



Health Data Management Practice and Associated Factors Among Health Professionals Working at Public Health Facilities in Resource Limited Settings

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Background: Despite the vast amount of resources invested in the development of health information systems, health professionals in developing countries are still suffering from lack of adequate skill to perform health data management activities. There is a lack of sound evidence to overcome health data management challenges in this setting. This study aimed to assess health data management practice and its associated factors among health professionals working at public health facilities in North Wollo Zone, Northeast Ethiopia.

Methods: A quantitative cross-sectional study was conducted at public health facilities in North Wollo Zone, Northeast Ethiopia from March 2 to April 15, 2020. A total of 715 health professionals were selected using a stratified random sampling technique. EpiData version 4.6 and STATA version 15 were used for data entry and analysis, respectively. Descriptive statistics were computed. Multi-variable logistic regression analyses techniques were carried out to show the association between explanatory and outcome variables. Odd ratio at 95% confidence level was used to describe the strength of association.

Results: A total of 643 health professionals participated in this study. The response rate was 90%. Among them, 56.1% (95% CI: 52.3%–59.9%) demonstrated good data management practice. Working in health center [AOR=1.31 (95% CI: 1.853, 2.003)], having knowledge on data management [AOR=3.74 (95% CI: 2.454, 5.713)], favorable attitude toward data management [AOR=2.64 (95% CI: 1.746, 3.976)], high competency level on data management tasks [AOR=3.12 (95% CI: 1.873, 5.197)], friendliness of data management format [AOR=2.26 (95% CI: 1.478, 3.454)], supervision [AOR=1.78 (95% CI: 1.153, 2.745)] and training [AOR=1.84 (95% CI: 1.115, 3.022)] were significantly associated with good practice of health data management.

Conclusion: Health data management practices of health professionals' were found to be inadequate. Capacity building to enhance health professionals' data management knowledge, attitude and their competency level, providing continuous supportive supervision, designing friendly data management format, providing comprehensive data management training are necessary measures to improve data management practice in this study setting.

Keywords: health data management practice, health professionals, Ethiopia

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Background

Health Information System (HIS) is a system that integrates data collection, processing, reporting and utilization of the information that are necessary for improving effectiveness and efficiency of healthcare services.^{1,2} Health Information System is used to



design and manage healthcare data in healthcare facilities.^{3,4} Health data management is one of the six components of HIS that covers all aspect of data collection, storage, quality-assurance, compilation, analysis, display and report.⁵⁻⁷ It is an important alarming area which uses in promoting high standard of patient care and also it is highly significant for the allocation of healthcare budget.^{8,9} Data management practice is professionals' routine practice to collect, store, check quality, compilation, analyze, display and report data.^{5,7} Having a good data management practice is a prerequisite for obtaining quality data for decision-making which enables policymakers, managers, and service providers to make decisions based on evidence.^{8,10,11}

Despite the vast amounts of resources invested in the development of HIS, health providers are still suffering from the lack of adequate skill to perform data management activities.^{12,13} There are a lot of problems in developing country regarding to HIS implementation.¹⁴⁻²¹ Evidence showed the presence of poor health data management practice in Africa.²²⁻²⁷ Within the context of Ethiopia; some studies have examined the level of data management practice in the health sectors.^{10,28} Poor data management knowledge, supervision, feedback, training and resource shortage were the main determining factors associated with health data management practice.²⁹⁻³⁴

In Ethiopia, different efforts have been made to strengthen routine health information systems (RHIS).^{35,36} The Federal Ministry Of Health (FMOH) has designed, developed and implemented digital systems for managing health data including, District Health Information System 2 (DHIS2), to manage national reporting system, and electronic Community Health Information System (e-CHIS), to manage community health information system (CHIS).^{35,37}

However, data management is still far behind the expectations and not showing substantial progress.³⁸ The practical challenge in public health facilities is fragmented routine data collection and aggregation process, difficulty in interpreting results and implications of data, and poor informed decision-making practice on the health status of the population.^{10,39-41} Addressing this problem will have a practical benefit for improving coverage and quality of health services. Accordingly, this study proposes to investigate the practice of health data management and its associated factors among health professionals working at public health facilities in North Wollo Zone, Northeast Ethiopia.

Methods

Study Design and Setting

Institutional-based cross-sectional study design was conducted from March 2 to April 15, 2020, at public health facilities in North Wollo Zone. North Wollo is one of the 11 zones of the Amhara Regional state of Northern Ethiopia. The city of North Wollo is Woldia which is located 521 km away from Addis Ababa, the capital city of Ethiopia. It consists of ten rural and four urban districts. District or woreda is the administrative unit next to zone containing a minimum of 100,000 populations.⁴² There were 2132 health professionals working within six hospitals and 64 health centers.

Study Participants, Sample Size, and Sampling Procedure

The sample size was calculated using a single population proportion formula. It was calculated by considering a 95% level of confidence, a 5% of margin of error, a design effect of 2% and 5% of the non-response rate. There were a total of 2132 health professionals in this study setting. Finally, a total sample size of 715 health professionals was obtained. There are six hospitals and 64 health centers in North Wollo zone. Out of the total public health facilities, 3 hospitals and 29 health centers were selected by stratified random sampling technique. A total sample size of seven hundred fifteen participants proportionally allocated for each selected health center and hospital. Study participants were selected from the selected health centers and hospitals using a simple random sampling technique.

Data Collection Tool and Procedure

Data were collected using a pretested self-administered questionnaire and an observation checklist. The questionnaire was adopted from WHO measure evaluation tools of Health Metrics Network (HMN), Performance of Routine Information Systems Management (PRISM) tools, and related studies.^{2,7,31,32,36,43} A pretested self-administered questioners were filled by health professionals in order to assess health data management practice, socio-demographic, behavioral, technical, and organizational factors. The questioners consisted of 8 items for socio-demographic and 26 items for behavioral factors. Additionally, 8-item technical factors and 32-item organizational factor questions were used. The health data management practice of the respondents was assessed using 5-point Likert scale questions that ranged from "1 = strongly disagree" to "5 = strongly agree".

An observational checklist was used to collect data on availability of data management tools, health information resources, guidelines and reporting documents. The content validity of the questioners was checked, and the reliability was calculated using Cronbach alpha (overall Cronbach alpha =0.83). A total of three degree holder health professionals and 9 HIT professionals were participated in data collection process. During the course of data collection, participants were informed about the objective and processes of the study and the confidentiality of the information.

Health professionals who scored greater than & equal to the mean value of Likert scale questions, ranging from “strongly disagree” to “strongly agree”, were labeled as having a good data management practice.^{31,32} Health professionals who scored less than the mean value were labeled as having poor data management practice. In this study, health professionals were defined as those employees who had at least a diploma certificate in the health profession and directly manage patients’ or clients’ data.

Data Processing and Analysis

After data collection was completed, the result was entered into a computer using EpiData version 4.6 and analysis was done using STATA version 15. Binary logistic regression analysis was conducted to discover the effect of each study

variable on the outcome variable. Variables having a *P*-value <0.2 on the bivariate analysis was entered into a multi-variable logistic regression analysis. The strength of the association was described at 95% CI and *P*-value less than 0.05 was considered a cutoff point for significance relationship between independent variables and dependent variable. A multi-collinearity test was conducted for the model and none of the variables scored above 10 for the test statistic.

Result

Socio Demographic Characteristics

Out of 715 distributed questionnaires, 643 responses were received with a response rate of 90%. More than half of the respondents 362 (56.3%) were males with the mean age of participants was 34.68 ± 12.6 years. In terms of educational level, this study revealed that 387 (60.2%) of the respondents were degree holders Three hundred sixty-one study participants were rural residents.

Regarding the field of study, 212 (33.0%) respondents were nurses. The study implied that, 247 (38.4%), 162 (25.2%) and 234 (36.4%) respondents had less than 6 years, 6–10 years and above 11 years working experience, respectively. Four hundred ninety-seven of the respondents had above 2800 ETB monthly salaries, as shown in Table 1.

Table 1 Socio-Demographic and Economic Characteristics of Health Professionals in North Wollo Zone, Northeast Ethiopia, April, 2020

Variables	Frequency(#)	Percent (%)	Variables	Frequency(#)	Percent(%)
Sex			Field of study		
Male	362	56.3	Nurse	212	33.0
Female	281	43.7	Medicine	56	8.7
Age			Midwife	114	17.7
<31	268	41.7	Pharmacy	67	10.4
31–40	231	35.9	Health officer	93	14.5
41–50	122	19.0	Laboratory	65	10.1
>51	22	3.4	Other	36	5.6
Residence			Work experience		
Urban	282	43.9	<6	247	38.4
Rural	361	56.1	6–10	162	25.2
Educational level			>11	234	36.4
Diploma	226	35.1	Work load		
Degree	387	60.2	Yes	383	59.6
Master	27	4.2	No	260	40.4
			Salary(in ETB)		
			≤2800	146	22.7
			>2800	497	77.3

Behavioral Factors

This study implied that health professionals who had good knowledge on data management were found to be 49.6% [95% CI: 45.4, 53.2]. Health professionals who had a favorable attitude on data management were found to be 63.8% [95% CI: 59.2, 68.7]. The overall competence of health professionals for data management tasks was 28.3% [95% CI: 24.9, 31.9].

Organizational and Technical Factors

More than half, 377 (58.6%) of health professionals were supervised at least once within three months. Likewise, only 192 (29.9%) of health professionals had taken training on data management. Additionally, about 313 (48.7%) of the respondents got incentive for managing data. Majority of the respondents responded that reporting format (74.4%), tally sheet (70.8%) and stationery (72.2%) were available. Less than half of health professionals responded that there were available data management guideline (35.5%), graph paper (39.5%) and functional computer (12.6%) as shown in Table 2.

In the bi-variable logistic regression analysis, health facility type, patient number per day, knowledge, attitude, competency, and friendliness of data management tools, availability of reference material, reporting format, HIS related training, supervision, feedback and incentive were associated with good routine health information utilization

at a p-value of less than 0.2. Consequently, these variables were subjected to the multivariable logistic regression analysis to control potential confounders, and it was noted that, health facility type, knowledge, attitude, competency, friendliness of data management tools, training and supervision were significantly associated with good data management practice at a p-value of 0.05 (See Table 3 for details).

Discussion

In this study, based on the operational definition set, the overall data management practice of health professional in the study area was 56.1% (n = 361) [95% CI of 52.3% to 59.9%]. This finding was somewhat comparable to the study in Northwest Ethiopia where 53.3% of health extension workers had good data management practice.³¹ However, it was considerably higher than the HIS assessment conducted in Zanzibar and Jamaica whereas data management practice were 27%, and 48%, respectively.^{26,27} 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, whereas data management practice is 13%.²⁸ The increment in the current study might be due to the study period. There is about an 8-year gap between the previous study and the current study; hence, the government concern for data management might be changed within this gap.

Table 2 Organizational and Technical Factors of HP's in North Wollo Zone Factors Associated with Data Management Practice Northeast Ethiopia, April, 2020

Variables	Frequency(#)	Percent (%)	Variables	Frequency(#)	Percent (%)
Training			Availability of Reporting format		
Yes	192	29.9	Yes	478	74.4
No	451	70.1	No	168	26.1
Supervision			Tally sheet		
Yes	377	58.6	Yes	455	70.8
No	266	41.4	No	188	29.2
Feedback			Stationery		
Yes	308	47.9	Yes	464	72.2
No	335	52.1	No	179	27.8
Datamanagement guide line			Graph paper		
Yes	228	35.5	Yes	389	39.5
No	415	64.5	No	254	60.5
Incentives			Functional Computer		
Yes	313	48.7	Yes	81	12.6
No	303	51.3	No	562	87.4

Table 3 Bivariate and Multivariable Logistic Regression Factors Associated with Data Management Practice Among HP at Primary Health Facilities in North Wollo Zone, Northeast Ethiopia, 2020

Variable	Category	Data Management Practice		OR (95% CI)	
		Good	Poor	Crude	Adjusted
Type of health facility	Hospital	118	163	I	I
	Health center	243	119	1.129(1.808, 2.57)	1.31(1.853, 2.003) *
Work load	Yes	187	196	I	
	No	174	86	1.387(1.066, 2.075)	
Data management knowledge	Poor	133	191	I	I
	Good	228	91	5.062(3.608, 7.101)	3.74(2.454, 5.713)*
Attitude toward data management	Unfavorable	112	128	I	I
	Favorable	249	161	3.59(2.589, 4.978)	2.64(1.746, 3.976)*
Competency level	Low	227	234	I	I
	High	134	48	2.979 (2.044, 4.343)	3.12(1.873, 5.197)*
Friendly format	No	128	164	I	I
	Yes	233	118	2.319(1.686, 3.191)	2.26(1.478, 3.454)*
Feedback	No	128	207	I	
	Yes	233	75	3.709(2.660, 5.171)	
Supervision	No	104	162	I	I
	Yes	257	120	3.555(2.557, 4.942)	1.78(1.153, 2.745)*
Reporting format	No	76	89		
	Yes	285	193	1.67(1.170, 2.385)	
Availability of data management guideline	No	97	131	I	
	Yes	264	151	2.538(1.822, 3.535)	
Incentive	No	153	177		
	Yes	208	105	2.406(1.748, 3.312)	
Training	No	214	237	I	I
	Yes	147	45	3.749(2.559, 5.492)	1.84(1.115,3.022)*

Note: *Variable significant at p-value less than 0.05, I = reference.

On the other hand, this finding was lower compared to the study done in Southern Ethiopia, whereas data management practice was 74.3%.³² This increment might be due to the difference in training, feedback and supervision. The study in southern Ethiopia showed that 93.6% of health extension workers were supervised and 41.6% of the participants got training in data management. On the contrary, only 29.9% of the respondents got training and 58.6% of them were supervised in the current study. The other possible explanation could be the study setting in Southern

Ethiopia was health posts, whereas the current study was conducted on health centers and hospitals. Due to this reason, friendliness of data management format might be varying between those health posts and our study setting.

Data management practice is interlinked with socio-demographic, behavioral, and organizational factors. The knowledge of health professionals is highly associated with data management practice. Health professionals who had good knowledge were 3.74 [AOR=3.74 (95% CI: 2.454, 5.713)] times more likely to have good data

management practice as compared to those health professionals who had poor knowledge on data management. This is in line with the study conducted before.³² This might be explained as knowing how and what to do is the prerequisite for practicing.

The results in this study indicate that health professionals who had a good attitude were 2.64 [AOR=2.64 (95% CI: 1.746, 3.976)] times more likely to had good data management practice than those who had a poor attitude. This is consistent with the finding in previous studies.^{10,16,19,20,40,41} The explanation for this could be that the attitude of health professionals helps to be committed since they are not consider spent their time when managing routine data. Having a favorable attitude indicates an understanding of the relevance and usage of managing data that could lead to good practice by making health professionals responsible.

Respondents who have a good level of competency are about three [AOR=3.12 (95% CI: 1.873, 5.197)] times more likely to be good data managers. This is supported by the studies in Southern Ethiopia.^{10,18,40} The possible explanation for this could be low competency 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, explain trends with chart, using and interpreting data.

The finding of this study indicates that trained professionals are about 1.84 [AOR=1.84 (95% CI: 1.115, 3.022)] times more likely to be good data manager than who did not get training. This is supported by the previous studies conducted in Ethiopia and Nigeria.^{32,33} This could be as a result of training can enhance the capacity to carry out data management activities and it might create skilled human resource that are confident and motivated to perform data management tasks.

The odds of data management practice were 1.31 times higher [AOR=1.31 (95% CI: 1.853, 2.003)] among health professionals working at health centers when compared with those at hospitals. This might be due to the great concern for supervising and technical support in health centers. In this regard, this study noted that health professional who had supervision is about 1.78 [AOR=1.78 (95% CI: 1.153, 2.745)] times higher in data management practice than who are not supervised. This observation is supported by studies in different areas of the world.^{10,17,31} This might be due to supervision initiate health professionals to perform data management activities by providing on-the-job training and technical support.

Furthermore, the odds of data management practice among health professional who had friendly data management format were about 2.26 [AOR=2.26 (95% CI: 1.478, 3.454)] times higher than those who had no such formats. This is consistent with the result of the previous studies in Ethiopia.^{17,21,40} This might be due to a friendly format which enables health professional to understand easily what and how they do, and also it enables them efficient by saving their time during the overall data management activities. Moreover, having vague/unclear texts and inconsistent data management format might lead to health professionals not to managing health data in a proper way.

Limitation of the Study

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

Health data management practices of health professionals were found to be inadequate. Capacity building to enhance health professionals' data management knowledge, attitude, and competency level, providing continuous supportive supervision, designing friendly data management format, and providing comprehensive data management training are necessary measures to scale up data management practice in this setting.

Abbreviations

AOR, Adjusted Odds Ratio; CHIS, Community Health Information System; CI, Confidence Intervals; DHIS2, District Health Information System 2; e-CHIS, electronic community health information system; FMOH, Federal Ministry of Health; HIS, Health Information Systems; HMN, Health Metrics Network; MPH, Master of Public Health; PRISM, Performance of Routine Information Systems Management; RHIS, Routine Health information System; WHO, World Health Organization.

Data Sharing Statement

The datasets generated and/or analyzed during the current study will be available upon request from the corresponding author.

Ethics Approval and Consent to Participate

The study protocol was reviewed and approved by the ethical review board of the University of Gondar and Informed consent was obtained from each study participant. Permission letters also obtained from Each Hospital. Names of participants and other personal identifiers were not included in the data collection tool. The participants' consent included publications of anonymous responses and this study was conducted in accordance with the Declaration of Helsinki.

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Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis, and interpretation, or in all these areas; took part in drafting, revising, or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

Disclosure

The authors declare that there are no competing interests in this work.

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