disease prevention indicators</b>	Yes	6(85.71)
	No	1(14.29)
<b>Comparison of service coverage on MCH and disease prevention indicator</b>	Yes	6(85.71)
	No	1(14.29)
<b>Having updated analyzed routine health data</b>	Yes	6(85.71)
	No	1(14.29)
<b>Annual report/Bulletin preparation</b>	Yes	2(28.57)
	No	5(71.43)
<b>Map of catchment area</b>	Yes	3(42.86)
	No	4(57.14)
<b>Catchment population profile</b>	Yes	5(71.43)
	No	2(28.57)
<b>Staffing data visualized</b>	Yes	4(66.67)
	No	2(33.33)
<b>Tot ten cause of morbidity visualized</b>	Yes	5(71.43)
	No	2(28.57)
<b>CAR by age/method visualized</b>	Yes	6(85.71)
	No	14(29)
<b>ANC coverage data visualized</b>	Yes	6(85.71)
	No	14(29)
<b>SBA data visualized</b>	Yes	6(85.71)
	No	14(29)
<b>Penta3 immunization data visualized</b>	Yes	6(85.71)
	No	14(29)
<b>Measles immunization coverage data visualized</b>	Yes	6(85.71)
	No	1(14.29)
<b>Malaria data visualized</b>	Yes	4(57.14)
	No	3(42.86)
<b>Pneumonia data visualized</b>	Yes	3(42.86)
	No	4(57.14)
<b>HIV/AIDS(VCT) data visualized</b>	Yes	5(71.43)
	No	2(28.57)
<b>HIV/AIDS(PMTCT) data visualized</b>	Yes	3(42.86)
	No	4(57.14)
<b>HIV/AIDS(ART) data visualized</b>	Yes	6(85.71)
	No	1(14.29)
<b>Hygiene and sanitation data visualized</b>	Yes	2(28.57)
	No	5(71.43)

#### Decision making and performance discussion forums

All facilities have functional PMT, but one facility reported that PMT membership was not per the standard. Regarding the frequency of PMT meetings in the past three months, only one facility met three times for PMT meetings. All facilities maintained PMT

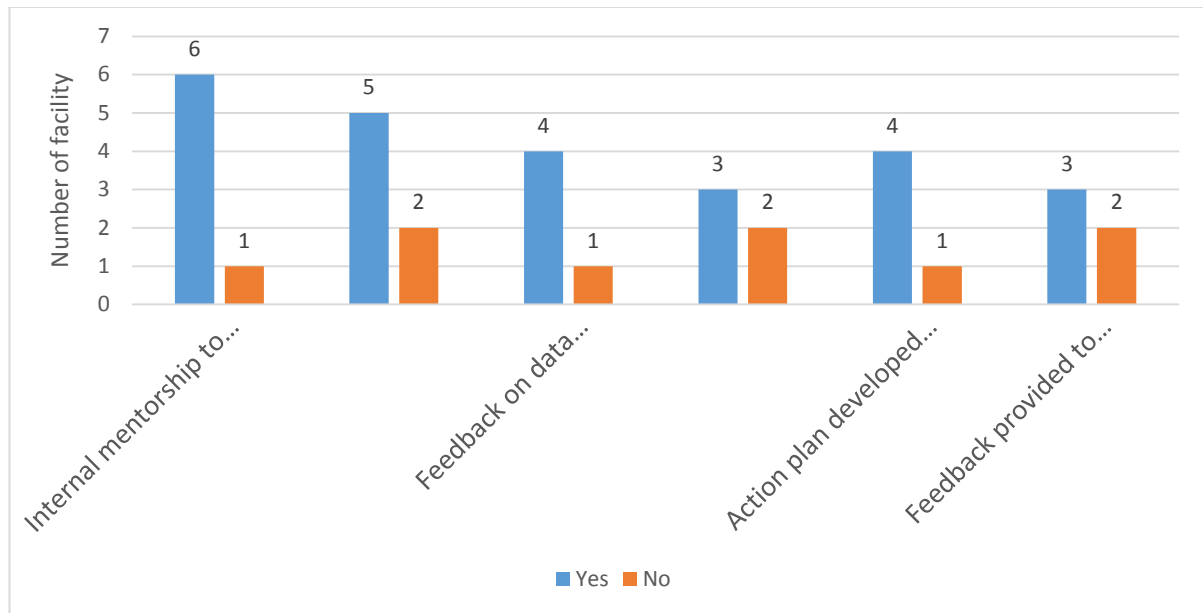
minutes and six facilities used standard PMT minute logbooks, whereas one facility didn't use standard PMT minute logbooks due to unavailability. Three facilities reported that three PMT meetings in the past three months were chaired by the head/CEO of the facility, and in two facilities, the PMT meetings were chaired by other staff members due to competing

priorities. The PMT scored 67.5% on making data-driven, evidence-based decisions.

### Supervision and feedback provisions

Six of the facilities provided internal mentorship and/or supervision to case teams/departments, while five

health facilities received input from the woreda, or region, with four of the facilities receiving comments on data quality and data utilization and three receiving feedbacks on service performance (**Figure 3**).



**Figure 3: Supervision and feedback provisions among health facility workers.**

### Performance Monitoring Team (PMT) areas of discussion

Most facilities (six out of seven facilities) focused on HIS, disease prevention and RMNCH-Y, whereas only one facility discussed human resource management and finance-related issues in the PMT meeting. Most facilities focused on plan formation and service quality when making decisions, based on PMT discussions.

### Information dissemination

All of the seven facilities used data from HMIS in order to provide health sector performance reports to the kebele/woreda. Only three facilities provided case teams with PMT minutes. For accessing facility performance, more than half of the facilities had a website that was updated at least once a year. Only three facilities shared performance data through a brochure or newsletter. Only two facilities conducted and disseminated assessment findings (IR assessment, satisfaction survey, and community score card). All facilities held performance review meetings with community representatives. The overall practice of information dissemination was only 4.7%.

### Factors that determine competency levels with regards to the use of HIS data for evidence-based decision making

**Assumption checking:** Basic linear regression assumptions were checked and the results indicated there was no strong violation of normality (from normal probability plot), linearity and homoscedasticity (no pattern in residual versus fitted value plot) (**Figure 4**). In addition, linearity assumptions were checked using scatter plots and there was a linear relationship between dependent variables and explanatory variables (**Figure 5**). There were no multicollinearity issues as all variables had a VIF (variance Inflation Factor) of less than 10 and the overall VIF was also less than 10 (**Table 3**).

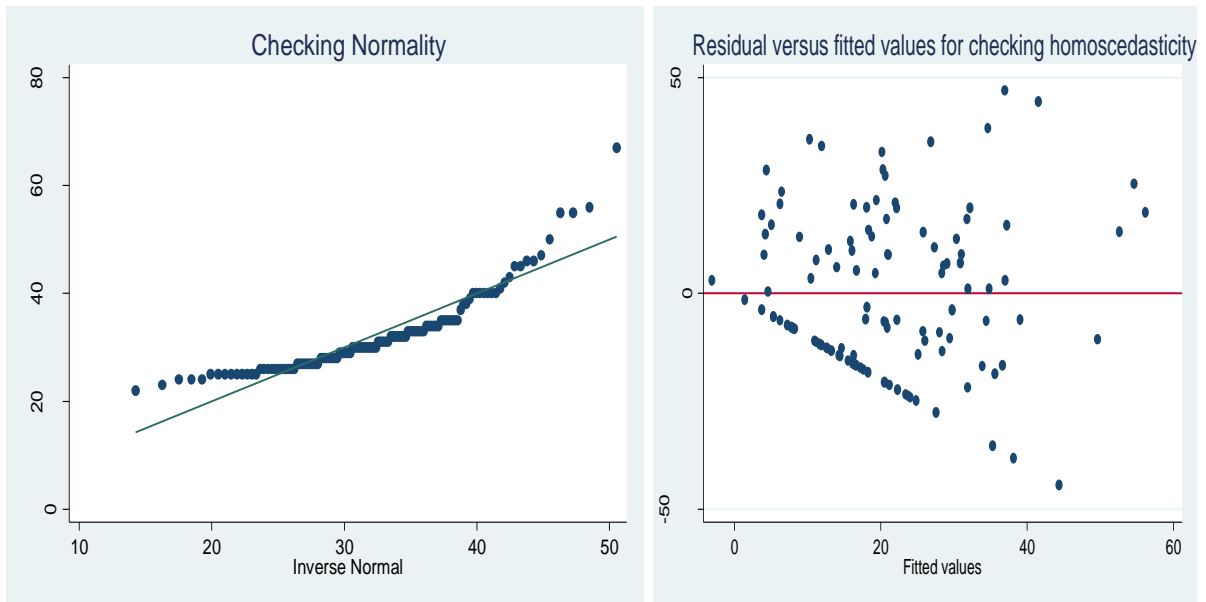


Figure 4: Normality and constant variance assumptions.

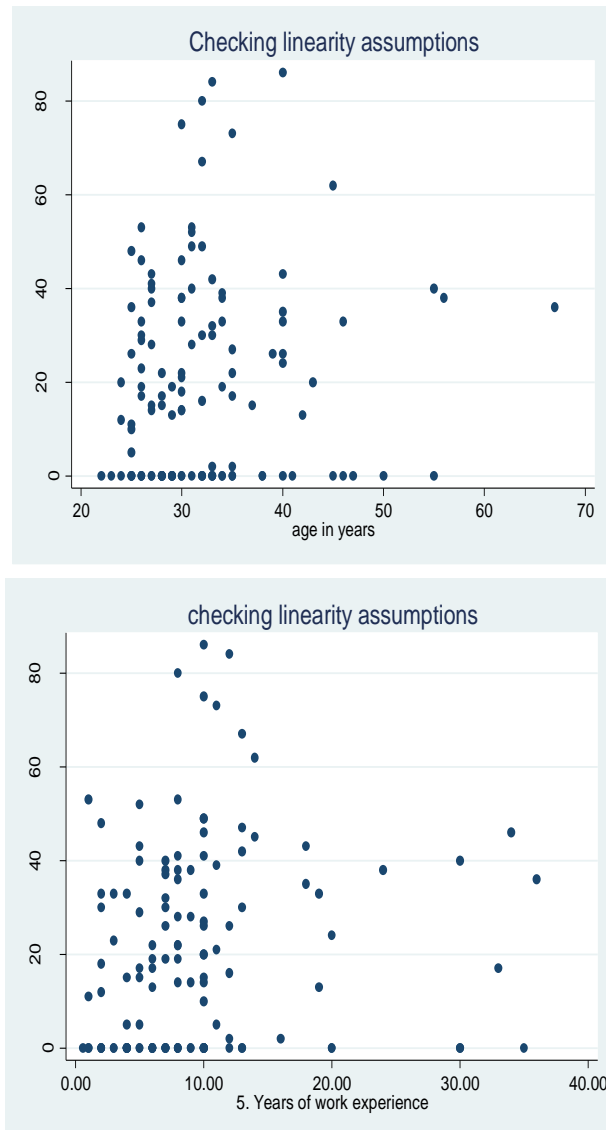


Figure 5: Linearity assumption

Table 3: **Variance inflation factor.**

Variables	VIF	Tolerance (1/VIF)
<b>Age (in years)</b>	1.82	0.55
<b>Work experience (in years)</b>	1.88	0.53
<b>Gender</b>		
Female	1.03	0.97
<b>Level of education</b>		
Degree & above	1.08	0.92
<b>Profession</b>		
HIT professionals	1.13	0.88
<b>Health facility type</b>		
General hospital	1.19	0.84
<b>Title of the health worker</b>		
Case-team leaders	1.12	0.89
Hospital/Health center head	1.15	0.87
HMIS focal person	1.10	0.91
<b>HIS related training</b>		
Yes	1.31	0.76
<b>Attitude towards information use</b>		
Good	1.11	0.89
<b>Perception toward information use</b>		
Good	1.15	0.87
<b>Knowledge on Health information system</b>		
Good	2.72	0.37
<b>Perceived competency</b>		
Good	2.59	0.39
Overall	1.46	

Multiple regression analysis was employed to identify factors associated with the competency level of health workers. The result revealed that being a hospital/health center head, taking HIS training and perceived competency to perform RHIS tasks were significantly associated with the actual competency level of health workers at a p- value of 0.05.

Being a hospital /health center head was associated with a 19 times higher competency level on average ( $\beta$ : 19.24, 95% CI: 4.42, 34.06) as compared to health care providers, keeping the effect of other variables

constant. Health workers who took HIS related training had on average 14 times higher competency levels ( $\beta$ : 14.38, 95% CI: 6.10, 22.67) as compared to those who were not trained adjusting for other variables in the model.

The actual competency level of health workers decreased by 12 on average for health professionals with good perceived competency towards HIS data use ( $\beta$ : -12.96, 95% CI: -25.49, -0.43) keeping the effect of other variables constant (Table 4).

Table 4: **Factors associated with actual competency level of health workers in use of HIS data for evidence-based decision making.**

Variables	Crude $\beta$ (95%CI)	Adjusted $\beta$ (95%CI)	P-value
<b>Age (in years)</b>	0.28 (-0.24, 0.79)	0.06 (-0.52, 0.69)	0.86
<b>Work experience (in years)</b>	0.41 (-0.11, 0.93)	0.09 (-0.75, 0.57)	0.79
<b>Gender</b>			
Male	1	1	
Female	-2.18 (-9.69, 5.33)	-4.82 (-12.01, 2.36)	0.18
<b>Level of education</b>			
Diploma	1	1	
Degree & above	6.19 (-4.62, 17.02)	8.54 (-1.92, 18.99)	0.11
<b>Profession</b>			
HIT professionals	1	1	
Non HIT professionals	11.00 (-2.89, 24.90)	12.34 (-1.14, 25.82)	0.07
<b>Health facility type</b>			
Health center	1	1	
General hospital	-9.05 (-16.56, -1.54)	-6.47 (-14.36, 1.41)	0.11
<b>Title of the health worker</b>			
Healthcare provider	1	1	
Case-team leaders	-2.21 (-12.38, 7.97)	-0.79 (-11.06, 9.49)	0.88
Hospital/Health center head	22.54 (7.30, 37.79)	19.24 (4.42, 34.06)	0.01*
HMIS focal person	6.04 (-15.10, 27.19)	1.21 (-19.69, 22.11)	0.91



<b>HIS related training</b>				
No	1	1		
Yes	13.95 (6.66, 21.25)	14.38 (6.10, 22.67)		0.001**
<b>Attitude towards information use</b>				
Poor	1	1		
Good	-0.94 (-8.44, 6.57)	-1.91 (-19.38, 5.57)		0.61
<b>Perception toward information use</b>				
Poor	1	1		
Good	1.56 (-6.11, 9.23)	8.81 (-3.06, 20.68)		0.38
<b>Knowledge on Health information system</b>				
Poor	1	1		
Good	-3.61 (-11.10, 3.86)	-0.339 (-10.98, 4.19)		0.14
<b>Perceived competency</b>				
Poor	1			
Good	-2.26 (-10.69, 6.17)	-12.96 (-25.49, -0.43)		0.04*

### Discussion

This study assessed the competency level of health workers and their determinant factors at public health facilities in Eastern Ethiopia. It revealed that the mean actual competency level of health workers was 20.45% and of the total health professionals, only 27.13% and 50.39% had good perceived and actual competency levels, respectively. This result is lower than findings from previous studies, (30) and is not congruent with the competency of health workers as defined by the World Health Organization (WHO) (31). This might be due to inadequately trained health workers and management on HMIS. Poor infrastructure in these areas related to resource unavailability and financial constraints have been reported to influence HMIS performance and might be another reason for poor competency levels (20).

In this study, health workers who received HIS-related training had a higher level of competency on average than those who did not receive training. This finding is supported by previous studies (32) which implies that HIS training has the potential to improve skills and knowledge in using ICT, which in turn can improve the overall competency of healthcare workers.

Being a hospital /health center head was another variable which was significantly associated with a higher average competency level, as compared to health care providers. This might be explained by the fact that those in managerial and leadership positions are more involved in decision making and this encourages them to be involved in the use of HIS information. This is a great opportunity to analyze and review data for informed decisions and to increase the overall competency levels of health workers and health center heads.

Health workers with good perceived competency have a lower average competency level, which could be explained by those who perceive they are competent enough in utilizing HIS for decision making and may hesitate to take capacity-building activities like focused training for healthcare workers, which might lower their actual competency level.

### Strengths and limitations of the study

The strength of the current study was that it used the validated questionnaires adapted from the Performance

of Routine Information System Management (PRISM) assessment tool. The relatively small sample size might limit generalizability to the wider population.

### Conclusions

The health workers with high perceived competency levels were found to have low actual competency levels. Health information systems focused trainings were found to be positively associated with actual competency levels and being hospital or health center head were found to be negatively related to the actual competency levels of health workers. This research recommends providing HIS training for health workers. There is also a need for competency enhancing focused initiatives to improve the health information systems related to competency levels and data use.

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### Competing interest

The authors declare that they have no competing or potential conflicts of interest.

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