

Health data management practice and associated factors among health professionals working in public health facilities in Oromia Special Zone, Amhara, Ethiopia: a cross-sectional study

Abdu Molla,¹ Mulugeta Hayelom,² Kidist Adamu,¹ Mengistu Mera Mihiretu,¹ Yonas Fissaha Adem ³

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¹Department of Health Systems and Management, Wollo University, Dessie, Ethiopia

²Department of Health Informatics, Wollo University, Dessie, Ethiopia

³Department of Public Health, Dessie College of Health Science, Dessie, Ethiopia

Correspondence to

Yonas Fissaha Adem;
yonasfissaha029@gmail.com

ABSTRACT

Objective Data and information are vital to the decision-making process surrounding health sector reform. In spite of the vast amounts of capital invested in the development of health information systems, health professionals continue to fight with a lack of basic data management skills in Ethiopia. Therefore, this study aimed to assess health data management practices and associated factors among health professionals in public facilities in the Oromia Special Zone, northeast Ethiopia.

Method A facility-based cross-sectional survey was conducted among 442 health professionals working in Oromia Special Zone from 8 March 2023 to 28 March 2023. Data were entered into Epi-Data V.4.6, and then it was exported to SPSS V.26 statistical software for processing and analysis. Bi-variable and multivariable logistic regression analyses were computed to see the association between health data management practice and selected independent variables. The bi-variable logistic regression analysis model was used to identify candidate variables for multivariable regression, with a p value <0.2 fitted into the multivariable logistic regression analysis model; a p value less than 0.05 and an adjusted OR (AOR) with a 95% CI were used to declare statistical significance associated with the dependent variable.

Results The prevalence of good health data management practices among health professionals was found to be 51.1%, with a 95% CI (45.9 to 55.7). In this study, received training on health data management (AOR=1.82, 95% CI (1.06 to 3.13)), used appropriate technology (AOR=1.78, 95% CI (1.09 to 2.91)) and competency (AOR=6.62, 95% CI (4.06 to 10.80)) were positively associated with health data management practice among health professionals.

Conclusion and recommendations Nearly half of health professionals had poor health data management practices. The Zonal Health Department should plan capacity-building training for healthcare professionals, so as to improve their competency. All healthcare facilities should have appropriate and functional health data management technology.

WHAT IS ALREADY KNOWN ON THIS TOPIC

- ⇒ Health data management practice in developing countries does not provide the necessary information, which supports decision-making.
- ⇒ There is incomplete, untimely and largely incorrect reporting of data and grossly inadequate capacity to analyse and use data.

WHAT THIS STUDY ADDS

- ⇒ This study contributes comprehensive knowledge regarding barriers to health information utilisation in the healthcare system. We indicated possible solutions to answer the identified problems. We presented the impact of health professionals' information utilisation on the right process decision-making processes.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

- ⇒ This study helps healthcare providers, policymakers and managers examine the mechanism for improving the practice of health data management and potentially serve as an initiative and reference for other researchers in this field.

INTRODUCTION

Data and information are vital to the healthcare delivery system and to the decision-making process surrounding health sector reform. Healthcare functions revolve around collecting, analysing, making decisions and using data and information.¹

Managing health data is all about managing health information. Using the sequence of data collection, processing, reporting and utilisation of the information, those are necessary for improving the effectiveness and efficiency of healthcare services.² Good

data management practice is a prerequisite for quality data for decision-making that allows decision-makers, managers and service providers to make evidence-based decisions.^{3,4}

Poor health data management practices (HDMP) have a great influence on the progress of the health system, the population's health as well as the information revolution, which is one of the building blocks of the health system.⁵

Worldwide, there is increasing interest in the measurement of data quality and information use to capture key information about the challenges and limitations of health service provisions and programme implementation. This reliance on data quality and information usage requires quality assurance mechanisms that promote reliable data collection, storage and management.⁶

Despite the vast amounts of resources invested to improve HDMP globally, health professionals continue to struggle with a lack of basic data management skills.⁷ Studies showed that good practice of health data management (HDM) in three nations (the United Kingdom, Germany and Jamaica) was 33.3%, 39% and 48%, respectively.^{4,8,9} Over the years, HDM systems have experienced many problems, which were generally based on paper and manual recording processes, leading to poor HDM practice.^{10–12} HDM practice in developing countries does not provide the necessary information, which supports decision-making. Some of the reasons are poor quality of data, weak data analysis, lack of information culture, lack of trained personnel and health information system (HIS) activities seen as a burden due to high workloads especially at the health facility level.¹³

The utilisation of information for evidence-based decision-making is also still very weak in most low and middle-income countries.¹⁴ Most health workers in developing countries become one of the obstacles to effective and efficient management in the delivery of healthcare services. At the primary level, where service delivery is the main task, there are problems with data management tasks such as capture, processing, analysis, storage, reporting and utilisation, which have primary responsibility for operational activities.^{15,16}

All functions of the health system and public health policy are seriously reliant on the presence and use of quality HIS data.^{14,17} However, lack of quality data and poor HDMP are affecting the health system's performance and the health of society. This is evident by frequent overstocks and understocks of supplies, poor detection and management of outbreaks and scarcity of human resources at different times.¹⁸ Findings from different African countries indicated that the practice of data management among health professionals remains low (Nigeria, Zanzibar and Kenya) showed 9.7%, 27% and 21.6%, respectively.^{19–21} Studies in Kenya have shown that health workers usually spend 40% or more of their time filling out HMIS forms but make little use of the information for decision-making.²²

In Ethiopia, different efforts have been made to assess and improve the strengths and weaknesses of routine health information systems.²³ As a result, the Ministry of Health Ethiopia has designed various initiatives and implemented a digital system for managing and utilising health data, including the District HIS to manage the national reporting system and the electronic Community HIS to manage standardising and simplifying data collection and reporting formats, disseminating guidelines and developing health information management capacity. However, the 2019 annual health sector performance report indicates that, in Ethiopia, among the six major components of HIS resources, data management was not showing progress and became a major problem in the health sector.²⁴

Studies conducted at the data management practice level in the health sectors were not uniform throughout the country's health facilities and showed a range of 13%–74.3%.^{25–29} Owing to the observed gap in the health sector in Ethiopia, information use has been given substantial prominence in the Health Sector Transformation Plan as part of the information revolution, which is one of the four transformation agendas. The information revolution is not only about changing the techniques of data and information management; it is also about bringing about fundamental cultural and attitudinal change regarding the perceived value and practical use of information.²³ Therefore, this study pursued to assess HDM practices and associated factors among health professionals at public health facilities.

METHODS AND MATERIALS

Study design, area and period

A facility-based cross-sectional study was conducted from 8 March 2023 to 28 March 2023, in Oromia Special Zone, in Amhara Region. The capital city of the zone is Kemise, which is located 325 km north of Addis Ababa and 555 km from the regional capital, Bahir-Dar. The zone had a population of 57 671 in 2021/2022.³⁰ According to the Plan and Programmes report of the zonal health department, there are 1 general hospital, 1 primary hospital, 5 woreda health offices, 2 town administrations, 29 health centres and 105 health posts. There are 878 permanent and contract health professionals working at public health facilities.³⁰

Population

Source population

All health professionals worked at public health facilities found in the Oromia Special Zone

Study population

All health professionals that were involved in HDM practice in the selected public health facilities

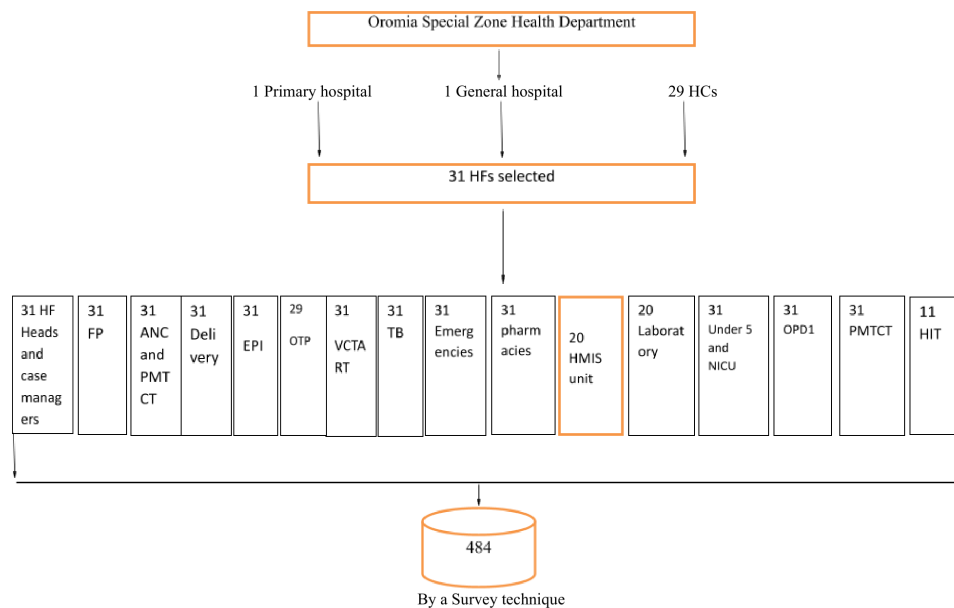


Figure 1 Schematic presentation of sampling procedure. ART, antiretroviral therapy; EPI, expanded program immunisation; FP, family planning; HF, health facility; HIT, health information technology; HMIS, health management information system; NICU; neonatal intensive care unit; OPD, out patient department; PMTCT, prevention of mother-to-child transmission; TB, tuberculosis; VCT, voluntary counselling and testing.

Inclusion and exclusion criteria

Inclusion criteria

All selected health professionals who were unit heads, department heads, case teams, health managers and focal persons worked at public health facilities in Oromia Special Zone; those who had more than 6 months' work experience and were available during the data collection period were included in the study.

Exclusion criteria

Contract employers of health professionals were excluded from the study

Sample size and sampling procedures

In Oromia Special Zone, there are one general and primary hospital and 29 health centres. Out of the total 31 health facilities, each health facility, there are 16 departments from those a total of 484 health professionals of focal person and unit department were studied by survey method. All health professionals fulfilling the inclusion criteria were included in the final analysis (figure 1).

Study variables

Dependent variables

A HDM practice was measured as poor or good.

Independent variables

- ▶ **Sociodemographic characteristics:** sex, age, marital status, educational level, work experience, field of study, position, working unit and monthly salary.
- ▶ **Behavioural factors:** knowledge, attitude and competency.
- ▶ **Technical factors:** user friendliness of reporting tools, standardised indicator and availability of appropriate technology for data management.

- ▶ **Organisational factors:** training, feedback, workload, supervision, reward on performance, management support, availability of data management guidelines, availability of reporting format, functional computer and availability of stationery materials.

Operational definitions

- ▶ **Good data management practice:** the health professionals who score above the mean value from 10 item questions have a good HDM practice if not poor.³¹
- ▶ **Good knowledge:-** health professionals who were scored above or equal to 60% out of a total of 12 yes/no questions.^{28 29}
- ▶ **Poor knowledge:-** health professionals who were scored below 60% out of a total of 12 yes/no questions.^{28 29}
- ▶ **Good attitude:-** health professionals who were scored greater than the mean of six questions.²⁷
- ▶ **Poor attitude:-**health professionals who were scored less than the mean of six questions.²⁷
- ▶ **Good competence:** average score of respondents equal or more than 75% of competence questions was considered as good competence.⁶
- ▶ **Poor competence:** average score of respondents less than 75% of competence questions was considered as poor competence.⁶
- ▶ **Good management support:** study participants who were scored above the mean from 6-item questions.
- ▶ **Poor management support:** study participants who score below the mean from 6-item questions.
- ▶ **Health professionals:** in this study, health professionals are defined as those employees who record and handle data, generate data, use generated data for their decision making and those who serve as the

Table 1 Sociodemographic characteristics of study participants in public health facilities of Oromia Special Zone, Amhara Region, Northeast Ethiopia, 2023 (n=442)

Characteristics	Category	Frequency	Per cent
Age	<31	354	80.10
	31–40	77	17.40
	>40	11	2.50
Educational status	Diploma	233	52.70
	Degree	193	43.70
	Master and above	16	3.60
Sex	Male	282	63.80
	Female	160	36.20
Marital status	Married	245	55.40
	Single	179	40.50
	Divorced	18	4
Filled of study professional	Nurse	203	45.90
	HIT	16	3.60
	Midwifery	81	18.30
	Health officer	76	17.20
	Doctor	10	2.30
	Laboratory	21	4.80
	Pharmacy	23	5.20
	Others	12	2.80
Working area	MCH	120	27.10
	OPD	178	40.30
	IPD	11	2.50
	Pharmacy	22	5
	Laboratory	21	4.80
	Management	40	9
	Under-5	28	6.30
	ART	13	2.90
	Other	9	2
Position status	Unit focal	264	59.70
	Case or department Head	133	30.10
	Others	45	10.20
Salary	<6000	217	49.10
	≥6000	225	50.90
Experience	<6years	342	77.40
	6–10years	77	17.40
	>10years	23	5.20%

ART, antiretroviral therapy; HIT, health information technology; MCH, maternal and child health; OPD, out patient department.

focal person and unit head within their unit, departments and health facilities.

- **Appropriate technology:** in the facility of each department had functional computer with DHIS and intranet access.

Data collection tools and quality control

The study was conducted using a structured, pretested and self-administered questionnaire. The questionnaire was adapted from WHO, Performance of Routine Information Systems Management tools, and from previous related studies with the addition of some variables.^{26–29 32} A total of three trained diploma HIT as data collectors and two B.Sc. HIT as supervisors participated in the data collection process. A pretest was taken 5% of the sample size from Gerba Health Center, Kālu woreda, South Wollo zone and checked for internal constancy by Cronbach's alpha test before the actual data collection time. Amendments to the instrument, such as unclear questions and ambiguous words, were checked accordingly. For data collectors and supervisors, a half-day orientation was given on the objective of the study, instrument and data collection procedures by the principal investigator. Furthermore, public health research experts reviewed the tool. The principal investigator and supervisors were conducting supervision. To ensure data quality, data collectors check the questionnaires from each study participant for completeness on a daily basis. The supervisors and principal investigator also reviewed each questionnaire and checked for completeness daily.

Data analysis

Data were checked for completeness and consistency; after that it was coded and entered into Epi-Data V.4.6, then exported to SPSS V.26 statistical software for analysis. Different frequency tables, graphs and descriptive summaries were used to describe the study variables. Binary logistic regression analysis was used to see significance of association between dependent and independent variables. Model fitness was checked by using Hosmer and Lemeshow goodness of fit test. Bi-variable logistic regression analysis model was used to identify the potential predictor variable, with p value <0.2 was fitted into the multivariable logistic regression analysis model; p value less than 0.05 and an adjusted OR (AOR) with a 95% CI was used to declare statistical significance associated with HDM practice.

Research ethics approval

The ethical clearance letter was obtained from an ERC ethical review committee of the Wollo University College of Medicine and Health Sciences with a reference number of cmHs/1745/2023. A supporting letter was taken from the Oromia Special Zone Health Department. Informed consent was obtained from health centre administrators and study participants after clear explanation of study objectives, data collection procedures, confidentiality

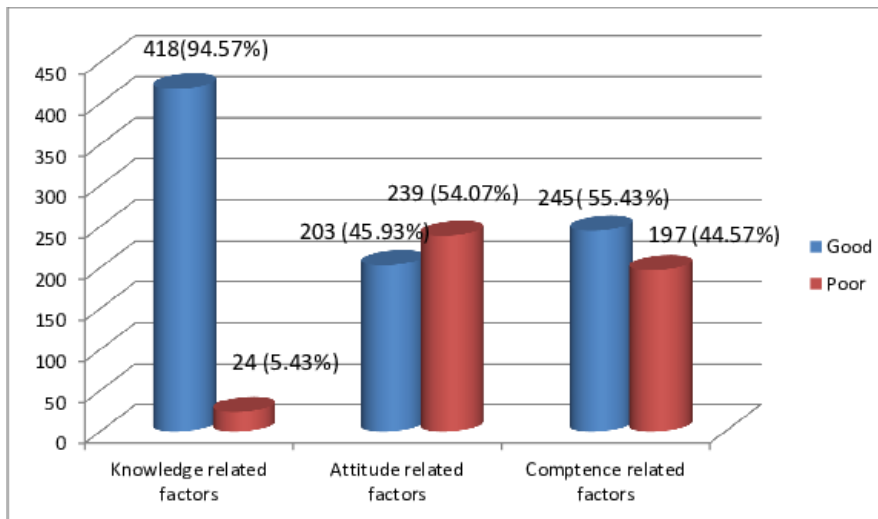


Figure 2 Behavioural related factors of study participants in Oromia Special Zone, Amhara Region, Northeast Ethiopia, 2023 (n=442).

and their rights. All methods were performed in compliance with the Declaration of Helsinki.

RESULTS

Sociodemographic characteristics of the study participants

From a total of 484 participants, 442 health professionals working in public health facility of Oromia Special Zone participated in this study with a response rate of 91.32%. The mean ages of respondents were 28.48 ± 4.91 (SD) years. More than half of study participants, 245 (55.4%) were married. Majority of the study participants, 342 (77.4%) have less than 6 years' experience. Nearly half 233 (52.7%) of study participants were diploma in their educational status (table 1).

Behavioural factors

In this study, behavioural factors were assessed through data management with knowledge about HDM,

competence and attitude. Majority of the study participants, 418 (94.57%) had good knowledge about HDM (figure 2).

Organisational factors

This study showed that 195 (44.12%) of participants had received training on HDM. The study findings also revealed that 305 (69.0%) of respondents got supportive supervision from higher officials (table 2).

Technical related factors

The study showed that in 409 (92.53%) of respondents, there is standard set of indicator and 409 (92.5%) a well-designed data collection and report formats. More than half 241 (54.52) % of health professional did not use appropriate technology for HDM (table 3).

HDM practice

In this study finding, 226 (51.1%) with 95% CI (45.9 to 55.7) of study participants had good HDM practice (figure 3).

Table 2 Organisational related factors of study participants in Oromia Special Zone, Amhara Region, Northeast Ethiopia, 2023 (n=442)

Individual related factors	Category	Frequency	Per cent
Training on health data management	Yes	195	44.12
	No	247	55.88
Get supervision from higher official	Yes	305	69
	No	137	31
Received regular feedback	Yes	283	64.03
	No	159	35.97
Any reward for performance	Yes	112	25.34
	No	330	74.66
Management support	Good	223	50.45
	Poor	219	49.55

Table 3 Technical related factors of study participants in Oromia Special Zone, Amhara Region, Northeast Ethiopia, 2023 (n=442)

Institutional related factors	Category	Frequency	Per cent
Standardised indicator	Yes	409	92.53
	No	33	7.47
Data management tools	Yes	409	92.53
	No	33	7.47
Availability of technology for data management	Yes	201	45.48
	No	241	54.52
Use of friendly reporting format	Yes	366	82.80
	No	76	17.20

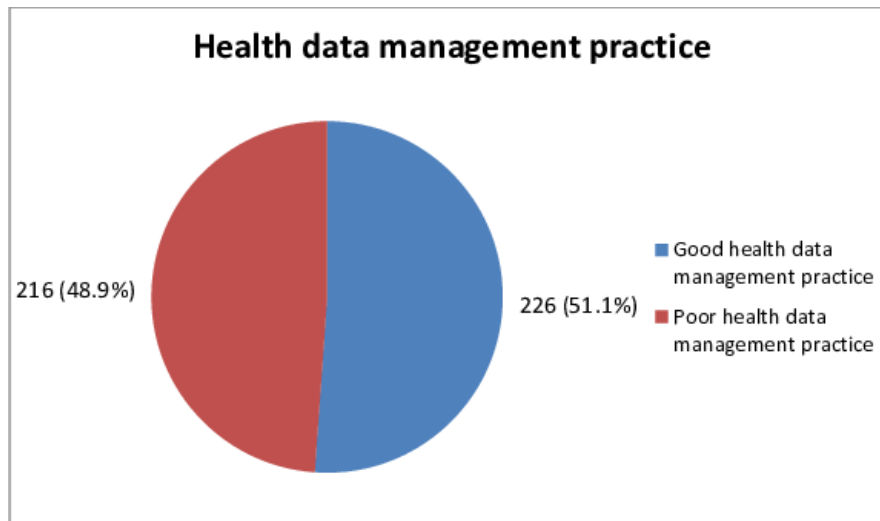


Figure 3 Health data management practice among health professionals working in public health facilities in Oromia Special Zone, Amhara Region, Northeast Ethiopia, 2023 (n=442).

Factors associated with HDM practice among health professionals

In bi-variable analysis, 13 variables, namely position, knowledge, attitude, competency, management support, the use of standardised indicators, well design recording and reporting format, friendly format, use appropriate technology, training on data management, get supportive supervision, received regular feedback and get any reward, were candidate variables for multivariable logistic regression at a p value of less than 0.2.

In multivariable logistic regression, 3 of 13 variables were significantly associated with HDM practice among health professionals at 5% level of significance. The significant factors of HDM practice were use of appropriate technology, training on data management and competency, had a statistically significant association with HDM practice among health professionals.

Participants who received training on data management were two times more likely had good HDM practice as compared with who did not get training (AOR=1.82, 95% CI 1.06 to 3.13). On the other hand, those who use appropriate technology were two times more likely had good HDM practice as compared with not use appropriate technology (AOR=1.78, 95% CI (1.09 to 2.91)). Those who had good competency were six times more likely had good HDM practice as compared with those who had poor competency (AOR=6.62, 95% CI (4.06 to 10.80)) (table 4).

DISCUSSION

In this study, the magnitude of HDM practice was 51.1% (95% CI 45.9 to 55.7). This finding is in line with studies done in East Gojam Zone, 53.3%²⁹ and Bench-Maji, 46.8%.³¹ However, this study is lower than previous studies in Gamo Gofa 74.3%,²⁸ and North Wollo, Ethiopia 56.1%.²⁷ The possible justification for this discrepancy might be due to the difference in training, feedback and supervision. The study in Gamo Gofa showed that

93.6% of health extension workers were supervised, and 61.6% of the participants got training in data management. On the contrary, only 44.1% of the respondents got training, and 69% of them were supervised in the current study. The other possible explanation could be that the study setting in Gamo Gofa was health posts, whereas the current study was conducted in health centres and hospitals. Due to this reason, the friendliness of the data management format might vary between those health posts and this study setting.

On the other hand, it was considerably higher than the HIS assessment conducted in Jamaica and Zanzibar, where the scope of HDM practice was 48% and 27%, respectively.^{8,19} This explanation might be due to the difference in the study setting and the variation in health information system structures between Ethiopia and those countries. It is also higher than the HIS assessments done in Ethiopia, the overall practice for managing health data was 13%.²⁵ The increment in the current study might be due to the study period. There is about an 11-year gap between the previous study and the current study; hence, the government's concern for data management might change within this gap.

Concerning the factors, the use of appropriate technology was significantly associated with HDM practices. Participants who use appropriate technology were more likely to have good HDM practices compared with those who do not use appropriate technology. This was consistent with the study done in North Gondar,³³ and Western Amhara.³⁴ This might be due to the fact that the use of technology is important for easy, fast and accurate management of data. It also reduces wastage of time, decreases the workload of workers and simplifies tasks.

Training on data management was significantly associated with HDM practices. Accordingly, healthcare professionals who get training are more likely to have good HDM practices as compared with those who did not get training. This finding is congruent with a study done in the North

Table 4 Factors associated with health data management practice among health professionals working in public health facilities in Oromia Special Zone, 2023 (n=442)

Variables	Health data management practice		COR (95% CI)	AOR (95% CI)
	Good	Poor	Bivariable model	Multivariable model
Position				
Unit focal	130	134	1	1
Case manager/head nurse	5	11	0.47 (0.16 to 1.39)	0.29 (0.08 to 1.09)
CEO/HC head	56	61	0.95 (0.61 to 1.46)	0.71 (0.42 to 1.23)
Department coordinator	13	6	2.23 (0.82 to 6.05)	0.95 (0.28 to 3.15)
HMIS/quality focal	22	4	5.67 (1.90 to 16.90)	1.69 (0.48 to 5.99)
Knowledge				
Poor knowledge	6	18	1	1
Good knowledge	220	198	3.33 (1.30 to 8.57)	1.44 (0.46 to 4.50)
Attitude				
Negative attitude	104	135	1	1
Positive attitude	122	81	1.96 (1.34 to 2.86)	1.45 (0.91 to 2.32)
Management support				
Poor Mgt support	89	130	1	1
Good Mgt support	137	86	2.33 (1.59 to 3.41)	1.05 (0.65 to 1.70)
Standardised set of indicators				
No	12	27	1	1
Yes	214	189	2.55 (1.26 to 5.17)	1.13 (0.41 to 3.14)
Well-designed format				
No	10	23	1	1
Yes	216	193	2.57 (1.20 to 5.55)	1.10 (0.34 to 3.56)
Friendly format				
No	25	51	1	1
Yes	201	165	2.49 (1.48 to 4.18)	1.71 (0.85 to 3.44)
Use of appropriate technology				
No	90	151	1	1
Yes	136	65	3.51 (2.37 to 5.21)	1.78 (1.09 to 2.91)*
Data management training				
No	91	156	1	1
Yes	135	60	3.86 (2.59 to 5.75)	1.82 (1.06 to 3.13)*
Get supervision from officials				
No	44	93	1	1
Yes	182	123	3.13 (2.04 to 4.79)	1.246 (0.60 to 2.58)
Get feedback from official				
No	52	107	1	1
Yes	174	109	3.29 (2.18 to 4.94)	1.93 (0.96 to 3.89)
Rewards form management				
No	157	173	1	1
Yes	69	43	1.77 (1.14 to 2.74)	1.00 (0.55 to 1.81)
Competency				
Poor competence	48	149	1	1
Good competence	178	67	8.25 (5.37 to 12.68)	6.62 (4.06 to 10.80)***

Continued

Table 4 Continued

Variables	Health data management practice		COR (95% CI)	AOR (95% CI)
	Good	Poor	Bivariable model	Multivariable model
*p<0.05, **p<0.001, ***p<0.0001, Hosmer and Lemeshow goodness of fit test=0.336. AOR, adjusted OR; CEO, Chief Executive Officer; COR, crude OR; HC, Health Center; HMIS, health management information system; Mgt, Management.				

Wollo Zone,²⁷ Hadiya southern Ethiopia³⁵ and Awi administrative zone.³⁶ This could be a result of training, which can enhance the capacity to carry out data management activities and create skilled human resources that are confident and motivated to perform data management tasks.

Competency was significantly associated with HDM practices. Participants who had good competency were more likely to have good HDM practices compared with those who had poor competency. This finding is in line with the studies done in the North Wollo Zone,²⁷ Gamo Gofa²⁸ and Western Amhara.³⁴ The possible justification might be due to low competency, which shows the skill gap, and competency is crucial for performing data management tasks such as data quality checking, calculating percentages, plotting charts, providing a possible explanation of the findings of the data, explaining trends with chart, using and interpreting data.

One of its most significant advantages of this study is that it provides a valuable source of information regarding the HDM practice. All study participants were selected only from public health facilities. So, the major limitation of the study was that it did not include private health facilities. Additionally, the study was not supported by qualitative data.

CONCLUSION

The magnitude of HDM practice among health professionals in Oromia Special Zone is relatively poor. Among the factors use of appropriate technology, training on data management and competency were factors associated with HDM practice of healthcare professionals. It is recommended that Oromia Special Zone health department is better to plan capacity building trainings for healthcare professionals, so as to improve their HDM knowledge and practice. All health facilities should also assign trained personnel and access computer with internet service for effective and efficient HDM. Health professionals should search, read and share the experiences with others about HDM formats to improve their competency. Programme planners and officers should conduct regular supervision with periodical feedback for healthcare providers to improve the skill of routine information utilisation.

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Patient and public involvement Patients and/or the public were not involved in the design, or conduct, or reporting, or dissemination plans of this research.

Patient consent for publication Consent obtained directly from patients.

Ethics approval The ethical clearance letter was obtained from an ERC ethical review committee of the Wollo University College of Medicine and Health Sciences with a reference number of cmHs/1745/2023. A supporting letter was taken from the Oromia Special Zone Health Department. Informed consent was obtained from health centre administrators and study participants after clear explanation of study objectives, data collection procedures, confidentiality and their rights. All methods were performed in compliance with the Declaration of Helsinki. Participants gave informed consent to participate in the study before taking part.

Provenance and peer review Not commissioned; externally peer-reviewed.

Data availability statement Data may be obtained from a third party and are not publicly available. Data can be obtained from NHS Improvement under a special license and are not freely available.

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ORCID iD

Yonas Fissha Adem <http://orcid.org/0000-0002-4818-8087>

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