

Evaluation of HMIS Data Quality and Information Use Improvement for Local Action-Oriented Performance Monitoring in Beghi District in West Wollega, Oromia, Ethiopia

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Abstract
Introduction: Strong health management information system (HMIS) have been most frequently identified as critical for addressing health challenges and improving health service delivery at all levels of health system. However, its data is often Inaccurate, untimely, incomplete and inconsistent as a result data are not used effectively for decision-making in developing countries.**Methodology:** A facility based cross- sectional study design was used for the baseline assessment HMIS performance and then acting to improve data quality and information use for local action-oriented performance monitoring through formulating possible interventions, take those possible actions and review Post interventions changes.**Result:** The result of the project showed that proportion of HMIS data accuracy has been increased from about 65% before to 87% after interventions. Similarly, level of HMIS data completeness has been increased from about 42% before to 100% after intervention. In addition, encouraging improvement were achieved on information use practice in the Beghi district of west Wollaga.**Conclusion:** For improving HMIS data quality and information use practice in local action-oriented performance monitoring; simple, strategic and practical interventional activities were carried out throughout the project. As a result, the encouraging improvement were achieved in terms of increasing proportion of data accuracy, completeness and timeliness of monthly HMIS reporting as well as on information use practice for identifying gaps, setting targets, making decisions and give feedback in internal health management for Begi District case. Therefore, health planners and Decision maker would be better to give great emphasis for checking HMIS data quality and use of HMIS information for evidence based decision making in developing countries for better quality of health care system implementation.
Keywords: HMIS data quality and information use practice, local action-oriented performance

Background

Improving evidence-based decision making by harmonization and alignment is one of the ten strategic objectives [SO] of HSDP-IV. That is to support improved evidence-based decision making particularly at peripheral level of woreda and facility. It has been enhanced through partnership, harmonization and alignment, including integration of health projects and programmes at the point of health service delivery whose expected outcomes are proper generation and use of evidence (better quality data and continuous information use) at all levels of the health system. The aim of this strategic objective of HSDP-IV is to respond to critical health problems of the community; to realize the one-plan, one-budget and one-report approach; and to effectively integrate and align health programmes and projects. In order to achieve this objective, Better HMIS performance producing better quality data and continuous information usage has been identified as critical since it leads to improved performance of health service delivery and consequently leads to better health status of community served (1).

To improve HMIS performance producing better quality data and continuous use of information; not only technology acquisition will be required but it should also be viewed as a long-term socio-cultural, political and technical development process. It is equally important to improve the understanding of health managers and health professionals on the importance of quality health data as well as the proper analysis of the available data and use of information for improved health service management at each level of health system. This can be achieved only through proper interventions and increasing the proportion of staffs that are competent enough on HMIS tasks leading to better performed HMIS process producing better quality data and continuous information use for local action-oriented performance monitoring (2). Thus, this project is intended to improve the HMIS data quality and information use practice by strategically availing accurate, timely and complete data and strengthen the use of locally generated data for evidence based health decision making in case of Begi District.

Currently health information quality and its utilization for local action-oriented performance monitoring is found poor within health sector in Ethiopia, particularly at woreda health office and health facility level which are primarily responsible for operational management (3).

PRISM Tools Package

The PRISM Tools Package is a set of routine HMIS performance assessment tools that are developed from the PRISM conceptual framework. When used as a whole, the package will provide a comprehensive picture of routine HMIS performance and its contributing factors in the technical, organizational, and behavioral areas. Results will allow users to develop multidimensional interventions to improve HMIS performance (4).

Key problems of Health Management Information System (HMIS) process in four countries (Lesotho, Mauritius, Sudan and Tanzania)were the fragmented nature of responsibility for data and disease-focused demands by different vertical programs and donors which result in: unprocessed health data; or if processed, unanalyzed; if analyzed, not read; if read, not acted upon. Only a little proportion of health information affects decision-making particularly at districts and health facility level (5)

Despite institutional will and guide to correct it is clear and strong, HMIS information quality and usage for monitoring and evaluating performance of health sector found weak within Ethiopia. For information to influence management in productive manner, it has to be of better quality and used continuously by managers and all stakeholders at all health management spirals for improved performance of health service delivery leads to improved health outcome (6).

Therefore, the project on HMIS data quality and information usage improvement is very significant for improving HMIS information use in internal management, improving HMIS information quality to support improved health management and to enhance credibility in reporting to external agencies in order to direct toward improve performance and remove obstacles in the Beghi District health office and its health facilities which has primary responsibility for operational management.

The findings of this study were first presented as *the baseline HMIS data quality and information usage practices* before intervention in Begi District, West Wollega, Oromia, Ethiopia.

Then the implemented interventional activities aimed to improve HMIS data quality and information use practice during this study has been presented. Finally the achieved improvement on *HMIS data quality and information use practice,* by improvement intervention, as identified by post interventions review, have been compared to the baseline data on HMIS performance before interventions in view of making recommendation

Methods and Materials

Study setting

The project was carried out at Beghi District in West Wollaga zone between Januarys to June/2015. West Wollaga zone is found 445 kilometers from Addis Ababa. The total population of Beghi District is estimated to be 149,459.The climate of the District is woina dega and farming is the predominant source of livelihood. Beghi District has 1 functional governmental primary Hospital and 5 Health centers and 42 community Health posts.

Study Design

A facility based cross- sectional descriptive study design was used to highlight the routine HMIS performance in terms of improved data quality and continuous use of information. In addition, the technical, behavioral and organizational determinants of HMIS performance were assessed to generate and implement possible interventions. Post interventions review was conducted to assess changes in a view of making recommendations.

Operational Definitions

Data quality: refers to state of data accuracy, completeness and timeliness that make data appropriate for use in identifying gaps, setting targets, making various decisions and providing evidence based feedback.

Data accuracy: refers to that the data compiled in reporting forms is accurate and reflect consistency between what is in reporting forms and in what is in registries at health facility level. Similarly, it refers to that when data entered in to computer file, there is no inconsistency between figures in reporting forms and computer file at woreda health office.

Data completeness: refers to two contexts:

(a) degree to which all data elements in the report form are filled against total number of all HMIS data elements supposed to be filled and
(b) Weather all health administrative units have reports from all health facilities and/or lower level health administrative units within their administrative boundary.

Data elements: refers to name of a particular event counted or measured. In a context of HMIS, data element means health event or health related events. Example: Number of birth attended by skilled health professionals, Number OPD attendance of female 15 years and above, Number of malaria (with p.falcifarum): female under five years of age, Number of children under 1 year of age who received measles vaccine etc

HMIS: an organized system of recording, record keeping, processing, reporting and use of generated information in health sector

Information culture: refers to capacity and control to promote values and beliefs among members of an organization for data collection, aggregation, transmission, analysis and evidence based decision making in accomplishing organizational mission and goals (7).

Study Population

All of 106 health professionals including the health facility managers and people working on HMIS in Beghi District were included in the project study. In addition, registered data and facility's reports were assessed using adopted PRISM toolset to check HMIS data quality and information use.

Survey Methodology

Beghi District has 5 Health centers. Each health center is comprised of its own satellite health posts connected to each other by a referral system based on geographical proximity. In accord with this division, the District HMIS performance assessment was conducted at all the five Health centers (HC) and the Woreda Health Office (WorHO). Those Health centers were: Beghi HC, Gunfi HC, Kobor HC, Shombo HC, and Tulu HC which comprises 15, 12, 5, 5 and 5 satellite health posts respectively. According to the PRISM conceptual framework, the District routine HMIS performance can easily be assessed by randomly selecting its 19 health facilities, if its total health facilities are 30 or more (7). According to this framework, 14 health facilities are needed in addition to 5 health centers in order to include 19 health facilities of the districts. Thus, 14 health posts were randomly selected from sampling frame of 42 health posts in the Beghi District. In order to proportionate the satellite health posts selection under each Health center, proportionate allocation sampling was used. That is by the formula:

$ni = \frac{n}{N} * Ni$, Where; $N$is all of the 42 health posts in the District, $n$is the 14 health posts to be included, Ni is the number of satellite health posts under the respective Health center and $ni$is the proportional satellite health posts to be selected from the respective Health center. All of the health professionals in the selected health facility were included in the study.

Data Collection Instrument

Self-administered questionnaires adopted from organizational and behavioral assessment tool of PRISM toolset were used to provide baseline of behavioral and organizational factors affecting routine HMIS performance. HMIS performance diagnostic tool was adopted from PRISM toolset in order to capture technical determinants of routine HMIS performance that is level of complexity of data collection forms and its user - friendliness as well as to provide a baseline of routine HMIS performance such as the level of data quality and use of information in Beghi District. In addition, facility checklist was adopted in order to list the availability and status of routine HMIS resource necessary for routine HMIS implementation at facility level. Management Assessment Tool (MAT**)** was adopted to take rapid stock of the routine HMIS management practices and developing possible intervention for better management.

Data Quality Issues

The questionnaires were adopted from PRISM Framework, Measure Evaluation and WHO guidelines. The adoption of questions from these guidelines and framework was based on the definition given to HMIS and its components by South African development community (9). The questionnaires were adopted in English. Pre-testing of the questionnaires was conducted in the Beghi District using randomly selected twenty individuals to assess clarity, understandability, and flow of questions as well as the time needed to fill the questionnaires. Based on the findings some questions were restructured.

Ethical Consideration

The project work was conducted after the approval of the project by the ethical clearance committee from Addis Ababa University. Before conducting the survey, written permission was obtained from the Oromia Regional health Bureau and West Wollaga Zonal Health Department and Beghi woreda health office. The data collection consent was obtained from the Beghi woreda health office. All the project participants were briefed on the purpose and benefits of the project and the consent was obtained in advance from each participant. At the same time, data collectors told the respondents the ethical prerequisites for the questionnaires, where and how the writer is going to present the results. The data collectors clearly expressed the emphasis given to bring up the rules to maintain the respondent's anonymity. After explaining the ethical issues and get an informed consent from the respondent, the data collectors collected the data in the suitable area that can avoid an interruption. In this manner the questionnaires were filled.

RESULTS AND DISCUSSION

Pre-intervention assessment results

Baseline HMIS Performance: HMIS data quality and information use within Begi District

Dimensions of the HMIS data quality involved by pre-intervention assessment of this project were data accuracy, completeness and timeliness of HMIS monthly report.

HMIS data quality

HMIS data accuracy at health facilities level

The routine collection of HMIS data at health facilities started with information collected in the registries at each services delivery points. Thus, the staffs at each department of health facilities collected data and sent monthly

report on paper to HMIS unit during every monthly reporting period. Then, the monthly summaries of HMIS reports were converted in to electronic format by Health Information officer at the health facilities and sent to the district health office (this was at only one Health center in the project area). But, at the rest of health centers the monthly summaries of HMIS report were produced on paper at health facilities by the facility manager and sent to the district health office.

For pre intervention assessment of this project, seven data elements:(a) Number of repeat Contraceptive Acceptors, (b) Number of pregnant women that received ANC at least four visits, (c) Number of birth attended by skilled professional, (d)Malaria (confirmed with P. falciparum) for female under five years of age, (e) OPD attendance of female 15 years & above, (f) Clients (20-24 years :female) receiving HIV test results (at VCT) and (g)Number of children under one year of age who have received measles vaccine were purposefully selected for assessing HMIS data accuracy. Records from 21 July to 20 august/2014 and from 21 November to 20 December/2014 G.C from registers for these data elements were recounted and cross-matched with the figures in the corresponding monthly reports of the health facilities.

Table 1 below shows the routine HMIS data accuracy by the data elements and by health facility types. The findings of pre intervention assessment of this project showed that overall in about65% cases the data elements properly matched between what is in registers and what is in reporting forms at health facilities level. However, the data accuracy was100% at woreda health office level (see Table 1)

HMIS report completeness at health facilities

HMIS report completeness has two meanings according to the context of Health Administrative units. These are whether:

- All the HMIS data elements in a report forms or database are filled and
- All the health administrative units have reports from all the health facilities or lower level health administrative units within their administrative boundary (10)

HMIS Report data Completeness

For the pre-intervention assessment of this project, the completeness of routine HMIS monthly reporting was measured in terms of whether Health Facilities reported all the HMIS data elements filled against the total number of HMIS data elements that the Health facility was supposed to fill. Accordingly, HMIS monthly reports that were routinely reported by Health centers and satellite Health Posts during 21 July to 20 august/2014 and 21 November to 20 December/2014 G.C were assessed in order to measuring completeness of routine HMIS monthly report data at health facilities. The result showed that during 21 July to 20 august/2014 and 21 November to 20 December/2014 G.C, only 32% and 42% of the health facilities respectively reported all the HMIS data elements filled against the total number of HMIS data elements which the Health facility was supposed to fill. (Table 2 and Table 3)

Completeness of health facility's monthly reporting

In addition, for the pre-intervention assessment of the project, the completeness of the HMIS monthly reports at woreda level was assessed by how many health facilities in the Beghi woreda that were supposed to report are actually reporting to the Woreda Health Office. To do so, the number of available routine HMIS monthly reportsthat were routinely reported during **21 July/2006 to 20August/2006and21 November/2007 to 20 December/2007** was recounted. The findings showed that about 96% of the health facilities that were supposed to report were found actually reporting to Beghi woreda health office (Table 4).

Timeliness of HMIS data reporting to respective level

Another dimension of routine HMIS data quality that was assessed at pre-intervention assessment stage of this project was timeliness of monthly HMIS data reporting. Timeliness of monthly HMIS data reporting is measured by observing Health facilities' records kept as to measure timeliness. In addition, timeliness of monthly HMIS data reporting is measured by checking whether HMIS data reporting bythe health facilities met the predetermined deadline of reporting period. The results showed that both health facilities and woreda health office did not keep records to measure timeliness ofmonthly HMIS data reporting.As the reporting date on the report form indicated, 89% of the health facilities found reporting within the predetermined reporting deadline during 21 November to 20 December/2007.Thus,the identified problems were thatat each health administrative unit, the HMIS focal person did not keep records of receipt and transmission of the monthly HMIS report from and to the respective health unit level. This situation was leading both health facilities and woreda health office fail for identifying those who have or not submitted the report within the predetermined reporting deadline and ensuring the timely reporting.

HMIS Information Use practices

The practices of HMIS information use were assessed by conducting observation of action-oriented feedback given on the health facilities' performance in the view of local action-oriented performance monitoring both at the health facilities and woreda health office. In addition, it was also assessed by observing the presence of HMIS data display by table, chart or graph on core indicators and the presence of analysis of HMIS data in terms of conducting comparison of the data over months/quarters, comparison of service coverage by types and

comparison among facility's catchment area. Results of the HMIS information usage assessment were presented as following:

HMIS Information Use

The result showed that 88% of health facilities in the project area have received feedback during past three months on their performances from their higher level administrative unit although it was sporadic and insufficient.

HMIS data Display

The presence of data displayed by of tables, charts or Graphs on (a) Maternal health indicators, (b) Neonatal and child health indicators (c) Malaria indicators (d) Quality of Health service indicators (*Proportion of bed occupancy, OPD attendance per capita, customer satisfaction index*), (e) Hygiene and Environmental Sanitation indicators and (f) Nutrition indicators were assessed to know the level of HMIS data display at the health facilities and woreda health offices. As shown by table 6 below, 16 (84%) health facilities were displaying data on only $\leq$2 indicators; of them 6 (38%) HFs had all the indicators updated over the last 3 months period(see Table 5)..

HMIS data Analysis

As shown in Table 7 below, various types of HMIS data analysis were carrying out at Begi Woreda Health Office level. These were generating summary reports for Zonal Health Department; calculate some indicators for each facility catchment area, comparison of HMIS data over time (either by month or quarter) and comparisons among PHCU. However, particular gap on comparison of service coverage by types and with woreda/zone target was found at the woreda health office level(see Table 6).

At Health facilities case particularly at health centers level, among five HCs none of them conduct all type of HMIS data analysis except generating summary report for woreda and comparing HMIS data over time.

Interventions and strategy

Strategy

Establishing HMIS Performance Improvement Team

This was crucial for success of the project because culture of information that is ensured by promoting values and beliefs for collection, aggregation, transmission, analysis and use of health information for evidence based decision making is an element of organizational culture and can be strengthened if all staffs at each level of health system are involved. Therefore, involved members in HMIS performance improvement team include vice head of Begi WorHO, process owner of each program and HMIS focal person at all levels. Establishment of the team was aimed at initiating higher management of Begi WorHO and making them active participant of this project.

Interventions

Interventions made by the project for improving HMIS data quality and information use practice in case of Begi District comprise discussion and preparing action plan for the interventional activities with management team of the WorHO, on-job training, supportive supervision, data audit as well as performance review meeting.

Discussing with management team of Begi WorHO on improvement intervention of this project

Presenting the findings of pre-intervention assessment of this project and discussing with management team of Begi WorHO on the identified gaps and proposed solutions. In addition, briefing all staffs of the WorHO about concepts/definition and purposes of HIS, HMIS, and CHIS as well as on the methods of data quality check and purpose of information use for two days in order to increase their awareness and motivation. Pre and post test were given to evaluate knowledge and awareness of staffs. The post test result showed knowledge of staffs increased.

On the Job Training

The training principally involved the managers of health facilities as well as health information technician and one health professional from MCH of each health facility and two experts of planning and budgeting team from the District who were responsible for HMIS performance. The total number of participants involved was thirteen (13) health staffs of Begi District. This on- job training was intended to help the participants as they appreciate that high-quality data and continuous information use are essential for improving performance of health service delivery which ultimately improves health status of the community served. This training was also intended to initiate the trainees as they acknowledge the broader context in which the routine HMIS operate. Pre and post test were given and the trainee's awareness and knowledge was found increased as identified by post training test. To meet the intentions of the training, addressed areas were generally provided as follow:

- Concept/definition and purpose of HIS, HMIS, and CHIS for performance management
- Key concepts and purpose of information use and its relation with efforts of strengthening M&E capacity
- Meaning of data quality and how it can be assured
- HMIS indicators used to improve M&E of health program in Ethiopia.
- Methods of data analysis and information use for local evidence based decision making

Supportive Supervision

Developing supervisory checklists for supportive supervisory visits aimed at attaining the improvement of HMIS data quality and information use practices at both administrative health units. This was essential part of HMIS performance improvement interventions during the project execution. There was a need for strengthening supportive supervisions for achieving the objective of this project because supportive supervisions are a means of sharing experience for the staffs and providing action-oriented feedback to lower level health facility focusing on the HMIS data quality and information use practices.

By taking the importance of supportive supervisions in to an account especially for motivating health workers to improve HMIS data quality and information use, the following activities were conducted:

- Developing supervisory check lists for supportive supervisions aimed at attaining improvement of HMIS performance and integrated it with regular process (see Annex 4).
- Conducting supportive supervision at all the PHCU from March 15 to April 20/2015 G.C
- Explaining strengths and weakness of the collected and reported data

Data audit

Facility check list adopted from PRISM toolset was used for assessing accuracy of data, completeness and timeliness of monthly HMIS data reporting at health facility level during the data audit. The data audit was conducted by PM and HMIS performance improvement team using seven data elements collected from health facility's registries covering 21 March to 20 April/2014 G.C. Then performance review meeting was held aimed at assuring result-based monitoring of data quality and information use practice. During the meeting, HMIS performance improvement team has actively discussed on the facility's performance emphasizing the accuracy, completeness and timeliness of HMIS data reporting and utilization of information. After the data audit and performance review meeting, PM provided each facility with action-oriented feedback on its data quality.

Post-interventions assessment results

HMIS data accuracy at health facilities level

The findings of post-intervention assessment of this project showed that the data elements which completely matched between what is in registers and what is in reporting forms at health facilities level was increased from 65% before to about 87% in overall selected cases during 21/07/2014 – 20/08/2014 G.C after intervention (See Table 7).

HMIS report completeness at health facilities

HMIS report data completeness

The results of post-intervention assessment of this project showed that the health facilities (health centers and health posts) those reported all the HMIS data elements filled against the total number of HMIS data elements which the health facility was supposed to fill were increased from 42% before to 100% after intervention (Table 8).

In addition, the findings of post intervention assessment of this project also showed that 100% of the health facilities that were supposed to report were made to be actually reporting to the next higher health office which was 96% before intervention (Table 9).

Timeliness of HMIS reporting

Concerning timeliness of HMIS monthly reporting, the pre intervention assessment identified two problems. These were:

- At each administrative unit, the HMIS Focal Person did not keep record of receipt and transmission of the monthly report from and to the respective health unit level and
- Only 89% of the health facilities found reporting within the predetermined reporting deadline as identified from date monthly report.

As identified by post intervention assessment, interventional activities of this project solve this problem and timeliness of HMIS reporting was improved from 89% before to 100% after intervention.

Data quality check

Out of supervised Health Posts and Health Centers (79% and 100% respectively), in none of them the supervisors had carried out data quality check before intervention. Interventional activities of this project made possible the data quality check to be carried out at two health centers and their corresponding community health posts. In addition, best practice sharing on data audit was conducted by two trained HIT.

HMIS Information Usage practices

Data display

Displaying data by chart and/or graphs on such indicators as maternal health, neonatal and child health, malaria, Quality of health service (*Proportion of bed occupancy, OPD attendance per capita, customer satisfaction index*), hygiene and environmental Sanitation and nutrition was ensured at all health centers. As identified by the post intervention assessment, interventional activities of this project paved the way of using data to identify gaps and setting targets as well as to make decisions and provide feedback in view of local action-oriented performance monitoring.

HMIS data analysis

The pre intervention assessment of this project identified that HMIS data analysis at health facility level particularly at health center was conducted only in terms of generating monthly summary report for woreda health office. More or less this project by its interventional activities enables all health centers of Begi woreda to conduct data analysis in terms of carrying out comparison of HMIS data over quarter, Comparison among service coverage by types and Comparison among facility's catchment areas. In addition, particular gap identified on Comparison of service coverage by types and with zone target at the woreda health office level before intervention was addressed after intervention.

Discussion

Accurate, complete and timely health information on service delivery and other key indicators are crucial for health mangers at each management spiral for decision making to reach more people with better quality health services. Routine Health Management Information System is the backbone for planning and management of the health services at district level and below, and can potentially play an important role in health services improvement and reporting at all levels (11). Unfortunately, in Begi district health sector, routine Health Management Information System (HMIS) was unable to provide the better quality data and information support needed before interventions. The generated data were of low quality and the produced information was poorly utilized to support local decision making before the improvement interventions. But, after HMIS data quality and information use improvement interventions of this project, proportion of data accuracy has been increased from about 65% to 87% and the level of data completeness has been increased from 42% before to 100% after the intervention in Begi district health sector. In addition, after intervention 100% of the health facilities that were supposed to report were made to be actually reporting to the next higher level which was 96% before intervention. As shown by baseline assessments conducted on status of routine HMIS performance in Cote d'Ivoire, averagely data accuracy level in health facilities was 55%. Between 2008 and 2012, data accuracy improved in Cote d'Ivoire by 17% at health facilities and doubled (from 40% to 81%) at district level (12). Assessment undertaken at Guanajuato State, Mexico, in January 2010 showed that completeness for filling the monthly report at the facility level was only 22% while at the district level it was found to be 100% for three districts; five other districts had no data on completeness

There were two identified problems concerning timeliness of HMIS reporting: absence of record keeping as to measure timeliness of HMIS monthly reporting, and only 89% of the health facilities found reporting within the predetermined reporting deadline before intervention. These two problems were addressed after intervention and thus, keeping records of HMIS monthly reporting both at health centers and WorHO was ensured. Timeliness of HMIS reporting was improved from 89% before to 100% after intervention. Similarly, assessment of HMIS performance conducted in SNNPR of Ethiopia by MEASURE EVALUATION in collaboration with Regional health bureau showed that data accuracy level found very low at health facilities except hospitals, but data completeness and timeliness of facility reports were found relatively good (13).

As a result of the interventional activities of this project, data quality check was made to be conducted at two health centers and their corresponding health posts after interventions which were conducted at none of health centers and health posts before interventions. Similarly, assessment of HMIS performance conducted in SNNPR of Ethiopia by MEASURE EVALUATION in collaboration with Regional health bureau showed that in 64% of the supervised Health Facilities (primarily HCs and HPs), the supervisors had carried out data quality check (13).

Another dimension of HMIS performance was information use practice which was important area of HMIS data quality and information use improvement intervention of this project. Poor practice of displaying HMIS data by table, chart or graphs as well as HMIS data analysis by carrying out comparison of HMIS data over months/quarters, Comparison among service coverage by types and Comparison among facility's catchment areas were identified before intervention. Such Poor practices was improved at all health centers after interventional activities of this project as to pave the way of using HMIS data for identifying gaps and setting targets as well as to make decisions and provide feedback in view of local action-oriented performance monitoring in case of Begi District.

In terms of establishing Performance Monitoring Teams, this project ensured Performance Monitoring teams to be established at all Health centers which was only at two health centers of the woreda before interventions and increase awareness of keeping the meetings minutes for further reference to follow up the meetings decisions and give feedback on its implementation.

In view of the fact that since culture of information use is a subset of organizational culture, it can be strengthened if all people within an organization are participated and that is why HMIS performance Improvement Team was established as main strategy of interventional activities of this project. It was assumed that culture of information use affect staff's self-efficacy level for HMIS tasks. As other part of interventional activities of this project, data audit and performance review meeting was conducted with active participation of

HMIS performance Improvement Team. In such away evidence based decision making was promoted, staffs were motivated by recognizing their better performance. This in turn increased the confidence and responsibility of the staffs for their future continuous work toward ensuring and sustaining HMIS data quality and information use practice to locally monitor performance of service delivery.

Conclusion

This project was executed with the aim of HMIS data quality and information use improvement in the case of Begi District through baseline assessment of HMIS performance and its determinants categorized under technical, behavioral and organizational factors. It comes up with HMIS data quality and information use improvement interventions intended to address the identified barriers in the Begi District case.

The practical, strategic and simple interventional activities of this project on HMIS data quality and information use practice more or less increased the accuracy, completeness and timeliness of HMIS data reporting that paved the way for continuous information use in Begi woreda. The HMIS data quality and information use improvement intervention that involved specific on-job training, supportive supervisions, data audits as well as performance review meeting was found to be effective in increasing the accuracy, completeness and timeliness of HMIS data leading to continuous information use for local action-oriented performance review.

The Health Management Information System (HMIS) in Ethiopia is designed to capture and provide essential core data for planning and management purpose with the view to enhance the HMIS information use at each level of the health system. On the other hand, the purpose of HMIS is to routinely produce better quality health information that provides specific information support to the decision-making process at each level of the health system for improving the performance of health services delivery and eventually leads to improved health status of the community served. However, in reality the situation was far from this in case of Begi woreda before interventional activities of this project. This was due to Poor commitment from woreda management for better quality HMIS data and local continuous information use, lack of due attention given to knowledge and skills for HMIS data processing, analyzing, interpretation and use, and poor supportive supervision for improving HMIS performance as some contributing factors for poor performance of HMIS in Begi District.

During improvement intervention of this project, specific on-job training on concept, definition and purpose of HIS, HMIS and CHIS as well as HMIS data quality and its relations with health program, decision making in the context of local performance improvement, and sustaining a culture of information use was given. Supportive supervisory visits, data audit and performance review meeting were carried out with active participation of HMIS performance improvement team and an encouraging result was achieved on HMIS performance. Although it requires further research for formal costing analysis, these interventional activities are likely to be a relatively inexpensive way of improving HMIS data quality and information use in resource-poor settings**.**

Recommendation

Oromia regional health bureau and ministry of health would be better to strengthen regular supportive supervision on HMIS information utilization.

Oromia regional health bureau would be better to organize on job training on HMIS information use, quality data generation; early gap identification and timely feedback provision for improvement of health system performance.

West Wollaga zonal Health Department and all stakeholders would work together in order to conduct further assessment on HMIS data quality and information use practice within the zone.

Therefore, health planners and Decision maker would be better to give great emphasis for checking HMIS data quality and use of HMIS information for evidence based decision making in developing countries for better quality of health care system implementation.

Competing interests

The author(s) declare that they have no competing interests.

Authors' contributions

Fikru Negese Dufera, Dereje Bayissa Demissie conceptualized the study, designed the study instrument and conducted the data analysis and wrote the first draft and final draft of the manuscript.

Fikru Negese Dufer: Approved the research proposal with some revisions, participated in data analysis, revised subsequent drafts of the paper and involve in critical review of the manuscript. All authors read and approved the final manuscript.

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Notes: List s of Tables

Table 1: HMIS data accuracy at health facility level before intervention in Beghi District in West Wollega, Oromia, Ethiopia 2015

Data elements	Health facility by type HPts=14, HCs=5, All HFs=19	Recounted figure from Registries	Reported figure in report form	Percent of data accuracy
Number of repeat Contraceptive Acceptors	Health posts	84	112	75
	Health centers	103	119	87
	All Health facilities	187	231	81
Number of pregnant women that received ANC at least four visits	Health posts	-	-	-
	Health centers	21	98	21
	All Health facilities	21	98	21
Number of birth attended by skilled professional	Health posts	-	-	
	Health centers	39	55	71
	All Health facilities	39	55	71
Number of children under one year of age who have received measles vaccine	Health posts	33	48	69
	Health centers	22	31	71
	All Health facilities	55	79	70
Malaria (confirmed with P. falciparum) for female under five years of age	Health posts	2	2	100
	Health centers	11	11	100
	All Health facilities	13	13	100
OPD attendance of female 15 years & above	Health posts	9	12	75
	Health centers	14	17	82
	All Health facilities	23	29	79
Clients (20-24 years :female) receiving HIV test results (at VCT)	Health posts	-	-	-
	Health centers	6	21	29
	All Health facilities	6	21	29
For all cases of the seven selected data elements	Health posts	128	174	74
	Health centers	216	352	61
	All Health facilities	344	526	65

Table 2: HMIS monthly reports' data completeness at WHO Level in Beghi District in West Wollega, Oromia, Ethiopia 2015

Facility Type	Number of health facility by type	# of HFs reported Monthly complete HMIS data	% of HFs reported Monthly complete HMIS data
Health posts	14	3	21
Health centers	5	3	60
Total health facilities	**19**	**6**	**32**

Table 3: HMIS monthly reports' data completeness at woreda health office level in Beghi District in West Wollega, Oromia, Ethiopia 2015

Facility Type	Number of health facility by type	# of HFs reported Monthly complete HMIS data	% of HFs reported Monthly complete HMIS data
Health posts	14	5	36
Health centers	5	3	60
Total HFs	**19**	**8**	**42**

Table 4: Health Facility's monthly Reporting Completeness during in Beghi District in West Wollega, Oromia, Ethiopia 2015

Woreda	MM/DD/YY E.C	# of HFs supposed to report	# of HFs actually reporting to WorHO	% of HFs' reports available at WorHO
Beghi WorHO	21/11/2006 - 20/12/2006	50	47	94
	21/03/2007 - 20/04/2007	50	49	98
	Average	**50**	**48**	**96**

Table 5: HMIS Data Display at Health Facilities Level in Beghi District in West Wollega, Oromia, Ethiopia 2015

No. of indicators on which HMIS data were displayed by HFs (N= 19)	No. of HFs displaying HMIS data on these number indicators	No. of HFs with all displayed data updated	No. of HFs with at least one displayed data updated
All 6 indicators	0	0	0
5 indicators	0	0	0
4indicators	2	1	1
3indicators	1	0	1
≤2 indicators	16	6	10
Total (≤2– 6 indicators)	**19**	**7**	**12**

Table 6: WorHO level HMIS Data Analysis Practices in Beghi District in West Wollega, Oromia, Ethiopia 2015

HMIS Data Analysis by type	Is Begi WorHO performing the analysis of HMIS data by?	
	YES	NO
Summary report generation for Zonal Health Department	✓	
Calculate some indicators for each facility catchment area.	✓	
Comparison of HMIS data over time (either by month or quarter)	✓	
Comparison among service coverage types		✓
Comparison with woreda/zone target		✓
Comparisons among PHCU and/or HFs	✓	

Table 7: HMIS data accuracy at health facility level before and after intervention in Beghi District in West Wollega, Oromia, Ethiopia 2015

	Facility type Health posts (n=14) Health centers (n=5)	% of data accuracy before intervention	%of data accuracy after intervention
For all cases of the seven selected data elements	Health posts	74	82
	Health centers	61	91
	All Health facilities	**65**	**87**

Table 8: HMIS monthly reports' data completeness at woreda health office level before and after intervention in Beghi District in West Wollega, Oromia, Ethiopia 2015

Facility type	Number of facility by type	% of HF reported complete Monthly HMIS data before intervention	% of HF reported complete Monthly HMIS data after intervention
Health posts	14	36	100
Health centers	5	60	100
All Health facilities	**19**	**42**	**100**

Table 9: Health Facility's monthly Reporting Completeness before and after intervention in Beghi District in West Wollega, Oromia, Ethiopia 2015

Woreda	% of HFs actually reporting to WorHO before intervention	% of HFs actually reporting to WorHO after intervention
Beghi WorHO	**96**	**100**