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Original Article

Cascading Change: A New Paradigm for Creating Model Health Posts in Health Information Systems – Experience from Hawassa University's Capacity Building and Mentorship Program

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Abstract

Background: Health Posts (HPs) in Ethiopia play a vital role in primary healthcare but face significant challenges in implementing the Community Health Information System (CHIS). Issues such as inadequate infrastructure, limited training, data quality concerns, and reliance on paper-based records hinder effective decision-making. Existing supervision and mentorship models require substantial resources due to the number of HPs and their accessibility constraints. With the Ministry of Health (MOH) revising model woreda verification criteria to include Health Information System (HIS) performance at the HP level, stronger interventions are needed in key areas like structure, data quality, and data utilization. To address these challenges, this study introduces an extended innovative approach adapted; Focus on single facility, Gap analysis based on standard, Develop tailored action plan, Execute-tailored intervention and evaluate, Cascade the change, and Reward and recognition (FGD-ECR) to transform HPs into Information Revolution (IR) model facilities for improved healthcare data management and service delivery.

Methods: A structured before-and-after study was carried out from September 2023 to February 26, 2024, to enhance Health Information System (HIS) performance across four purposively selected from Hawassa University Capacity building and Mentorship Program (CBMP) targeted woredas in Southern Ethiopia. Guided by the FGD-ECR framework, the initiative was rolled out under the broader CBMP. In each selected woreda, one health center was chosen to participate in the intervention: Shebedino, Hawela, and Melga from the Sidama Region, and Misrak Badewacho from the Central Ethiopia Region. Through targeted action planning and a systematic execution of the FGD-ECR model, the program aimed to identify performance gaps, empower teams through mentorship, and implement reward systems to foster continuous improvement in HIS functionality. In the first phase, 20 health posts across the four Health centers underwent baseline assessments using standardized Information Revolution (IR) tools,

tailored action planning, and targeted interventions. The improvements observed were then cascaded to 59 additional health posts, guided by trained Health Extension Workers (HEWs), and Health Extension Program (HEP) coordinators from each Health Center serving as mentors. Data were entered into Epi-Info version 7 and exported to STATA version 16 for analysis. To assess the changes, paired t-tests evaluated pre- and post-intervention changes in HIS performance, while independent t-tests compared verification of the HEP assessment made by CBMP mentors.

Results: Significant improvements were observed in both the first and second phases across HP structure, data quality, and data use ($p<0.05$). For Phase 1 HPs, HP structure improved from a mean score of 16.6 to 26.8, data quality from 14.3 to 27.4, data use from 17.7 to 35, and the overall score from 48.2 to 89.3. For Phase 2 HPs, HP structure improved from a mean score of 14.1 to 24.4, data quality from 12.7 to 26.3, data use from 16.9 to 33.5, and the overall score from 43.6 to 84.2. Comparison of CBMP mentors' and HEPs' assessments showed no significant differences for most indicators ($p>0.05$), indicating the effectiveness of the HEP-led mentorship.

Conclusion: This extended FGD-ECR approach, leveraging HEP coordinators for mentorship, proves to be a more efficient strategy for developing IR model HPs compared to traditional methods. Large-scale implementation with broader stakeholder collaboration is recommended, alongside efforts to address implementation challenges.

Introduction

Health Posts (HPs) in Ethiopia serve as the foundation of the country's primary healthcare system, playing a pivotal role in delivering essential healthcare services to rural communities. Positioned at the frontline, these facilities bridge the gap between underserved populations and critical health interventions. HPs are staffed by Health Extension Workers (HEWs), who are trained to provide preventive, promotive, and basic curative services, thereby strengthening the healthcare system at the grassroots level [1].

Recognizing the need to enhance health information management at the local level, the Ministry of Health (MOH), in collaboration with six public universities—including Hawassa University—has established the Capacity Building and Mentorship Program (CBMP). This initiative is designed to support the transformation of Ethiopia's Health Information System (HIS) at the woreda and facility levels, including HPs. The program aims to equip healthcare workers, particularly those working in HPs, with the necessary skills to effectively utilize Community Health Information System (CHIS) data for informed decision-making, ultimately leading to improved community health outcomes [1, 2].

Despite these efforts, the implementation of CHIS faces several structural and operational challenges. Limited infrastructure, inadequate training, inconsistencies in data quality, continued reliance on paper-based record-keeping, human resource shortages, difficulties in engaging communities, challenges in resource allocation, and concerns over long-term sustainability hinder the full realization of CHIS's potential [3,4,5]. Addressing these gaps is crucial to ensuring that healthcare providers can effectively use health data for better decision-making and service delivery [4, 5].

Additionally, the existing supervision and mentorship approach within CBMP requires significant resources to effectively reach HPs across the targeted facilities because of their large number and geographical location, which distances them far apart. This logistical challenge has made it increasingly difficult to provide direct mentorship, supervision, and training support to all HPs on time [6, 7]. Compounding this, the MOH has recently revised the criteria for model woreda verification by incorporating HIS performance at the HP level as part of a composite index [2, 8]. This policy change has highlighted the need for a more comprehensive and scalable strategy to strengthen health posts, particularly in HIS areas such as facility structure, data quality, and data utilization [9].

To address these challenges, the current approach focuses on transforming HPs into Information Revolution (IR) model facilities in selected woredas within the Sidama and Southern regions of Ethiopia [2, 8]. Through targeted interventions, improved mentorship strategies, and enhanced capacity-building efforts, HPs will be better positioned to contribute to efficient health information management and drive positive health outcomes within their communities.

Methods and materials

Study Area and Period

This study was conducted in four woredas: Shebedino, Hawela, Melga, and Misrak Badewacho, located in the Sidama and Central regions of Ethiopia, from Sept 2023 – February 26 2024.

Study Design

The study employed a before-and-after design with pre- and post-intervention assessments to evaluate the effectiveness of the extended FGD-ECR approach.

Participants and Sampling

The study involved HPs from 20 health centers across the four selected woredas, totaling 79 HPs. The intervention was implemented in two distinct phases:

Phase 1 HPs (Intensive Intervention HPs): In the initial Focus phase, one nearest health post (HP) was purposively selected from each of the 20 health centers across all four woredas, resulting in a total of 20 HPs. These HPs were designated for intensive, direct intervention and mentorship and termed as first-layer HPs

Phase 2 HPs (Cascaded Mentorship HPs): The remaining 59 HPs within the 20 health centers constituted the second phase (second layer HPs). These HPs benefited from cascaded mentorship provided by the trained HEP coordinators and HEWs who participated in Phase 1. All functional health posts within the selected woredas were included. HPs that were non-functional, for example, those in the process of merging health HPs, were excluded.

Intervention: Extended FGD-ECR Approach

The study utilized an FGD-ECR approach, which is an innovative method to accelerate the creation of model health centers [10]. For this study, the FGD-ECR (Focus on a single facility, Gap analysis based on a standard, develop intervention tailored action plan, execute the tailored intervention, Cascade the change, Reward/ recognition) approach was extended to create IR model HPs and comprised the following systematic steps:
Focus Phase: In this, 20 phase 1 HPs were focused..

Gap Analysis Based on Standards: a pre-intervention baseline IR assessment was conducted using MOH's standard IR assessment tool to establish the initial status of HIS performance. Based on the baseline assessment results, a thorough gap analysis was performed

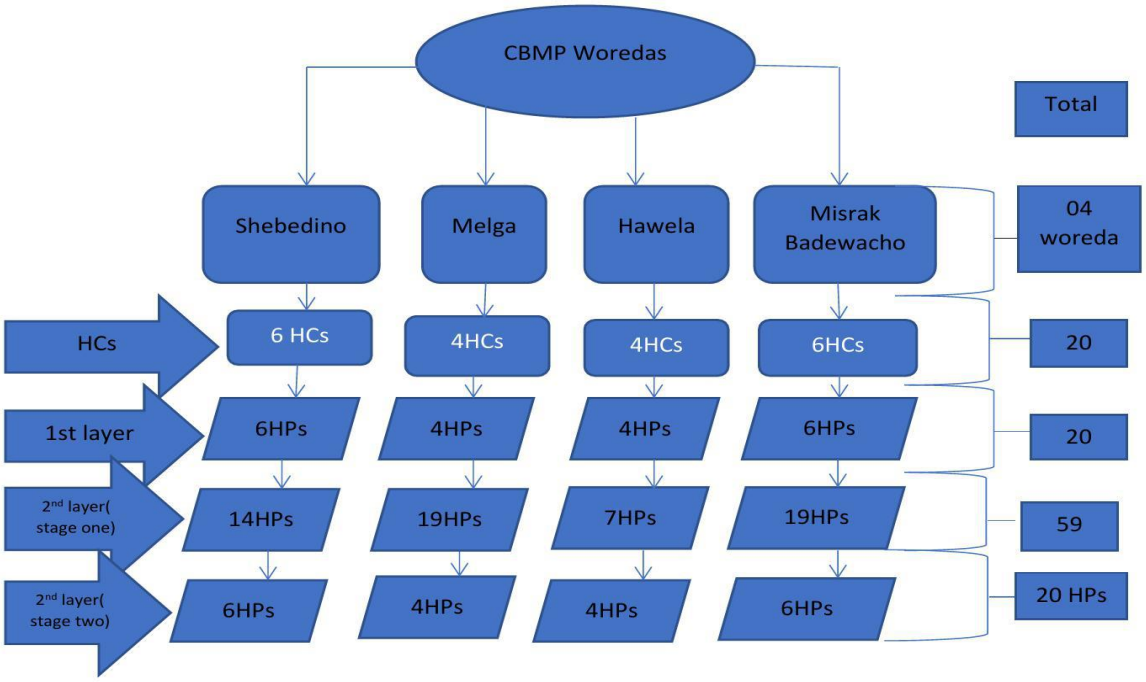

Fig 1. Diagram showing stages of the FGD-ECR and number of Health Posts by phase, Hawassa, 2023

for each Phase 1 HP, comparing their current status against established IR standards.

Develop an Action Plan for Tailored Intervention: Customized action plans were developed for each Phase 1 HP to address the identified gaps. These plans outlined specific activities, responsibilities, and timelines.
Execute and Evaluate: The tailored interventions were executed at the Phase 1 HPs with direct support and supervision from experienced CBMP mentors. Ongoing evaluation was conducted to monitor progress and adjust interventions as needed.

Practice-Based Learning Approach (PBLA)

The steps (Gap analysis, develop action plan, Execute and evaluate) for Phase 1 HPs were complemented by a Practice-Based Learning Approach (PBLA). This involved five Health Extension Program (HEP) coordinators from each health center and one HEW from each of the 59 Phase 2 HPs, totaling 59 HEWs. These individuals received hands-on, practical training and mentorship by CBMP mentors during the interventions in Phase 1 HPs. The PBLA is documented as an effective and efficient method for capacity building, enabling participants to apply learned experiences in their vicinities [11]. The trainers were experienced CBMP mentors with expertise in HIS and capacity building. A PBLA training guideline, adapted from standard basic HIS training and mentorship guidelines, was utilized to ensure consistency in the training delivery.

Cascading the Change (Phase 2 Activities)

The intervention for the Phase 2 HPs was structured in two sub-phases:
Phase 2, Sub-Phase 1 (HEP-led Mentorship): The HEP coordinators and HEWs who gained experience and skills during the Phase 1 HP interventions returned to their respective Phase 2 HPs. These HEP coordinators acted as mentors, integrating mentorship activities into their

routine HEP visits to HPs. They conducted IR assessments, identified gaps, developed action plans for tailored interventions, and executed these interventions within their HPs. Similar to Phase 1, pre-intervention and post-tailored intervention data were documented for evaluation of change.

Phase 2, Sub-Phase 2 (Verification by CBMP Mentors): To validate the assessments conducted by HEPs, our CBMP mentors randomly selected a sample of 20 HPs (one from each health center) from the 59 Phase 2 HPs. They conducted independent IR assessments to verify the post-intervention status reported by the HEPs.

Data Collection Tools and Procedures

Data collection was conducted at three key time points: pre-intervention (baseline), during the intervention for process monitoring, and post-intervention (endline). Structured questionnaires and observation checklists, developed based on national IR assessment criteria, were used as data collection instruments.

Pre- and Post-Intervention Measurement: Baseline assessments were conducted for both Phase 1 and Phase 2 HPs before any intervention. Endline assessments were conducted after the implementation of tailored interventions in both phases.

Method of Instrument Administration: For Phase 1 HPs, CBMP mentors directly administered the assessment tools through observation and review of records. For Phase 2 HPs, HEP coordinators conducted the assessments as part of their routine activities. For verification, CBMP mentors independently administered assessment tools in a sample of Phase 2 HPs.

Individuals Responsible for Data Collection: CBMP mentors were responsible for data collection in Phase 1 HPs and for verification in Phase 2. HEP coordinators and HEWs collected data for their respective Phase 2 HPs as part of their cascaded activities.

Measures for Consistent Administration:

All CBMP mentors and HEP coordinators involved in data collection received standardized training on the assessment tools and data collection procedures to ensure consistency. Regular supervisory visits were conducted by CBMP to monitor data quality.

Data Analysis

Data was entered into Epi-Info version 7 and exported to STATA version 16 for analysis.

For Phase 1 and Phase 2 HPs (Sub-Phase 1): A paired t-test analysis method was used to compare the mean scores of pre- and post-intervention HIS performance. Mean scores with standard deviations were measured as descriptive results. The mean score difference between pre- and post-assessment was tested for its statistical significance at a p-value <0.05.

For Phase 2 HPs (Sub-Phase 2 - Verification): An independent t-test was applied to compare the mean scores between the assessments conducted by HEPs (from Phase 2, Sub-Phase 1) and those verified by CBMP mentors (from Phase 2, Sub-Phase 2). The assumption was that there should be no statistically significant difference between these two sets of assessments, indicating the reliability of HEP-led assessments.

Operational Definitions

Information Revolution (IR) Model Facilities: In Ethiopia, health institutions, including HPs, are categorized based on Information Revolution (IR) assessment scores out of 100, covering data quality, data use, and infrastructure. Scores below 65 indicate an Emerging facility; 65–80 denotes a Lower Candidate; 81–90 an Upper

Candidate; and Model IR Facilities score 91 or above, demonstrating excellence in health information systems.

Health Post (HP): The lowest tier of healthcare facilities in Ethiopia, typically staffed by Health Extension Workers, providing essential primary healthcare services to rural communities.

Health Extension Worker (HEW): Frontline healthcare providers based at Health Posts, trained to deliver preventive, promotive, and basic curative health services.

Health Extension Program (HEP) Coordinator: Supervisors in a given Primary Health Care Unit (PHCU) are responsible for overseeing the performance and activities of HEWs within a cluster of Health Posts.

FGD-ECR (Focus on a single facility, Gap analysis based on a standard, develop intervention tailored action plan, execute the tailored intervention, Cascade the change, Reward/ recognition) approach: is an innovative change approach towards the IR model Woreda Formation.

Practice-Based Learning Approach (PBLA): A training methodology where learning occurs through direct engagement in practical activities and actual working environment within the healthcare setting.

Phase 1 HPs (Intensive Intervention HPs): The first 20-layer selected HPs that received direct, intensive mentorship and tailored interventions from CBMP mentors.

Phase 2 HPs (Cascaded Mentorship HPs): The 59 additional second-layer HPs that received mentorship and support from the trained HEP coordinators and HEWs from Phase 1.

Results

Improvements in Phase 1 HPs

In the Phase 1 HPs (n=20), a significant improvement was observed between the baseline (before the intervention) and the endline (after the intervention) across all assessed HIS performance criteria. The mean score for HP structure improved substantially from 16.6 to 26.8. Similarly, data quality demonstrated a notable increase from 14.3 to 27.4, and data use showed the largest improvement, rising from 17.7 to 35. Consequently, the overall HIS assessment score for Phase 1 HPs increased from 48.2 to 89.3 [Figure 2].

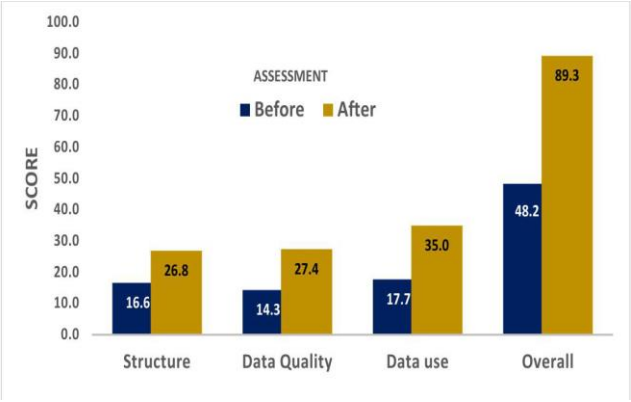

Fig. 2 Mean score of First layer HPs, before and after the intervention, Hawassa 2023 (n=20)

The differences in these mean scores were all statistically significant (p-value <0.05), indicating a profound positive impact of the direct interventions [Table 1].

Improvements in Phase 2 HPs

Similarly, in the Phase 2 HPs (n=59), which were mentored by the trained HEP coordinators, significant improvements were also observed. The mean score for HP structure improved from 14.1 to 24.4, data quality from 12.7 to 26.3, and data use from 16.9 to 33.5. The overall HIS assessment score for Phase 2 HPs increased from 43.6 to 84.2 [Figure 3]. The differences in these mean scores were statistically significant (p-value <0.05), demonstrating the effectiveness of the cascaded mentorship model [Table 1].

Comparison of HEP and CBMP Mentors' Assessments

To evaluate the reliability of the HEP mentoring support and their assessments for the interventions, a sample of 20 HPs from Phase 2

Fig 3. Mean score of Phase 2 HPs, before and after the intervention, Hawassa 2023 (n=59).

Table 1: The paired t-test result for Phase 1 and Phase 2 Assessments, Hawassa 2023.

Layers	Pairs	Assessment	Mean difference (post-pre)	SD	95%CI		Sig. (2-tailed)
Layer 1(n=20)	1.0	Structure	10.3	4.3	8.3	12.3	<0.001
	2.0	Data Quality	13.1	5.9	10.3	15.9	<0.001
	3.0	Data Use	17.3	7.8	13.6	20.9	<0.001
	4.0	Overall	41.0	14.0	34.4	47.6	<0.001
Layer 2(n=59)	1.0	Structure	10.3	4.7	9.1	11.5	<0.001
	2.0	Data Quality	13.5	5.2	12.2	14.9	<0.001
	3.0	Data Use	16.6	7.9	14.6	18.7	<0.001
	4.0	Overall	40.6	15.0	36.7	44.5	<0.001

HPs was randomly selected and verified by CBMP mentors. A comparison of the mean scores from the HEP assessments and the CBMP mentors' assessments revealed no significant differences in HP structure (p=0.934), data quality (p=0.18), data use (p=0.531), or in the total assessment score (p=0.347) [Figure 4 and Table 2]. This finding implies that the current approach, utilizing the extended FGD-ECR and engaging HEP coordinators in mentoring trained HEWs through PBLA and cascading the change, has a promising and reliable effect.

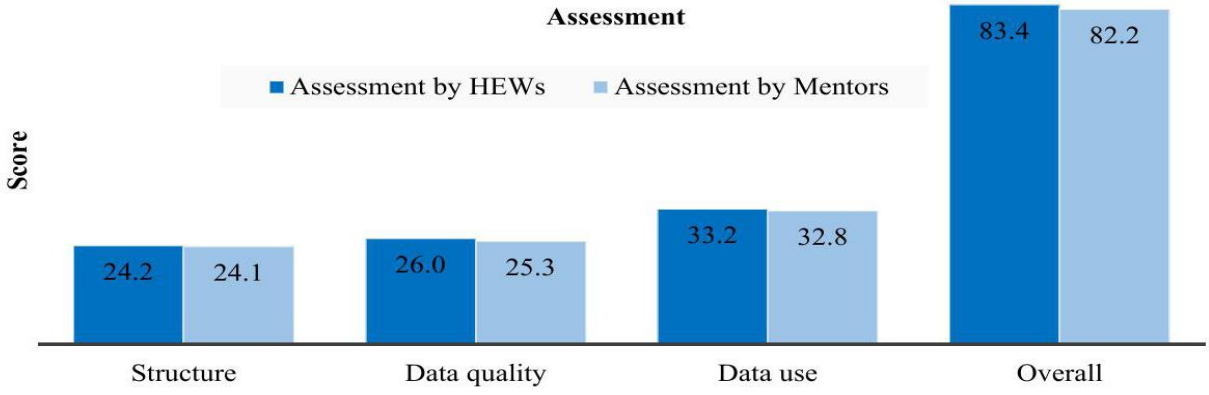

Fig 4. Comparison of HEPs IR assessment and CBMP's mentors' assessment, Hawassa 2023

Table 2: The mean difference in IR assessment between HEWs and Mentors (independent sample t-test), Hawassa, 2023

Comparison	Assessment	Sig. (2-tailed)	Mean Difference	95% CI	
B/n 2nd Layer stage 1(n=59) and 2nd Layer stage 2(n=20)	Structure	0.934	0.06	-1.269	1.38
	Data Quality	0.18	0.68	-0.32	1.679
	Data Use	0.531	0.42	-0.916	1.762
	Total	0.347	1.20	-1.325	3.726

Discussion

This study implemented an extended FGD-ECR approach, complemented with PBLA for HEP coordinators and selected HEWs, to transform HPs into IR model facilities in four woredas of the Sidama and Southern region of Ethiopia. The findings demonstrate a significant positive impact of this approach on various aspects of HP performance, including structure, data quality,and data utilization, ultimately leading to a substantial improvement in the overall IR assessment score in both Phase 1 (intensive intervention) and Phase 2 (cascaded mentorship).

The significant improvements observed in Phase 1 HPs, where focused and tailored interventions were directly implemented and evaluated with mentor support, align with existing literature highlighting the effectiveness of targeted capacity building and mentorship programs in enhancing healthcare service delivery at the primary care level [2, 3]. The structured approach of FGD-ECR, involving a thorough gap analysis and the development of actionable plans, likely contributed to the focused and relevant nature of the interventions, thereby maximizing their impact. The statistically significant increases across all assessed domains underscore the potential of intensive, direct support in driving tangible improvements in HP functionality, consistent with findings from other capacity-building initiatives in similar contexts [7, 12].

The results from the Phase 2 HPs, where trained HEP coordinators mentored HEWs from the remaining HPs, are particularly noteworthy. The significant improvements observed in this phase, mirroring the gains in Phase 1, suggest the effectiveness of the cascade training model and the capacity of HEP coordinators to act as effective mentors. This finding supports the idea that investing in the skills and knowledge of frontline supervisors can create a sustainable and scalable model for improving healthcare quality across a wider network of facilities [6]. The PBLA component, which empowered HEP coordinators and selected HEWs with practical skills through hands-on experience, likely played a crucial role in enabling them to effectively disseminate knowledge and support change within their respective HPs [10].

The comparison between the IR assessments conducted by the HEP coordinators and the CBMP mentors in a sample of Phase 2 HPs revealed no significant differences in overall scores, structure, and data use. This agreement provides strong evidence for the validity of the HEP coordinators' assessments and further strengthens the argument for their capacity to effectively monitor and support quality improvement initiatives at the HP level. The overall consistency in assessment suggests that the training and mentorship provided to HEP coordinators equipped them with the necessary skills to accurately evaluate HP performance against the IR standards, a critical component for sustainable HIS change [8, 13].

These findings contrast with traditional supervision and mentorship approaches in the

study area, which often face challenges related to resource intensity and limited reach [7]. The extended FGD-ECR approach, by focusing intensive support on a smaller group of "Phase 1" HPs and then leveraging the capacity of trained HEP coordinators to cascade knowledge and mentorship to a larger "Phase 2," appears to be a more efficient and potentially more sustainable model. This approach optimizes the use of limited resources by empowering local supervisors to drive improvement, rather than relying solely on external mentors for each facility. This is particularly relevant in the Ethiopian context, where resource constraints and the geographical dispersion of HPs pose significant logistical challenges for traditional mentorship models [9, 14].

Limitations

While this study successfully demonstrated improvements in HP HIS through the extended FGD-ECR approach and PBLA methodology, certain limitations should be considered. The scope and generalizability of the findings are restricted, as the study focused on four woredas in the Sidama and Central Ethiopia regions. Variations in infrastructural development, local leadership support, and existing HIS capacity in other areas could influence the replicability or magnitude of these results. Additionally, the study relied on self-reported assessments by HEPs in the Phase 2 HPs, which, despite verification efforts, could still carry a potential for bias, although our comparison indicated no significant difference from mentor assessments.

Conclusion and Recommendations

This study implemented an extended FGD-ECR approach combined with PBLA methodology to enhance Health Post (HP) performance in four woredas of Ethiopia. The findings reveal significant improvements in HP structure, data quality, and utilization, leading to higher HIS assessment scores across both intervention phases. The Phase 1 HPs, which received direct mentorship and tailored interventions, showed notable gains, confirming the effectiveness of focused capacity-building programs. The Phase 2 intervention, where trained HEP coordinators mentored HEWs, demonstrated similar improvements, reinforcing the strength of cascade training models in scaling healthcare quality. Importantly, the study highlights the reliability of assessments conducted by HEP coordinators, validating their role in quality monitoring and improvement. This model contrasts with traditional supervision methods by offering a resource-efficient and sustainable approach to capacity-building. Thus, the study presents a promising model for HP HIS improvement, optimizing limited resources while empowering HEP coordinators to drive change.

Recommendation:

It is recommended to continue implementing this approach on a larger scale by involving a more extensive sample size. A collaborative effort of other relevant stakeholders is essential to ensure its success. Additionally, efforts should be made to identify and address any barriers or challenges encountered during its implementation. Lastly, scaling up this intervention across additional health posts is highly encouraged to maximize its reach, sustainability, and overall effectiveness in strengthening primary healthcare systems. Future research should also explore the long-term sustainability and cost-effectiveness of this model in varied contexts.

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Ethical considerations

Ethical clearance was obtained from the institutional review board (IRB) of Hawassa

University College of Medicine and Health Science.

Data availability statement

Data supporting this study's conclusions are available upon reasonable request from the corresponding author.

Conflicts of interest

The authors declare no competing interests.

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