**ORIGINAL ARTICLE**

# DATA MANAGEMENT PRACTICE AND ASSOCIATED FACTORS AMONG HEALTH EXTENSION WORKERS IN AWI ADMINISTRATIVE ZONE, AMHARA NATIONAL REGIONAL STATE, ETHIOPIA

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## ABSTRACT

***Background:*** *Data management practice is vital for health workers at all levels so they may use information for decision making. According to the assessment conducted on the Ethiopian national health information system by the Federal Ministry of Health and the World Health Organization, health information system resources, data management, information dissemination and information use were rated as "not adequate". This study aimed at determining the level of data management practice and associated factors among health extension workers (HEWs) in Awi Administrative Zone, Amhara National Regional State, Ethiopia.*

***Methods****: An institution-based cross-sectional study was conducted from January to May, 2016 at the health posts of the zone. A total of 321 HEWs included in the study were selected using the simple random sampling technique. Data were collected using an interviewer-administered questionnaire and an observational checklist. The data were cleaned, coded, and entered into Epi-info version 3.5.3 and transferred into SPSS version 20 for analysis. The binary logistic regression model was used for analysis. Adjusted Odds Ratio (AOR) with a 95% Confidence Interval (CI) and P-value < 0.05 were used during the multivariable analysis in order to identify factors associated with the data management practice.*

***Results****: The study revealed that good data management practice among HEWs was 75.4% (95% CI: 70.7%, 80.1%). Supportive supervision (AOR = 4.41; (95% CI: 2.07, 9.41), training access (AOR = 2.58; 95% CI: 1.34, 4.94), availability of tally sheets (AOR = 3.40; 95% CI : 1.45, 8.01) and reference materials (AOR = 4.99; 95% CI: 2.62, 9.50) were factors significantly associated with the data management practice.*

***Conclusion:*** *The study indicated that a moderate proportion of HEWs had good data management practice. Supportive supervision, training access, and availability of tally sheet and reference materials were factors associated with the data management practice. Therefore, strengthening supportive supervision, facilitating needs based training, and making tally sheets and reference materials available are of paramount importance for improving the practice.*

***Keywords:*** *Data management practice, health extension workers, Awi Administrative Zone, Amhara National Regional State, Ethiopia*

## BACKGROUND

Health information system (HIS) is a system designed for the collection, processing, use and dissemination of health related data with the goal of improving health care outcomes. Data management is one of the six components of HIS. It covers all aspects of data handling from collection, storage, quality assurance and flow to processing, compilation and analysis. Health authorities require accurate, accessible and timely health care data to plan, manage and maintain health care at an optimal level (1-3).

Decision-making processes at all levels of the health care system are highly dependent on the quality and timely availability of data. For effective clinical management of cases and the assessment of community health needs and demands, information is highly needed at all levels of the health system. It is evident that accurate and timely health data not only main-

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tains quality health to the community but also improves data management practices and timely utilization and communication of practices to health facilities. In line with this, a weak information system is the main challenge to managers in making informed decisions because of inadequate data collection, processing and utilization (4-6).

Globally, many lives are lost due to insufficient access to quality HIS. In most developing countries, where evidence-based decision through better information utilization is highly required, weak data collection, analysis and reporting systems result in poor data management practice and remain a problem (3, 7).

Empirical evidences indicate that data management practice can be affected by organizational factors (8-10), such as the frequency of supervision and availability of reporting formats and data registration books (11, 12).

In Ethiopia, information quality and use remains weak within the health sector, particularly at district and health facility levels which have the primary responsibilities for operational management. Though they are the main sources of health related data for the nation, they have problems, such as lack of coordination, redundancy and delayed reporting systems (13-16). Health extension workers (HEWs) in health posts are responsible for collecting first line data from the community, and compiling and reporting them to district health offices. However, the data collected from the health workers lack completeness and timeliness due to lack of knowledge, shortage of data management guidelines, reporting formats and registration books (1).

Studies conducted in Northwest Ethiopia and Southern Ethiopia show that 53.3% and 74.4% of the HEWs have good data management practice, respectively (11, 12). However, evidences on data management practice are limited among HEWs in the study setting. Therefore, this study aimed at assessing data management practices and associated factors among HEWs in Awi Administrative Zone, Amhara National Regional State, Ethiopia.

## METHODS

**Study design and setting:** An institution-based cross-sectional study was conducted on HEWs in Awi Administrative Zone, Amhara National Regional State, Ethiopia, from January to March 2016. The capital of Awi Administrative Zone is Kosober, located 485 Kms from Addis Ababa, the capital of Ethiopia. According to the 2016 Plan and Program report of the Awi Health Department, the zone had 417 rural HEWs.

**Study participants, sample size and sampling procedures:** All HEWs in the zone were the study population. The sample size was calculated using the single population proportion formula, considering the following assumptions: 74% prevalence of data management practice at health post levels in Gamogofa (8), 95% level of confidence, 5% margin of error and 5% non-response rate. Accordingly, 321 HEWs selected by the simple random sampling technique participated in the study.

**Data collection tool and procedures:** Data were collected using a pretested, structured, and interviewer-administered questionnaire and an observation checklist. To maintain consistency, the questionnaire was first translated from English to Amharic (native language of study area) and back to English. Eight data collectors and three supervisors participated in the data collection process. A one-day training was given to the data collectors and supervisors on the objective of the study, data collection procedures, and the confidentiality of information.

**Operational definitions and study variables:** Health extension workers' data management practice was the dependent variable, whereas socio-demographic, technical, knowledge and organizational factors were the independent variables.

Good data management practice refers to respondents' practice in which they scored above the mean on questions on the issue.

Good knowledge on data management is defined as respondents' knowledge in which they scored above the mean on relevant questions.

**Data processing and analysis:** Data were entered into Epi-info version 7 and exported to a Statistical Package for Social Sciences (SPSS) version 20 for further analysis. Descriptive statistics, including frequencies and proportions were computed to summarize the variables. The binary logistic regression model was used for analysis. Variables with less than 0.2 p-values in the bi-variable logistic regression analysis were entered into the multivariable logistic regression analysis. Adjusted Odds Ratio (AOR) with 95% Confidence Interval (CI) and P-value < 0.05 were used during the multivariable analysis in order to identify factors associated with data management practices.

**Ethical considerations:** Ethical clearance was secured from the Ethical Review Committee of the Institute of Public Health, the University of Gondar. Before addressing the study participants, an official letter of permission and cooperation was obtained from Awi Zone Health Department and district health offices. Participants were informed about the purpose and importance of the study and assured that their names were not written on the questionnaire so confidentiality of data would be protected at all levels, and their responses would not affect their possible work efficiency scores they would need for promotion.

## RESULTS

**Socio-demographic and behavioral characteristics:** A total of 321 HEWs participated in the study which indicated that 38.0% of the participants had level-4 diploma, 61.7% had more than seven years of experience, 82.9% had radio receivers and 26.8% had TV sets (Table 1).

**Organizational factors:** Of the participants, 22.1% had no supportive supervision concerning their data management practices; 60.1% received feedback from the next higher health authority; 56.4% had training access in the last three years, and 60.1% had references in their offices (Table 2). Out of 250 supervised HEWs, 63 (25.2%) were visited monthly (Figure 1).

**Technical factors:** This study showed that 24.9% of the HEWs had difficulty of understanding the registration books, and 62.3% used mobile phones for weekly reports. The main reasons for the complexity of understanding the registration books were the use of uncommon words/terms (22.5%) and abbreviations (40.0%), and inconsistency of the books (37.5%) (Table 3).

**Table 1:** Socio- demographic characteristics of health extension workers in Awi administrative zone, Amhara region, Ethiopia, 2016 (n=321)

| Characteristics | Number | Percent |
|---|---|---|
| **Age** | | |
| <=20 | 18 | 5.6 |
| 21-30 | 297 | 92.5 |
| 31-40 | 6 | 1.9 |
| **Marital status** | | |
| Single | 91 | 28.3 |
| Married | 225 | 70.1 |
| Divorced | 5 | 1.6 |
| **Educational level** | | |
| Level III | 199 | 62.0 |
| Level IV | 122 | 38.0 |
| **Children under five** | | |
| No | 264 | 82.2 |
| Yes | 57 | 17.8 |
| **Years of service** | | |
| <=3 | 37 | 11.5 |
| 4-6 | 86 | 26.8 |
| >=7 | 198 | 61.7 |
| **Possession of radio** | | |
| No | 55 | 17.1 |
| Yes | 266 | 82.9 |
| **Possession of television** | | |
| No | 235 | 73.2 |
| Yes | 86 | 26.8 |

**Table 2:** Organizational factors of HEWs in Awi administrative zone, Amhara region, Ethiopia, 2016 (n=321)

| Variable | Number | Percent |
|---|---|---|
| **Supervised HEWs** | | |
| No | 71 | 22.1 |
| Yes | 250 | 77.9 |
| **Availability of registration book** | | |
| No | 4 | 1.2 |
| Yes | 317 | 98.8 |
| **Availability graph paper** | | |
| No | 63 | 19.6 |
| Yes | 258 | 80.4 |
| **Availability reporting format** | | |
| No | 88 | 27.4 |
| Yes | 233 | 72.6 |
| **Availability tally sheet** | | |
| No | 36 | 11.2 |
| Yes | 285 | 88.8 |
| **Availability feedback** | | |
| No | 128 | 39.9 |
| Yes | 193 | 60.1 |
| **Pen or marker received** | | |
| No | 52 | 16.2 |
| Yes | 269 | 83.8 |
| **Training access** | | |
| No | 140 | 43.6 |
| Yes | 181 | 56.4 |
| **Availability reference** | | |
| No | 128 | 39.9 |
| Yes | 193 | 60.1 |

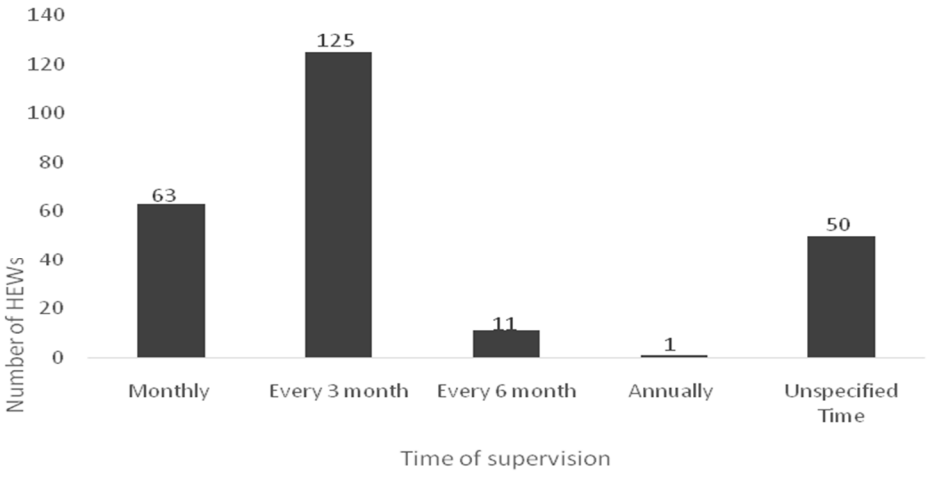


***Figure 1:*** *Supervision time of Awi zone health extension workers, 2016*

**Table 3:** Technical Factors of HEWs in Awi administrative zone, Amhara region, Ethiopia, 2016 (n=321)

| Variable | Frequency | Percent |
|---|---|---|
| **Clarity of registration book** | | |
| No | 80 | 24.9 |
| Yes | 241 | 75.1 |
| **Reasons for complexity of registration book (80)** | | |
| Uncommon words/terms | 18 | 22.5 |
| Unknown abbreviations | 32 | 40.0 |
| Inconsistency | 30 | 37.5 |
| **Clarity of reporting format** | | |
| No | 77 | 24.0 |
| Yes | 244 | 76.0 |
| **Reasons for complexity of reporting format (77)** | | |
| Un common words/terms | 17 | 22.1 |
| Unknown abbreviations | 9 | 11.7 |
| Inconsistency | 51 | 66.2 |
| **Mobile use for reporting** | | |
| No | 121 | 37.7 |
| Yes | 200 | 62.3 |

**Data management knowledge and practice:** Out of the participants, 85.7% collected data by interviews and 260 (81%) knew the primary data types. More than half, 195 ( 60.7%), had good knowledge of data management, while the remaining 126 (39.3%) had poor knowledge.

**Data management practice:** Three-fourths (75.4%) of the participants had good data management practice. The majority, 288 (89.7%), utilized the collected data for planning and monitoring purposes at facility levels. Nearly three-fourths, 237 (73.8%), of the respondents kept copies of their reports on their files, and the majority, 261 (81.3%) and 258 (80.4%), reported their practices weekly and monthly, respectively.

**Factors associated with good data management practice:** The study revealed that HEWs who were supervised (AOR = 4.09, 95% CI: 2.10, 7 97), and who had refreshment training on data management (AOR = 2.48; 95% CI: 1.32, 4.64), tally sheets in their offices (AOR = 3.31; 95% CI: 1.43, 7.67) and reference materials in their work areas (AOR = 4.78; 95% CI: 2.54, 9.04) were 4.09, 2.48, 3.31,and 4.78 times more likely to have good data management practice compared to HEWs who neither had supervisions nor the provisions mentioned (Table 4).

## DISCUSSION

This study revealed that supportive supervision, training on data management, availability of reference materials and tally sheets were significantly associated with good data management practice. In this study, three-fourths of the HEWs demonstrated a good data management practice. The finding is similar to that of a study conducted in Gamo Gofa, Ethiopia, and found 74.3% (11). However, this figure is higher than the finding in East Gojjam zone, Ethiopia, where HEWs' data management practice was reported to be 53.3%. The possible explanation for this variation could be differences in study periods (10).

**Table 4:** Factors associated with health extension workers' data management practice in Awi zone, Amhara region, Ethiopia 2016 (n=321)

| *Variables* | *Data management practice* | | *Crude OR (95% CI)* | *Adjusted OR (95% CI)* |
|---|---|---|---|---|
| | Good | Poor | | |
| **Supportive supervision** | | | | |
| Yes | 208 (83.2%) | 42 (16.8%) | 5.39 (3.04, 9.55) | 4.09 (2.10,7.97)** |
| No | 34 (47.9%) | 37 (52.1%) | 1 | 1 |
| **Feedback** | | | | |
| Received | 155 (85.6%) | 26 (14.4%) | 3.63 (2.12, 6.22) | 2.48 (1.32, 4.64)* |
| Not received | 87 (62.1) | 53 (37.9) | 1 | 1 |
| **Reference materials** | | | | |
| Available | 172 (89.1%) | 21 (10.9%) | 6.79 (3.83, 12.02) | 4.78 (2.54, 9.04)** |
| Not available | 70 (54.7%) | 58 (45.3%) | 1 | 1 |
| **Reporting format** | | | | |
| Available | 190 (81.5%) | 43 (18.5%) | 3.06 (1.79, 5.24) | - |
| Not available | 52 (59.1%) | 36 (40.9%) | 1 | |
| **Knowledge** | | | | |
| Knowledgeable | 155 (79.5%) | 40 (20.5%) | 1.74 (1.04, 2.90) | - |
| Not knowledgeable | 87 (69.0%) | 39 (31.0%) | 1 | |
| **Technique** | | | | |
| Good | 191 (79.6%) | 49 (20.4%) | 2.29 (1.32, 3.97) | - |
| Poor | 51 (63.0%) | 30 (37.0%) | 1 | |
| **Tally sheet** | | | | |
| Available | 224 (78.6%) | 61 (21.4%) | 3.67 (1.80, 7.48) | 3.31 (1.43,7.67)* |
| Not available | 18 (50.0%) | 18 (50.0%) | 1 | 1 |
| **Journal utilization** | | | | |
| Yes | 55 (83.3%) | 187 (73.3%) | 1.82 (0.90, 3.68) | - |
| No | 11 (16.7%) | 68 (26.7%) | 1 | |

***Note:*** *Multivariable analysis with backward likelihood ratio, p vale < 0.05(*), p value <0.001(**)*

In this study, a large number (81.1%) of the HEWs reported their activities weekly, while the Ethiopian Health Extension Program evaluation showed that only 53.8% did so (17). With regard to the types of data collection methods, 85.7%, and 32.1% of the respondents of this study knew about interviews and record reviews, respectively. This finding is almost similar to that of a study conducted in Gamo Gofa, Ethiopia, and reported 89.1% and 38.2%, respectively (11). However, respondents' knowledge (53.0%) of "observation" as a data collection method was not in line with the study in Gamo Gofa (38.2%). This could be due to such variations as some study participants might receive trainings on data collection method more focused on "observation".

This study showed that the majority of the HEWs (77.9%) had supportive supervision, 80% regularly and 20% as necessary. Three-fifths (60.1%) of the HEWs received feedbacks on data management practices from their supervisors. This is lower than that of a previous study conducted in Gamo Gofa zone, West Ethiopia, and reported 83.8% (11). The possible explanation for this variation could be differences in study participants and sampling methods. In our study, the participants were rural HEWs, whereas in the study in Gamo Gofa both rural and urban HEWs took part. In terms of the sampling procedures, this study used the simple random sampling technique, whereas the study in Gamo Gofa employed the cluster sampling method. Regarding the understandabil-

ity of the reporting format, the study revealed that nearly one-fourth (24%) of the HEWs had difficulty of understanding it. The main reasons for the problem were that the formats used uncommon words and abbreviations inconsistent with the registration books. Our finding is similar to that of Gamo-Gofa which revealed 24.9% had problems for similar reasons (11).

This study revealed that nearly three-fifths (63.2%) of the HEWs reported that they displayed updated EPI monitoring charts. The result is similar with a survey result (62.7%) of Amhara region. The possible reason might be the fact that the present study is in the same region, where updated EPI monitoring charts were displayed.

However, our result is higher than the national finding of 48.1%. A possible explanation might be that some regions, like Afar and Gambella, displayed the updated EPI monitoring charts to fewer, that is, 19.8% and 14.3% of their HEWs, respectively, minimizing the overall coverage (17). The present study indicated that HEWs who were supervised had higher odds of data management practice compared to their counterparts.

This result is supported by studies elsewhere (6, 10-12, 18, 19). It has been known that if health facilities get more support and feedback on data management and use, they improve the knowledge and personal initiatives of workers to manage and use their data at hand for various purposes (6, 12).

Like studies conducted elsewhere (6, 12), the odds of data management practices of our work were higher among HEWs who had training on data management compared to those who had not. This might be due to the fact that HEWs who get training on data management have the potential to collect, process, analyze, and utilize information generated in their routine day-to-day activities. However, studies in Gamo Gofa zone showed that training on data management had no significant association with data management practice. The possible explanation for this variation could be differences in study periods and sampling methods (11).

The odds of data management practice in this study were higher among HEWs who had tally sheets in their offices compared to their counterparts. This might be due to the fact that tally sheets are one of HMISs data collection tools which help supervisors to control data quality by crosschecking the records on tally sheets and registration books (20-22).

Like studies conducted elsewhere (11, 12), the odds of data management practice of our study were higher among HEWs who had reference materials in their offices compared to those who did not have such materials. This might be due to the fact that HEWs are expected to refer to guidelines while they implement the community health information system.

The main limitation of this study was that the findings were based on quantitative data only, in spite of the fact that qualitative data which could give better insights on the perceptions of HEWs and could contribute to data management practices were not used.

## CONCLUSION

A moderate proportion of HEWs in the study area had good health data management practice, and factors, such as supportive supervision, availability of tally sheets, and trainings on data management and updated guidelines on such management contributed to the practice. Therefore, strengthening supportive supervision, facilitating needs based trainings and providing tally sheets and reference materials are of paramount importance for improving the data management practices of HEWs.

**Competing interests:** The authors declare they have no competing interests.

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## REFERENCES

1. Damtew ZA, Moges AS. From Multiple Register to Family Folder: The Transition of Data Collection and Reporting Tools for Health Extension Workers in Ethiopia. Journal of Health Informatics in Developing Countries. 2013;7 (2).
2. Worku A. High Quality Health Information System for Improved Health System. Editorial. Ethiop. J. Health Dev. 2012; 26(3)
3. WHO. Improving Data Quality: AGuide for Developing Countries. World Health Organization Regional Office for the Western Pacific, Manila, Philippines 2003.
4. Adamki M, Asamoah D, Riverson K. Assessment of Data Quality on Expanded Programme on Immunization in Ghana:The Case of New Juaben Municipality. J Health Med Informat 2015, 6:4.
5. Cibulskis RE., Hiawalyer G.. Policy and Practice: Information systems for health sector monitoring in Papua New Guinea. Bulletin of the World Health Organization 2002, 80 (9).
6. Shiferaw AM, Zegeye DT, Assefa S, Yenit MK. Routine health information system utilization and factors associated thereof among health workers at government health institutions in East Gojjam Zone, Northwest Ethiopia. BMC Med Inform Decis Mak. 2017 Aug 7;17 (1):116. doi: 10.1186/s12911-017-0509-2.
7. Karuri J., Waiganjo P., Daniel O., Manya A. DHIS2: The Tool to Improve Health Data Demand and Use in Kenya. Journal of Health Informatics in Developing Countries. 2014;8(1).
8. Gimbel S., Micek M., Lambdin B., Lara J., Karagianis M., Cuembelo F., et al. An assessment of routine primary care health information system data quality in Sofala Province, Mozambique. Popul Health Metr. 2011; 9: 12. doi: 10.1186/1478-7954-9-12
9. Ekwueme OC, Aniebue PN, Obionu CN, Onwasigwe CN. Health Data Recording, Reporting and Utilization Practices Among Primary Health Care Workers in Enugu State, South Eastern Nigeria. International Journal of College of Medicine and Health Development. 2008;13(2):85-90.
10. Asemahagn MA. Determinants of routine health information utilization at primary healthcare facilities in Western Amhara, Ethiopia. Cogent Medicine.2017; 4(1), 1387971. https://doi.org/10.1080/ 2331205X. 2017.1387971
11. Shagake SS., Mengistu MY., Zeleke AA. Data management knowledge, practice and associated factors of ethiopian health extension workers in Gamo Gofa Zone, Southern Ethiopia: A cross-sectional study. J Health Med Informat. 2014;5(150):2.
12. Yitayew S., Zeleke AA., Asemahagn MA. Data management Practices and associated factors among the Health Extension workers in East Gojjam zone, Western Ethiopia.EPHA 28th Annual Conference; 28th Annual conference, 2016.http://etpha.org/conference/index.php/ 28thConference/28thConference/rt/ metadata/209/0
13. FMOH. Assessment of the Ethiopian National Health Information System. 2007.
14. WHO. Framework and standards for country

health information systems. June 2008.

15. FMOHh. Assessment of the Ethiopian National Health Information System:Final Report. October 2007.
16. FMOH. Health Management Information System (HMIS) / Monitoring and Evaluation (M&E) 2008.
17. Center for National Health Development in Ethiopia. Health Extension Program Evaluation: Rural Ethiopia Part - II HEW and Health post Performance Survey. Columbia University, 2007-2010.
18. Abajebel S., Jira C., Beyene W. Utilization of Health Information System at District Level in Jimma Zone, Oromia Regional State, South West Ethiopia. Ethiop J Health Sci. 2011 Aug; 21(Suppl 1): 65–76.
19. Andargie G. Assessment of utilization of Health Information System at district level with particular emphasis to HIV/AIDS program in North Gondar. Master Thesis. Addis Ababa University. 2006.http://etd.aau.edu.et/handle/123456789/11769
20. Manongi RN., Marchant TC., Bygbjerg IC. Improving motivation among primary health care workers in Tanzania: a health worker perspective. BMC Hum Resour Health. 2006; 4: 6.doi: 10.1186/1478-4491-4-6
21. Chewicha K, Azim T. Community health information system for family-centered health care: Scale-up in Southern Nations, Nationalities and People's Region. Ethiopia Ministry of Health Quarterly Health Bulletin. 2013; 5(1):49-53.
22. Measure Evaluation. Community-Based Health Information Systems in the Global Context: A Review of the Literature. June 2016.https://www.measureevaluation.org/resources/publications/wp-16-161