ECHIS Scale-up For HEP Improvement Project

DIGITALLY ENABLED PERFORMANCE-BASED INCENTIVE FOR IMPROVED HEALTH EXTENSION PROGRAM PERFORMANCE IN ETHIOPIA

AN IMPLEMENTATION SCIENCE RESEARCH STUDY REPORT

Digitally Enabled Performance-based Incentive for Improved Health Extension Program Performance in Ethiopia: Implementation Science Research Study Report

Awabel Woreda awardees and participants

Executive summary

Background: Health worker motivation plays a critical role in the performance of the health sector and the provision of quality care. The Ethiopian flagship Health Extension Program (HEP) has significantly contributed to the country's success in improving maternal and child health. However, in recent years, the program met challenges, particularly around motivation and performance among health extension workers (HEWs). This prompted the Ministry of Health (MOH) to develop a HEP optimization roadmap for 2020-2035, recommending introducing a performance-based incentive (PBI) system for improving the quality of health services provided through HEP. JSI has supported the MOH in designing and testing digitally enabled PBI using the Electronic Community Health Information (eCHIS) platform, digital tooling enabling this critical community health worker cadre quick access to counseling tools, client history, reporting forms and community-level data. The digitally enabled PBI system was designed to improve HEWs' performance, service quality, data use for decision-making, and maternal and child health outcomes.

Methods: This implementation research employed a mixed methods design to examine digitally enabled PBI interventions and strategies for improving HEP performance. The interventions were digital-enabled HEP services provision, digitized support systems, and performance tracking on the eCHIS platform. Implementation strategies included training, digital target setting, digitally enabled mentorship and supportive supervision, performance improvement and review, data use for decision, and incentivization.

The quantitative component of the study used a quasi-experimental controlled observational design having three woredas implementing the PBI intervention and four comparison woredas. Data from the eCHIS and DHIS2 from December 2021 to October 2023 were analyzed to examine trends with a before and after t-test and interrupted time series analysis. The qualitative data were collected through group discussions, in-depth interviews, and observations conducted at baseline, process, and end-line evaluations. Employing the Reach, Effectiveness, Adoption, Implementation, and Maintenance (RE-AIM) and Consolidated Framework for Implementation Research (CFIR) frameworks, the study examined effects of implementation strategies and explored enablers and barriers.

Results: In total, 240 HEWs and their supervisors were trained in PBI. Training evaluation data showed a significant increase in their mean knowledge score from 68% during the pre-test to 75% during the post-test. Over 95% of the trainees had favorable reactions to the training. All the health posts' targets were set for the key performance indicators digitally. The supervisors provided digitally enabled mentorship and supportive supervision support for the HEWs. Data from the eCHIS were used by the HEWs and their supervisors for service provision, referral, and feedback; monitoring progress; generating reports; and to incentivize highest performance.

The digitally enabled PBI intervention and its implementation strategies were acceptable, feasible, and well-adopted by the community health system. The trend analysis of DHIS2 and eCHIS2 data showed that digital-based service delivery, coverage of maternal and child health services as well as improved performance and motivation of HEWs improved significantly after

the PBI implementation. We learned that the digitally enabled PBI is a promising strategy for data-informed performance monitoring and support, performance improvement; performance measurement, and evaluation of the community health system.

However, there were ongoing implementation challenges, including sub-optimal programmatic and technical support, not well-functioning or complete eCHIS, denominator issues impeding reliable target setting, and logistic constraints (application, infrastructure, and tablets).

Conclusion and recommendations: The very digital nature of the PBI intervention requires a strong eCHIS foundation, where the required inputs in terms of digital tools, infrastructure, application, and support systems should have been in place and functional for the successful implementation of the PBI intervention. Accordingly, scaling up of digitally enabled PBI should consider the following 1) creating an enabling digital environment, 2) resource allocation for monitoring and sustained implementation of PBI, 3) balancing the individual vs team-based incentives, 4) developing metrics that account for population density and topography, and 5) monitoring unintended consequences, such as improving individual performance at the expense of health system performance as poorly planned and implemented performance-based incentives can be counterproductive to the HEP, and HEWs' and their supervisors' motivation, which could damage teamwork one of the core values in health care and shared vision.

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Acronyms

ANC	antenatal care
BCG	Bacilli Calmette-Guerin
CIFF	Children's Investment Fund Foundation
eCHIS	Electronic Community Health Information System
DESC	Digitally enabled, Equipped, Supervised and Compensated
EPAQ	Ethiopian Primary Care Alliance for Quality
FPA	focal person application
FRAME	Framework For Reporting Adaptations and Modifications to Evidence-based Interventions
HC	health center
HCD	human-centered design
HEP	Health Extension Program
HEW	health extension worker
HIT	Health Information Technician
HP	health post
JSI	JSI Research & Training Institute, Inc.
KPI	key performance indicators
MOH	Ministry of Health
PBI	performance-based incentive
PHCU	primary health care unit
PM	performance management
PNC	postnatal care
QI	quality improvement
RE-AIM	Reach, Effectiveness, Adoption, Implementation, and Maintenance
RHB	regional health bureau
RMNCH	reproductive, maternal, newborn, and child health
SOP	standard operating procedures

Introduction

Ethiopia is among the countries with a well-established community health program, known as the Health Extension Program (HEP), which responds effectively to critical reproductive, maternal, newborn, and child health (RMNCH) needs. The HEP has significantly contributed to improving maternal and child health outcomes [1]. It is still considered to be one of the major drivers for achieving national, as well as global, health targets and attaining universal health coverage (UHC) [2, 3]. However, according to the national HEP assessment in 2019, the program showed a declining trend and lost its momentum [4]. One cause identified in this decline included lack of structured and systematic motivation packages for health extension workers (HEWs). This prompted the Ministry of Health (MOH) to develop a HEP optimization roadmap for 2020-2035, whereby introducing performance-based incentive systems as one strategy for improving the quality of health services provided through HEP [5].

Global and local evidence shows performance-based incentives (PBI) is a promising strategy to improve the motivation of a health workforce, health service utilization and outcomes, and heightened quality of care [6]. Performance-linked incentive aims to counteract dysfunctional incentives and drive changes that strengthen health systems and improve outcomes [7]. A mix of financial and non-financial incentives was found to be an effective strategy to enhance performance [7]. Studies in Ethiopia showed that organizational culture, financial incentives, enabling work environments, personal recognition and appreciation, career structure, and promotion play a role in HEWs' satisfaction and motivation; while low salaries, insufficient training, absence of transport, poor supervision were mentioned as reasons for dissatisfaction and demotivation [6, 8]. Previous studies reported that consistent supervisory support, use of dashboards as a supervision tool and provision of feedback [6, 9], and data use for decision-making [10] improved motivation and performance of health workers.

Since March 2021, JSI and the MOH designed and integrated a digitally enabled PBI into the electronic community health information system (eCHIS), which uses digital tools to enable real-time, high-quality service delivery and data collection and use to improve the performance of HEWs and their supervisors. We employed implementation science research [11] to test digitally enabled PBI, which is embedded into eCHIS to demonstrate the incremental impact of adding PBI on eCHIS for improving HEP and HEW performance [5]. The study answers the following questions:

1) What contextual factors promote or hinder integration, high fidelity implementation, and scale-up of digitally enabled PBI interventions within the HEP and in improving HEW performance to deliver quality RMNCH services and using data-informed decisions?

2) How can implementation of digitally enabled PBI interventions be further strengthen and well-integrated into HEW performance management systems to ensure high-fidelity implementation, successful scale-up, and sustainable performance?

3) What is the effect of the implementation of digitally enabled PBI interventions on improving performance, quality-of-service provision, and RMNCH outcomes?

4) What lessons can be drawn from the digitally enabled PBI incentivization process including data sources, measurement, verification, and actual awarding of the incentives and motivation?

This report describes lessons from the implementation of the strategies, implementation outcomes, and synthesized strategies for scale-up in the Ethiopian context.

Methods

Study Settings

In consultation with the MOH and regional health bureaus (RHBs) of Amhara, Oromia, and South Ethiopia regions, one learning woredas from each region was selected for the implementation of digitally enabled PBI interventions (Figure 1).
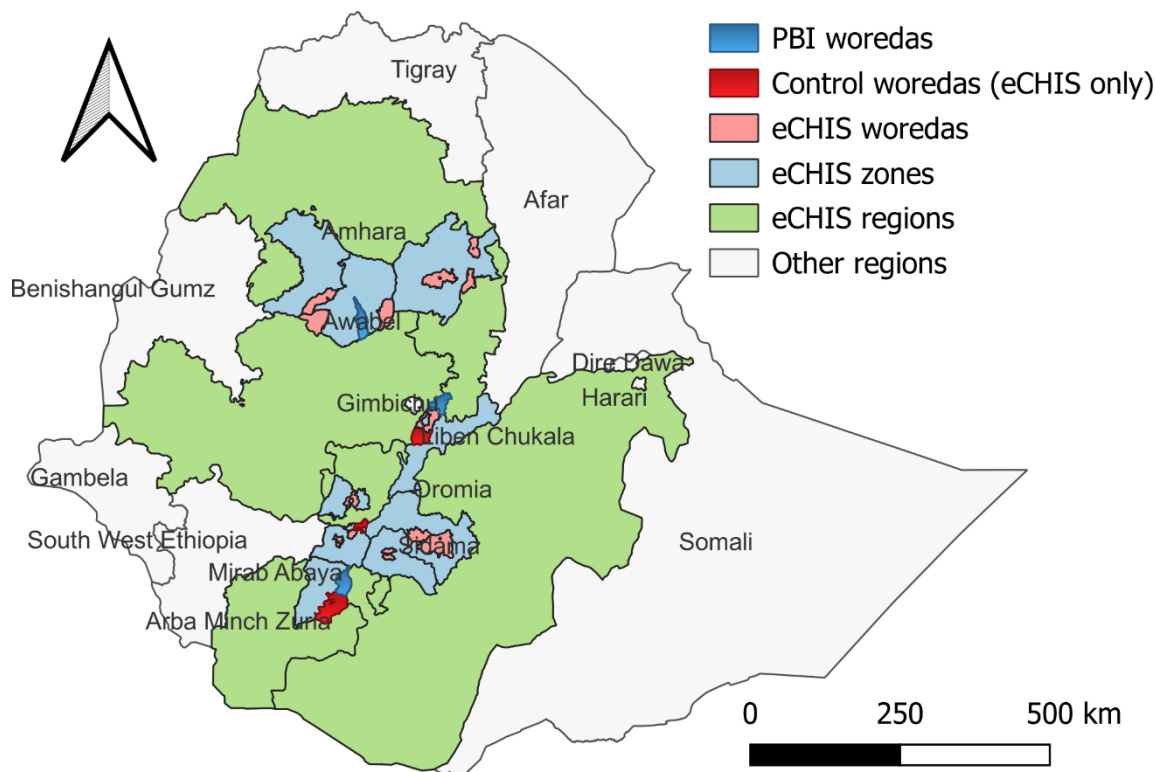
Figure 1: Map of study woredas

Study Population

The sample population and study participants included health posts (HP), HEWs, and their supervisors in the three intervention and four comparison woredas. The PBI intervention woredas had 15 health centers (HCs), 87 HPs, 154 HEWs, and a total of 342,116 individuals withing the catchment populations, while the comparison woredas (eCHIS only) had 19 HCs, 90 HPs,180 HEWs and 459,573 population as shown in Table 1.

Table 1: Profile of PBI implementing and comparison woredas, HCs, and HPs

Study arm	Region	Woreda	# of HCs	# of HPs	# of HEWs	Estimated Population
	South Ethiopia	Mirab Abaya	4	26	37	98,883

Intervention (digitally enabled PBI)	Amhara	Awabel	6	28	56	128,601
	Oromia	Gimbichu	5	33	61	114,632
Total	3	3	15	87	154	342,116
Comparison (eCHIS only)	South Ethiopia	Arbaminch Zuria	4	26	38	127,316
	Central Ethiopia	East Badewacho	4	27	53	139,007
	Oromia	Liben Chukala	6	15	42	60.323
	South Ethiopia	Damot Pulassa	5	22	47	133,457
Total	3	4	19	90	180	459,573

Study Design

This implementation research, employed a mixed methods design [1] using the Reach, Effectiveness, Adoption, Implementation, and Maintenance (RE-AIM) and Consolidated Framework for Implementation Research (CFIR) frameworks. The study examined the effect of implementation strategies and explored enablers and barriers [2-4]. The quantitative component of the study was a quasi-experimental observational controlled design, with intervention and comparison arms. The qualitative component employed a rapid phenomenological design, involving group discussions, in-depth interviews, and observations.

Interventions and Implementation Strategies

The intervention arm implemented digitally enabled PBI in three woredas. The digitally enabled PBI interventions were embedded in the eCHIS platform. The comparison arm implemented only eCHIS in four woredas. Both the intervention and the comparison woredas have been implementing eCHIS since April 2021.

The project adopted the Digitally enabled, Equipped, Supported, and Compensated (DESC) framework [5] for developing the digitally enabled PBI interventions, and for tracking and monitoring success.

Digitally enabled: The project harnessed the eCHIS digital platform for developing the digital component of the PBI intervention including the national eCHIS dashboard and enhancing the existing focal person application with critical PBI features and for customizing existing implementation strategies. These are the Plan Setting Manager, Supervisors Task Manager, and performance management (PM) dashboard, while the PM Scorecard, PM Logbook Manager, e-learning, and Communication features are under development and not covered in this study.

- o *Plan Setting Manager* is used to set the HP's eligible population (denominators) and targets at the beginning of each fiscal year using population projections made by the central statistical agency to compute denominators for some key performance indicators (KPIs)

- o *Supervisor Task Manager* supports the routine activities of the supervisor. It has integrated supportive supervision and mentorship checklists enabling supervisors to track and follow-up on tasks and challenges identified during supportive supervision and mentorship at the HPs.

- o *PM Dashboard* is developed for supervisors to monitor and visualize the performance of each HEW, and the HP's overall performance. It also produces a report on the supervisor's routine activities. We integrated a PM dashboard for activity tracking, monitoring progress, real-time reporting, and promoting data utilization for decision-making and accountability and used by HEWs and their supervisor.

Equipped: This component is concerned with three major items 1) ensuring that the HEWs have access to essential drugs and medical equipment. In line with the KPIs selected for the study, eight essential drugs and eight essential medical equipment items were identified that should be available all the time at the HPs. The supervisors are responsible for closely monitoring these inputs and facilitating re-filling in case of absence; 2) ensuring the HEWs and supervisors have functional tablets, power banks, and internet connectivity are critical resources for using digital applications (eCHIS and its focal person application [FPA]). The MOH availed these inputs for HEWs and HC supervisors; 3) ensuring digitally enabled PBI training which includes topics on the FPA is provided to HEWs and supervisors to equip them with the required knowledge and skills.

Supervised component concerns with increasing accountability of supervisors and managers at HC and woreda to ensure that HEWs are adequately supported. Target setting and supervisions, and monitoring the performance are included in this section of the framework.

Compensated component focuses on compensating HEWs with appropriate incentives. Top performing HEWs, HPs, and supervisors will be rewarded bi-annually and annually with financial and/or non-financial incentives.

During pre-implementation, we conducted a landscape analysis, gathered insights through a human-centered design (HCD) study, and consulted relevant stakeholders. The landscape analysis explored existing HEP performance management and incentive policies, practices, implementation strategies, gaps, and challenges [6]. Informed by the landscape analysis and HCD insights, we developed performance standards, indicators, measures, and evaluation approaches. Then we further validated it through consultation with stakeholders. The project prepared an implementation guide, standard operating procedures (SOPs), training materials, evaluation tools, digital mentorship checklists, and a digitized supportive supervision checklist to facilitate pilot testing of the PBI interventions in selected woredas.

Digital target setting, training, supportive supervision, performance review meetings with the Ethiopia Primary Care Alliance for Quality (EPAQ) approach, quality improvement, and data use for monitoring and decision were strategies employed during the implementation phase. Forming a verification team and incentivization are additional strategies employed (see Table 2). The table below shows the implementation strategies, the actors, the action, the target, and the dose (Table 2).

Table 2: Description of the implementation strategies

Strategy	Actor	Action and operationalization	Dose
Digital target setting	HC supervisors JSI, Dimagi	• Performance targets were set for the ten, six, and six KPIs for the HEW, HP, and HC supervisors respectively at the outset. • HC supervisor engages HEWs to set annual performance targets for selected indicators using the *Plan Setting Manager* feature in the FPA. • For estimating the eligible population, projection by the Central Statistical Agency for the year has been used • Set performance targets for the 22 selected indicators for each HP for tracking the performance of HEWs, HPs, and HC Supervisors. • Integrate the set KPIs targets into the eCHIS dashboard.	Once per year
Training	JSI, Living Goods, and Dimagi technical teams	• The digitally enabled PBI and FPA training follows adult learning principles integrating practical exercises and reflections, using different instructional mediums including presentation, group discussion, role-play demonstration, and re-demonstration. • The PBI training integrated with FPA training is five days-long.	Once
Digital supportive supervision	HC supervisors and woreda focal persons	An integrated supportive supervision where relevant experts from HCs routinely pay supervision to their catchment HPs. Undertaken using the integrated supportive supervision checklist on the FPA, HC supervisors support HEWs at HP to effectively perform their duties. The checklist contains 18 major topics, whereby four are eCHIS and digitally enabled performance management-related topics the study has integrated it on the existing supportive supervision checklist.	Monthly

Digital mentorship	HC supervisors, woreda focal person, and JSI zonal coordinators	Mentorship is undertaken in a one-on-one hands-on, friendly manner to identify and address knowledge and skill gaps affecting KPIs performance and technical challenges the HEWs face in using the eCHIS app (troubleshooting, service provision, referral, delayed action card).
		
		o The enhanced FPA incorporated mentorship checklist for supervisors to use when they provide mentorship support.
		o Mentor can record identified gaps to be followed up under the Open Mentorship Task Manager feature of the FPA at the next visit.
		
		• Contents of the mentorship checklist are;
		    o Device/tablet assessment
		    o eCHIS basics and tablet usage
		    o eCHIS application usage
		    o eCHIS data use
			Monthly by the HC supervisor (early phase would require frequent mentorship as time goes on with reduced frequency)

Review meeting	HC Woreda	Training on EPAQ review meetings has been provided to HC and HP staff as part of the PM and PBI training. Performance review meetings use EPAQ with catchment HPs. • Used as a collaborative learning platform for experience sharing among HPs to learn from best-performing HPs. • HC identifies lead/best performing HP based on their KPIs performance. • The review meeting integrates site visits to a lead HP selected based on their performance by the HC. • Award/recognition is given to the best-performing HPs at each review meeting.	Monthly by the HC Annual by the woreda

		• During the meeting HEWs present their HPs KPIs progress against the plan, reasons for the reported performance, and challenges encountered • Develop action plans and revise, as needed.	
Quality improvement project	HC supervisors and director	QI training is given to HC supervisors, directors, and HEWs together as part of the digitally enabled PBI training. • The HCs form a QI team including HEWs • HCs involve catchment HPs to identify performance gaps, conduct root cause analysis to draft a QI project • HC and HP teams work jointly to improve service provision and quality • The team has a monthly meeting on the progress of the QI project and for course correction • Upon successful completion of one QI project, another project should be planned. • The QI team set a target and timeline for each QI project.	Monthly
Data for decision	Supervisors, HC directors, Woreda experts and decision-makers	• Establishing a system of data use for decision-making and a clearly defined problem-solving approach is an important activity. User accounts have been created for woreda and HC-level decision makers in addition to the focal persons/supervisor to maximize data use and enable them to track HEWs and HCs KPIs performance and examine gaps and success using eCHIS data. • The HC performance monitoring team and supervisors meet every month to use eCHIS data for monitoring progress on KPIs performance • Use data from the PM dashboard on the FPA to identify performance gaps and to give feedback for HEW. • The PM dashboard helps the supervisors monitor HEWs and HP KPIs performance regularly, to avail needed support, and to fetch monthly reports.	Monthly
Incentivization	HC Woreda Zonal coordinators JSI	• Developed a standard guide for incentivization following inputs from the co-design workshops. • Each woreda and HC form performance verification teams responsible for grading HEWs, HPs, and HCs based on their KPIs performance using data from eCHIS and FPA then shortlisting best-performing HEWs and HPs, verifying the performance from the eCHIS platform, and taking samples at the HP and community • Provide in-kind awards and certificates for top-performed HEWs, HPs, and HCs in an event co-organized by JSI and respective woreda. The woreda is also recognized by JSI with a certificate	Bi-annual

To facilitate adoption and ensure sustainability, specifying and reporting these implementation strategies is an important undertaking of the study. The study also used a framework for reporting adaptations and modifications of evidence-based interventions (FRAME) [7].

Data and Measurement

Both primary and secondary data were collected at different points in time and from various sources including program information systems, evaluations, and eCHIS and DHIS2 platforms.

Baseline, process, and end-line evaluation data were collected from the HEWs, HC supervisors, and woreda focal persons through semi-structured interviews (n= 60), in-depth/key informant interviews (n= 43), focus group discussion (n=5 with 34 informants), small group discussions (n=10 with 23 informants) and participant observation (n=6 woreda level review meetings and PBI award ceremonies) at different times (Table 3).

Table 3: Data items collected over time

Data type	Baseline	Process evaluation	End-line
Qualitative informants	64	60	22
Quantitative interviews	24	27	92

The interview guides containing main themes on PBI interventions were developed by the RE-AIM and CFIR frameworks for exploring implementation of the strategies, barriers, and enablers to implementation, the success of the interventions, and adaptations made on the implementation strategies (Tables 4 and 5).

Table 4: RE-AIM dimensions, outcome measures, data sources, and analysis techniques

RE-AIM Dimensions	Indicators/outcome measures	Data sources	Analysis techniques
Reach	• # of HPs, HEW, HC, and supervisors participated in digitally enabled PBI interventions. • # of HEWs, HCs, and woreda experts trained on PBI • # of households and population reached • # of clients received service using the eCHIS platform • # of HEWs, supervisors, and HPs incentivized	Program data eCHIS platform (National eCHIS dashboard and CommCare)	Descriptive statistics Trend analysis Before and after the student's t-test
Effectiveness	• # of women who received first antenatal care (ANC) visit 1, PNC, and contraceptives using eCHIS • # of children who received BCG, measles, and Penta vaccination using eCHIS • # of HPs completed HH and members registration on eCHIS • Improved motivation of HEWs and their supervisors • Improved frequency and content of supportive supervision	Program data eCHIS and DHIS2 (National eCHIS dashboard and CommCare) Baseline, process, and end-line evaluation	Interrupted time series analysis Before and after student T-test Qualitative account
Adoption	• # of HPs and supervisors setting targets digitally using FPA • # of supportive supervision provided using FPA • # of mentorship provided using FPA • # of woredas and HCs formed a performance verification team • # of supervisors and woreda focal person	Program data eCHIS platform	Descriptive analysis Qualitative accounts

	accessing digital data for monitoring performance ● Setting realistic measures of HEWs performance or HEP outcomes and accountability, ● Motivation of primary health care units (PHCU) and woredas to implement PBI intervention. ● HEWs using eCHIS data for monitoring their progress and generating monthly reports ● Proportion of HPs and HCs using eCHIS app for service provision	(National eCHIS dashboard and CommCare) Baseline, process, and end-line evaluation	

Implementation acceptability, feasibility adoption, and fidelity	● The acceptability, feasibility, and adoption of the digital-enabled PBI interventions, performance measurement, and incentive
	● Fidelity to the various elements of the intervention's key components and strategies, including consistency of delivery as intended and the time of the implementation including
	
	  ○ Digital target setting
	  ○ Mentorship support
	  ○ Supportive supervisors who received PBI training
	  ○ Utilization of FPA for supportive supervision and monitoring progress
	  ○ Performance review meeting at PHCU and woreda levels
	  ○ Quality improvement projects implemented at HC
	  ○ Data use for decision
		Program data
		
		Baseline, process, and end-line evaluation
			Descriptive analysis
			
			Qualitative accounts

Maintenance	● Functionality of the PBI system ● Local capacity created for maintaining troubleshooting and mentorship ● Integration of PBI into the routine workstream	Program data	Descriptive analysis Qualitative accounts

Table 5: Possible constructs/measures for each domain of CFIR and data sources

CFIR domains	Constructs/measures	Data sources
Characteristics of the intervention	● Adaptability of the digital-enabled PBI ● Complexity of the interventions ● Feasibility ● Acceptability of the digitally enabled solutions	Qualitative data collected through process and end-line evaluation
Outer setting	● Required resources to run the eCHIS including internet connectivity, electric power source, high-performance tablets	Qualitative data collected through process and

	● Policies and strategies to support the interventions including financial sources to support the implementation of the interventions ● Political instability and security situation	end-line evaluation
Inner setting	● Networks and communications within the HP, HC, and woreda ● Implementation climate and readiness at the facility and individual levels including leadership engagement, motivation of HEW, HC, and woreda staff to implement the interventions, available resources, support system, supplies and logistics management system, functional status of the eCHIS, goals set at HP, HC, and woreda levels for RMNCH and KPIs	Qualitative data collected through process and end-line evaluation
Individuals' characteristics	● Knowledge and competence of HEW, HC supervisors, and woreda staff on the interventions, ● Self-efficacy of HEWs, HC supervisors, and woreda staff ● Executing the interventions according to the plan ● Motivation	Qualitative data collected through process and end-line evaluation
Process of implementation	● Planning of the interventions including coordination and collaboration, monitoring, evaluation, and budgeting ● Intervention participants	Qualitative data collected through process and end-line evaluation

For evaluating the PBI training given to HEW, HC supervisors, and woreda experts, the four levels of the Kirkpatrick training evaluation approach were used [8]. The report presents levels 1 and 2 i(.e., 1) reaction to the training, which evaluates trainees' reaction to the training using seven items Likert scale tool; and 2) knowledge and skills accusation using a pre and post-test questionnaire during the training; see Table 6).

Table 6: The four-level Kirkpatrick's evaluation of training effectiveness

Levels	**Domain**	**Descriptions**
Level 1	Reaction	To what degree do trainees react favorably to the training
Level 2	Learning	To what degree are trainees acquiring the intended knowledge, skills, and attitudes?
Level 3	Behavior	To what degree do trainees apply what they learned during the training when they are back on the job

| Level 4 | Outcomes | To what degree targeted outcomes occur as a result of training and subsequent reinforcement |

Data Analysis

Descriptive statistics were used for analyzing pre- and post-test training scores. A trend analysis was conducted to assess service data and population and household registration. Data from the eCHIS platform and the FPA were used to see a performance improvement over time. Training on PBI was given in October 2022; hence October 2022 was taken as a baseline/treatment period to compare the before and after intervention effects. The effectiveness of the study was assessed by looking into monthly KPIs and RMNCH service delivery employing a before-after design. An interrupted time-series analysis was used to see the counterfactuals of the PBI intervention. SPSS version 25 was used for the descriptive and multiple response analyses. Excel was used for descriptive statistics and calculating changes in the before and after intervention period and the training sessions with student t-tests. P value <0.05 was the cut-off to declare a statistically significant difference.

Using both quantitative and qualitative data consistency of delivery of the strategies as intended (adherence) and the time of the implementation (dose) were assessed to determine implementation fidelity. The qualitative data were first read and reread then coded with pre-defined themes as listed in Table 5 and the content was analyzed using the themes in the interview and discussion guides. Results were presented in narration supported by quotes from informants. Audio records from the interviews and discussions were transcribed and the transcript texts were analyzed manually using thematic analysis.

Due to the active war and state of emergency in the Amhara Region, incomplete/no data were collected from Awabel from July to October 2023 and hence the woreda level analysis excluded the date for the stated period.

Ethical Considerations

Ethical clearance was obtained from the Ethiopian Public Health Association (EPHA) Research Ethics Review Board reference number EPHA/OG/886/22. The protocol received an exemption from human subject oversight from JSI Research and Training Institute, Inc. (JSI), USA. A study permit to undertake the study was sought from the zonal health department, woreda health offices, the HC, and the HPs. All data collected for the study were upon respondents' consent. They were informed about the purpose of the study, its benefits, and risks, and their right to opt out. Moreover, participants were given information that their participation in the study was voluntary and the researcher kept the information obtained from them confidential only shared with the study team to respect confidentiality and privacy.

Results

The results are presented in the following sections; 1) acceptability, feasibility, and adoption of the interventions and implementation strategies; 2) implementation fidelity of implementation strategies; 3) reach and effectiveness of the interventions; 4) sustainability; 5) facilitators and key challenges; and 6) lessons learned.

Acceptability, Feasibility, and Adoption

Acceptability

The acceptability of the digitally enabled PBI intervention and implementation strategies was reported as high by HEWs, supervisors, and woreda focal persons. They appreciated the digital tools, eCHIS and FPA.

> *"We accepted and implemented the digital performance management interventions with full commitment."* —M&E and Health Information Technician (HIT) head, Mirab Abaya woreda

> *"The system ensures that those who work hard receive the incentives, and I am grateful to have been one of the recipients because of my hard work. The transparency and accuracy of the process were commendable, as it allowed me to emerge victorious."* — HEW, Awabel woreda

The applications digitized all activities, reduced workload, increased efficiency, reduced duplication efforts, and simplified supervision and home visit activities in which HEWs are not required to carry paper-based folders and supervisors do not need to carry checklists for HP supervision.

> *"PBI proved vital in reaching out to the community and ensuring they received high-quality services."* —HEW, Awabel woreda

The woreda program managers acknowledged the importance and significance of PBI in improving data quality. They also described the level of difficulty in implementing the interventions as neither easy nor complex. They emphasized the significance of PBI for decision-making and its positive impact on service quality.

The head of a HC described the intervention as focused and simple, emphasizing the selection of KPIs, as well as the relevance of the strategies to bring improvement in service provision. He noted that acceptability of the digitally enabled PBI intervention lies not only in its implementation simplicity but also in the competitive environment and the winners' spirit it brought to the system. The key informants emphasized the value of this spirit in boosting the morale of the staff. They also mentioned that the PBI intervention came at the right time when the HEWs were highly demotivated. The supervisors appreciated the fact that they could monitor the progress of each HC, supervisor, and HP from the digital platform. The skill and knowledge HEWs gained through training and mentoring enabled them to monitor their performance status and provide effective services; while the woreda health office can provide tailored support. The capability to virtually monitor the activities of each HEW is considered as a significant step forward in enhancing service provision and is part of the PBI implementation. The supervisors also appreciate the evaluation being digital as noted in the below quote,

"Digital evaluation is a very important part of PBI implementation because digital data is reliable, accessible, and the verification is easy." —Supervisor, Awabel woreda

Despite the high level of acceptability, the shortage of required inputs including supplies and high-performing tablets made it difficult to implement PBI, which affected the motivation of HEWs and hindered progress. As the implementation progressed, these challenges were mitigated. Subsequent training, supportive supervision, and mentorship support helped to solve most of the challenges and improve implementation fidelity and progress. Moreover, the woreda health office, along with project staff, created a Telegram channel to foster a competitive environment among HEWs and supervisors. This channel helped to track their performance, provide timely support, and regularly update each other on their progress. It resulted in increased motivation.

"HEWs, despite being heavily burdened and occupied, have shown commitment and dedication to implement the PBI interventions." —Focal person, Gimbichu woreda

Adoption

PBI interventions and implementation strategies have been implemented across the board in all the PBI woredas and health facilities. All the 333 HEWs and 87 HPs in the implementation woredas adopted the digitally enabled PBI interventions. HEWs used the eCHIS digital platform for HEP service provision, client referral, population registration, household registration, tracking their progress, generating monthly reports, and data-informed decisions. All the HPs set targets for the selected KPIs on the FPA along with their supervisors. According to the data from the end-line evaluation at Gimbichu and Mirab Abaya woredas, all 27 HEWs who participated in the interview reported using the eCHIS platform for various purposes, as seen in the figure 2. All HEWs used eCHIS for household and family member registration, providing services, and generating monthly reports (Figure 2).
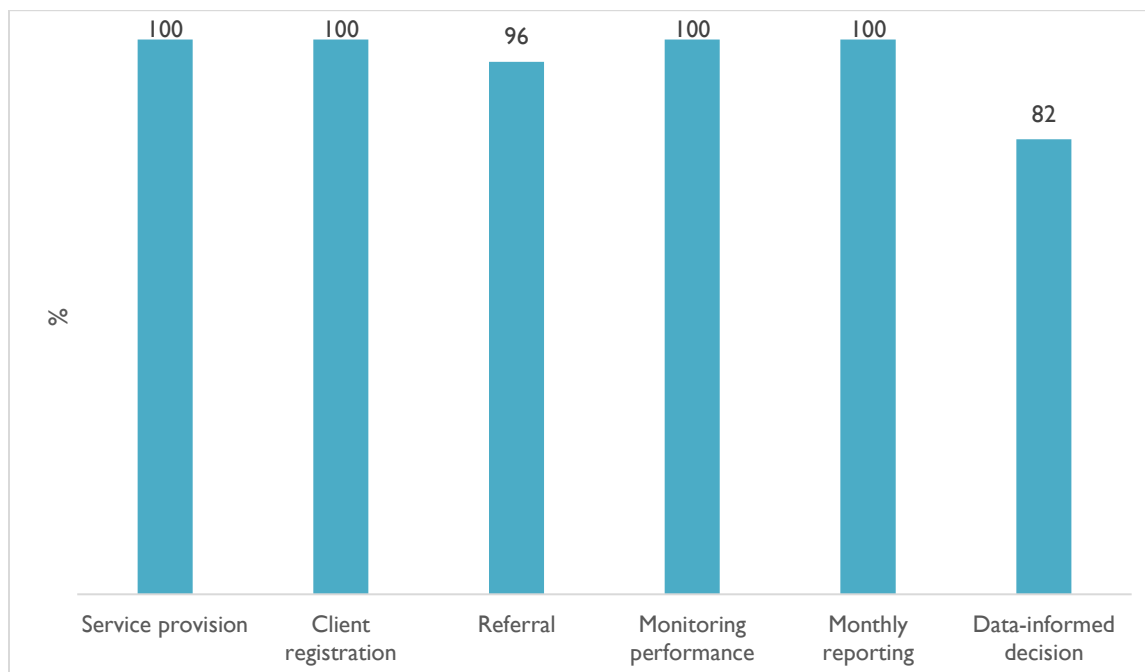

Figure 2: Percent of HEWs using eCHIS for specific services in Gimbichu and Mirab Abaya woredas

Similarly, all the supervisors and HCs in the PBI implementation woredas used the eCHIS platform for managing referrals and giving feedback. They used eCHIS data for HMIS reports, performance reviews, and tracking HEWs' progress. Moreover, all the supervisors used the FPA for setting KPI targets, mentorship, and supportive supervision. eCHIS and PBI interventions were a standing agenda for the monthly PHCU-level performance review meeting that involved all catchment HPs. All the HCs developed quality improvement projects to improve the performance of priority HEP services. The woreda health offices also facilitated woreda-level performance review meetings, conducted mentorship and supervision, performance verification, and facilitated incentivization.

The digitally enabled PBI interventions and implementation strategies being aligned with the existing health system and functions fostered easy adoption. Some of the PBI implementation strategies enabled experts to solve other problems such as improving the uptake of post-partum and long-acting family planning. Similarly, supervisors from a HC reported that PBI implementation helped them learn how to overcome challenges.

> "*PBI helped us see how to address challenges, especially through the QI [quality improvement] approach and root cause analysis.*" —Head of HC, Mirab Abaya woreda

The PBI interventions helped implementers gain valuable experience to anticipate bottlenecks ahead of time, and address them in a timely manner. Bottlenecks related to supplies, and materials to ensure fidelity of the implementation, which promotes adoption were resolved efficiently.

It became apparent that to ensure adoption and make subsequent progress in implementing the intervention as planned, more time and further resources were required. An expert from Mirab Abaya woreda acknowledged that the interventions require technical expertise, experience, and familiarity with the approaches. The supervisor gave an example, stating that,

> "*Extracting data from the digital platform looks easy, but it still requires skills to do so.*" —Focal person, Mirab Abaya woreda

There were several challenges affecting the adoption of the PBI interventions identified during the early implementation of the intervention. Some of the challenges related to tablet capacity and performance, on the eCHIS application, internet connectivity, power for charging tablets, and mentorship were solved by making appropriate adaptions. There are ongoing efforts by the woreda to address challenges related to the shortage of HEWs and staff turnover. Ensuring ownership of the eCHIS system at the woreda level could ensure reliable implementation and consistent programmatic support.

> "*We have recently received a better tablet, and we anticipate that service provision will increase over time.*" —Focal person, Mirab Abaya woreda

Feasibility

According to the HEWs, their supervisors, HC head, and woreda program managers, implementing digitally enabled PBI and its strategies were feasible. Incentivizing individual HEW and supervisors would encourage them to strive for better performance and is an effective strategy for motivating them.

"I believe that individual incentives would further enhance motivation and performance among supervisors. It is important to continue all categories of incentives, including group and individual incentives." —PHCU director, Mirab Abaya woreda

Financial incentives alone came out as least favored both for the HEWs and their supervisors. In-kind incentives or a combination of financial and in-kind were almost equally favored by most of the respondents.

"Money is expendable and short lived while in-kind incentive has memories that can last longer" —HEW, Mirab Abaya woreda

Informants suggested making the incentive type contextual, which would be meaningful for the HPs focusing on the felt need and critical gaps. In this way, the incentive would be more meaningful and leave a memory for those HEWs who made it happen. HEWs stated that,

"If the incentives are based on the specific needs of the HP, it would be much appreciated. For example, some HPs require maintenance, solar power, etc. The maintenance is tangible and can be seen easily witness not only the good performances of the HEWs but also the support of the partners." —HEW, Mirab Abaya woreda

For us, HP doesn't have electricity, in places where there is electricity awarding television is good, as it can be used for health education. Money does not last long but the in-kind item will be a remembrance." —HEW, Mirab Abaya woreda

Different opinions were observed regarding individual incentives for HEWs, however. According to the quantitative data collected from 92 HEWs following the second round incentivization ceremony, the effect of individual incentivization in driving health system level performance improvement remained contested. As shown in Table 7, individual incentivization contributed to encouraging individual HEWs to work hard as reported by 61.5%. However, it did not seem to drive performance at HP and tended to damage teamwork. Combining individual and group incentivization was found to drive performance improvement at individual and HP levels without damaging teamwork. HEWs reported that team incentivization would motivate them to work together for a shared vision and targets for HP rather than individual targets.

Table 7: HEWs' and their supervisors' preference for incentive schemes

Reasons for choosing the incentive scheme	Individual	Group/team	Both
It gives recognition to individual contribution	34.6%	9.1%	17.6%
It encourages individual HEWs to work hard	61.5%	36.4%	35.3%
It would create positive competition among HEWs	38.5%	0%	52.9%
It would strengthen teamwork	23.1%	63.6%	47.1%
It promotes HP's performance	30.8%	18.2%	52.9%
It contributes most to HEP service provision	15.4%	0%	54.9%

NB: the percentages were computed from multiple response questions which do not add up to 100%.

The team-based incentive provided for supervisors entertained mixed reactions. Some respondents give recognition to incentivizing the HC team as a whole as a pragmatic undertaking as several supervisors are supporting the HEWs. On the other hand, some respondents voiced their concern that team-level incentivization undermines the supervisor's effort, and they suggested incentivizing both individual supervisors and the HC team.

Moreover, the process and end-line evaluations after the awards revealed concerns about the effect of incentivizing individuals on the overall performance of the HPs/health system with special concern on teamwork, which is one of the core values in health care. According to the qualitative accounts, individual incentivization could create a workload on the HEWs who received the incentives and rivalry among colleagues, which would negatively affect the overall performance of the HPs and HEP.

> *"To me, it is better to provide incentives at the HP/team level than for the individual HEW. We (HEWs) are working in the same village. Our efforts are similar. So, it is better to focus on the HP. For instance, if a mother comes for FP service, it creates a spirit of disruptive competition between HEWs to record the woman on the eCHIS/tablet to increase the number of provided services. The other thing is that those who don't need the incentive might also ignore the program activities. One might say, let the one who received the incentive do all the tasks, which would affect the performance of the HP and the HEP."* —HEW A, from Awarded HP in Gimbichu woreda

> *"Because our efforts are almost similar, the incentive should be at the HP level. If one is incentivized and the other is not in a single HP, the unincentivized HEW may not have a good feeling for her colleague. She would ignore all the HEP activities … It is not good if only one HEW gets an incentive and the other is left from the same HP as it demoralizes those who did not get it. Rather it is good to provide at least a simple incentive, even a certificate, which can be motivational."* —HEW B, from Awarded HP in Gimbichu woreda

Contextual factors such as population density, topography, information-communication-technology (ICT) infrastructures, and HEW engagement in non-health activities contributed to the HEWs performance variability and service uptake by the community, which also determine individual and HPs' level performance. As the current performance verification did not take into account these factors, it became a reason for some HEWs and supervisors to question the fairness of the performance standard.

> *"We (HEWs) were discussing that unless a geographic stratification-based incentive mechanism is implemented it is hard for us (the HEWs in hard-to-reach areas) to compete with the HPs having favorable topography… the HEWs assigned in difficult geographic locations have lots of ups and downs to serve the community. The incentive should be based on strata; highlanders with highlanders and lowlanders with lowlanders. We (the highlanders) often work long hours but can cover a few households but the lowlanders can reach many households with a comparable given time."* —HEW, Mirab Abaya woreda

> *In HPs where the community had better care-seeking behavior and, in those HPs, where the HEWs should travel to the community/household to provide the health services can't cover the same number of clients in a given time but the level of effort could be much higher for the*

latter case…The community we are working with is inhabited in a remote highland where there is no infrastructure and mass media. The criteria for PBI needs to consider the geographic location of the kebeles, the communities' awareness level, and access to media. We shouldn't be compared with HEWs working places where access to transport and media is not a problem." —HEW, Mirab Abaya woreda

Implementation Fidelity

According to informants and the program information system, most of the strategies were implemented as planned with certain variabilities across settings.

Setting Performance Targets Digitally

In this study, it was expected that the HEWs and supervisors would achieve set targets following the implementation of PBI interventions. For each KPI, targets were set using the Central Statistical Agency projected population of the catchment and with standard conversion factors as appropriate on the FPA. Setting annual performance targets at the beginning of the budget year is a routine health system practice whereby the HEWs are given targets without being engaged in the process. In PBI, target setting on the FPA is expected to be done by engaging the HEWs. According to the data from the end-line evaluation, 93% of the HPs had set their annual performance targets digitally. The target-setting strategy was implemented with full fidelity in 58% of the HPs, whereby supervisors responsible for the task engaged the HEWs in setting annual and monthly targets for the HPs using the *Plan Setting Manager* feature on the FPA. Major reasons for poor adherence included supervisors having time constraints to involve HEWs in plan setting and the practice of engaging HEWs and using FPA having not yet been practiced.

Training

In total, 240 participants received the digitally enabled PBI training from JSI. Trainees included HEWs, supervisors, woreda focal persons, and zone and region program experts. The PBI training for the supervisors, directors of the HC, and woreda focal persons integrated topics on the FPA. The training had a five-day duration. The PBI trainings were conducted with full fidelity in adherence and dose as planned.

PBI training in Mirab Abaya woreda at Arbaminch City, October 2022

We evaluated the knowledge and skills participants gained from the digitally enabled PBI training employing a pre-post-test Kirkpatrick training evaluation model [9]. From Mirab Abaya, Awabel and Gimbichu woredas 73, 88, and 79 trainees completed the pre-test and

72, 85, and 80 completed the post-test assessments, respectively. The two-tailed paired sample t-test showed significant improvement in trainees' mean knowledge score from 66% during the pre-test to 75% during the post-test, p<0.001 (Table 8).

Table 8: Paired independent sample t-test showing difference in trainees' knowledge and skills score during post-test assessment compared to the pre-test in the three PBI woredas

Test score	Mean	Sample standard error	Paired difference standard error	Sig (two-tailed) p-value
Pre-test	66	1.417	1.497	0.000
Post-test	74	1.614		

Trainees were also asked for their thoughts on the overall training, including appropriateness of the training for their work, training facilities and supplies, trainers, and training outcomes. According to training evaluation results, over 95% of PBI trainees had favorable reactions to the training as shown in Table 9 below.

Table 9: Digitally enabled PBI training evaluation results in the three woredas (n=245), in %

	Training objectives were met	For the work I do the training was appropriate	Training facilities and arrangements were satisfactory	The facilitators were fair and friendly	Training has updated my knowledge & skills	Teaching aids were useful	Group discussions were important & helpful
Strongly agree	52	39	66	65	61	61	61
Agree	43	57	30	26	39	35	35
Neither agree nor disagree	0%	0	0	4	0	4	0
Disagree	4	0	0	4	0	0	0
Strongly disagree	0	4	4	0	0	0	4

According to the end-line evaluation conducted in December 2023, 90% of the trainees who received the PBI training acknowledged the training had improved their knowledge and skills. By contrast, there were gaps in the basic foundational eCHIS training each PBI implementer should have before the PBI training. Process evaluation data collected in December 2022 revealed that 25% of the HEWs and the majority of supervisors did not receive the basic eCHIS training and were challenged when using eCHIS.

Digitized Mentorship Support

Providing mentorship support for the HEWs by HC supervisors using the checklist integrated into the FPA is one of the digitally enabled PBI implementation strategies. In total, 135 mentorship events were done digitally using the checklist on the FPA during the study period. As shown in Figure 3, device and tablet-related issues were the most common issue resulting in mentorship support, while eCHIS data use-related issues were the least that received mentorship support.
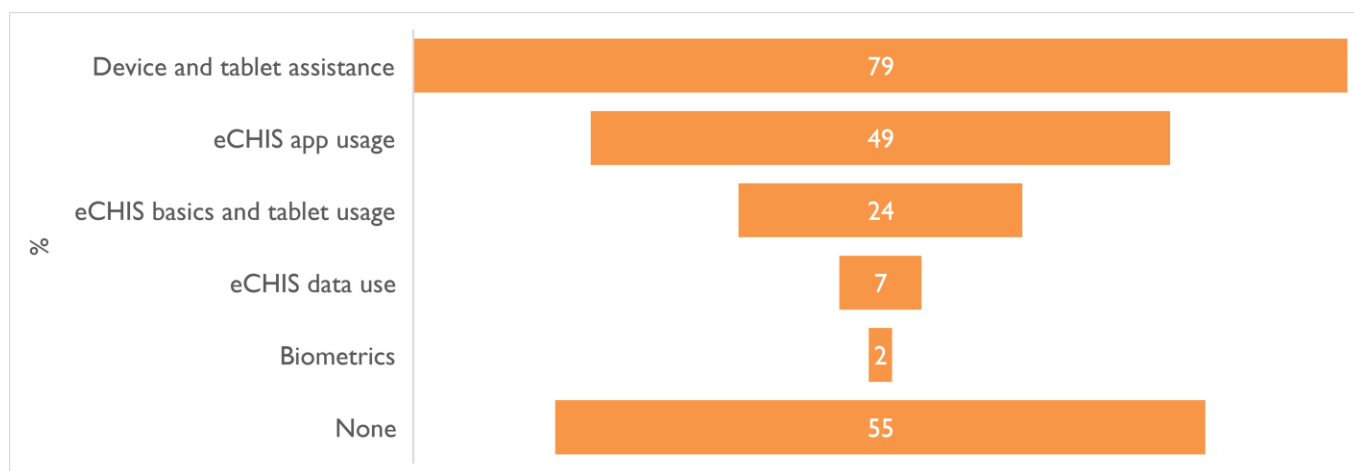
Figure 3: Issues addressed through mentorship support during the year III project period

The end-line evaluation data collected in December 2023 showed that 59% of the HEWs received regular mentorship support and that 50% of them received support every month. According to qualitative accounts, the mentorship activity was an effective approach highly appreciated both by HEWs and mentors. Unlike supervision, mentorship provides technical support with a focus on addressing knowledge and skill gaps identified during the visit. Mentorship was provided in a one-on-one, hands-on approach in a friendly and supportive manner. According to the HEWs,

> *"The mentorship activity helped us to advance service provision using the tablet... We used to have supportive supervision in the past, but it was often a source of conflict and blame. —* HEW, Gimbichu woreda
>
> *The mentorship improved our performance. We like it very much, it is like a family conversation, engaging and never boring."* —HEW, Awabel woreda

Supportive Supervision

The digital integrated supportive supervision conducted using the FPA has been displayed on the national eCHIS dashboard for easy real-time tracking, as shown in Figure 4. In total 59, 69, and 76 digital supportive supervisions were conducted using the FPA in Gimbichu, Awabel, and Mirab Abaya woredas, respectively from November 1- October 30, 2023.
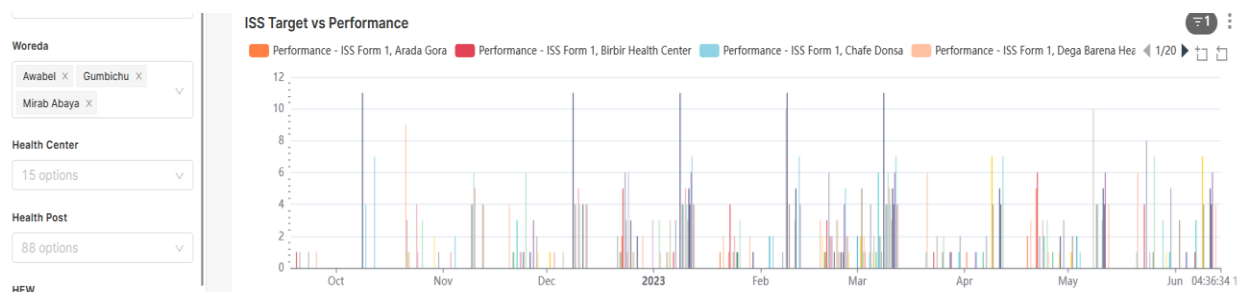

Figure 4: Snapshot of the integrated supportive supervision report from the National eCHIS dashboard

According to HEWs and supervisors who participated in the end-line evaluation, supportive supervision was conducted with variable regularity. Seventy-four percent

reported receiving it every month. The participants acknowledged the positive changes in the supportive supervision undertaken following the implementation of the PBI intervention. 52% of the participants reported improvement in the frequency and 64% of the participants reported improvement in the quality of supportive supervision respectively following the implementation of PBI interventions, respectively (see Figure 5).
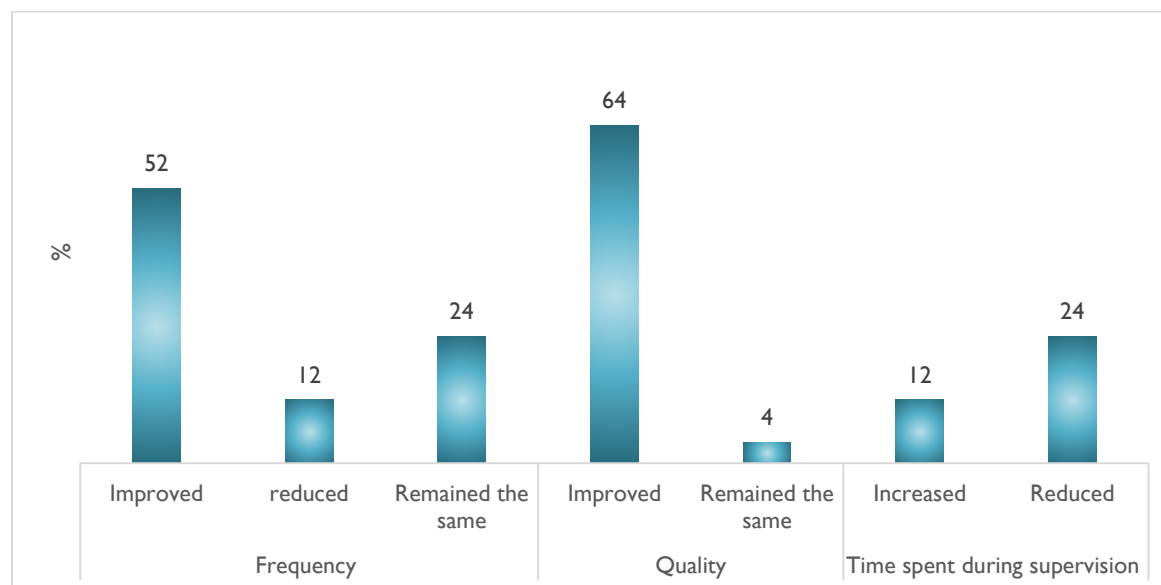

Figure 5: Change in supportive supervision undertakings following the implementation of PBI intervention in Gimbichu and Mirab Abaya woredas

According to the FGD informants, FPA usage for supervision was limited due to competency gaps among supervisors to use the application. This was attributed to inadequate training, lack of frequent practice due to competing priorities, not having the tablet in their hand, and poor motivation among some supervisors

> *"FPA has been used by some but other supervisors are not well versed with the application. On the eCHIS implementation, much focus has been given to capacitating HEWs but capacitating the supervisors is equally important as they are the one who supports the HEWs. The training on the FPA was inadequate"* —Supervisors FGD 1, from Awabel woreda

Performance Review

Performance reviews every month at the PHCU level and annually at the woreda level were one of the implementation strategies for digitally enabled PBI interventions. About 54% of PHCUs in the first two months and 57% of PHCUs in the six months following the study conducted performance reviews using the EPAQ approach[1] These implementation gaps were due to logistic and budget

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[1] *EPAQ approach PRM is used as a collaborative learning platform for experience sharing among HPs to learn from best-performing HPs. HC identify lead/best performing HP based on their KPIs performance. The meeting integrates site visits to a lead HP selected based on their performance by the HC. Award/recognition is given to the best-performing HPs at each review meeting. During the meeting HEWs present their HPs KPIs performance against the plan, reasons for the reported performance, and challenges encountered. Finally, they develop action plans and revise them as needed.*

constraints affecting the routine undertaking of review meetings with the EPAQ approach. To hold the monthly EPAQ meeting, the HC is expected to avail transport and required logistics for the HEWs and staff coming from the catchment HPs and the HC itself. During the implementation of PBI, all HCs had transport and financial constraints hindering them from facilitating EPAQ meetings regularly leading to adherence gaps in conducting EPAQ with the right dose/frequency, due to resource constraints.

> *"There is a lack of awareness among high-level decision-makers about the PBI interventions, which posed challenges for allocating budgets and prioritizing activities. The financing of the EPAQ activity was entirely the responsibility of the HCs, but the activities did not have a budget."* — PHCU Director, Mirab Abaya

All three PBI woredas conducted their annual performance review meetings attended by HEWs, supervisors, HC staff, and woreda decision makers including the head, M&E and health information technology (HIT) coordinator, HEP coordinator, RMNCH coordinator, and zone M&E experts. During the meeting, the HEWs, supervisors, and HC directors presented their performance against set targets for the KPIs using data from the eCHIS platform and FPA. These were followed by discussions on the enablers that facilitated implementation and, on the barriers, and challenges that impede implementation. Then they developed joint action plans involving teams from woreda, HCs, and HPs to accelerate progress. These meetings fostered commitment and ownership among end-users, supervisors, and woreda managers. It was also an opportunity for experience-sharing, refresher training, and motivating implementers.

Quality Improvement

Developing quality improvement projects for prioritized problems was a strategy selected to drive performance improvement. All 15 HCs developed a quality improvement project by engaging representatives from catchment HPs, for one of its priority problems by undertaking root cause analysis. HEWs from each HP would then propose a change idea appropriate for their setting to address prioritized problems. There was a regular meeting expected to be undertaken at the HC engaging the HPs to evaluate progress made and to make required revisions. According to the data from early implementation, fidelity gaps were observed in implementing the strategy. Although all the HCs have developed quality improvement projects, in 46% of the surveyed HPs, HEWs were not involved in developing the projects, and in 79% of the cases, HEWs were not members of the quality improvement team. For the list of projects developed at each HC, see Annex II.

Data for Decision/Action

The PBI interventions promote data to be used to inform decisions at all levels and became a common practice in all the PBI woredas. At the point of data collection, data from the eCHIS were used for registration, service provision, client appointments, HMIS reports, and for tracking their performance. In the first two months of the PBI implementation, 23 out of 24 HEWs used eCHIS data for various decisions, predominantly for tracking household and member registration and monitoring clients. According to the end-line evaluation data completed by 27 HEWs, 90% reported that the eCHIS data enabled them to monitor individual and HP's performance.

Supervisors and health center directors used the data from the FPA and eCHIS platform for tracking HEWs performance, providing referral feedback, tracking mentorship and supervision tasks examining gaps in essential drugs and medicine, and providing needed support. In the first two months of PBI implementation, six out of eight HCs used the eCHIS data for decision-making. The supervisors that used the FPA dashboard were very positive about it for the reasons that it would increase accountability, efficiency, and data quality and asked for further improvement for the FPA.

> *"PM dashboard has enormous benefit for remote monitoring of performance and progress without the need to travel to the HPs, to compare eCHIS and HMIS and DHIS2 data for improving data quality. It is critical to improve the PM dashboard feature functionality on the FPA to show data in tabular form to see KPIs performance against the target."* —Supervisors, FGD, Mirab Abaya woreda

Data from eCHIS has been used for supporting other programmatic endeavors including epidemic tracking and it is appreciated by decision makers for its validity and ease of access. According to the qualitative accounts from the woreda M&E and HIT team lead,

> *"We are using eCHIS data for decision-making. In 2016 E.C., we used the data from the eCHIS platform to identify children for vaccination in the reach of every child. It helped us identify about 5,000 children eligible for vaccination that were to be missed if we used the traditional approach for estimating the number of children… Moreover, in our area malaria is endemic. If the number of cases is unusually high, we can easily see the trend by accessing the eCHIS data and quickly decide on interventions. If a HEW used to report 20 cases per month and if there was a sudden jump and reported 60 at a certain period, someone following her report can simply question and understand what is happening. It helps in resource mobilization including manpower, logistics, drugs, etc. …It helped us in early detection of outbreaks, plus monitoring and evaluation of services."* —M&E lead Mirab Abaya woreda

Incentivization

As of December 2022, 87.5% of the HCs established a verification team, and this figure reached 100% as of April 2023. The teams were composed of the HC head and supervisors (HIT, M&E, RMNCH, and HEW representatives) as per the standard on the implementation guide (Annex III). All three woredas formed their performance verification team involving relevant experts according to shared guidelines. For the first PBI award Gimbichu, Mirab Abaya and Awabel woredas' performance verification team verified the performance of each HEWs and supervisor on the respective KPIs against the set target. In the first-round award, the teams analyzed six months (November 2022- April 2023) performance of all HPs and HCs against their respective KPIs and set targets to shortlist the top three performers while for the second-round award, they analyzed data from May-October 2023. The team used digital data from the eCHIS HEWs application, FPA, and the national eCHIS dashboard. Data verification was made first by the respective HC team, followed by the respective woreda verification team to identify the top three performers in each category (i.e., HEWs, HPs and HCs). JSI then validated the results submitted by the woreda verification team. Having a verification team and standard PBI implementation guidelines were instrumental in ensuring clarity in measurement and scoring.

The process of incentivization was performed with full fidelity during the first round (bi-annual) and the second round (annual) incentivization. Based on their KPIs score, the three top-performing HEWs, HPs, and HCs (i.e., in first to third positions) were awarded. The awards were handed out by region, zone, woreda, and JSI program managers in a ceremony organized by the woreda. HEWs, supervisors from HCs including HC heads, relevant officials from woreda, zone, region, and JSI attended the ceremonies. In total, 103 participants in Awabel woreda (only in the first bi-annual award), 212 in Gimbichu, and 166 participants in Mirab Abaya woredas (for the bi-annual and annual awards) attended the incentivization ceremonies.

Photo of Mirab Abaya, Awards and Awardees

From the outset, the awarding procedure was designed to be objective and fair. Among the respondents who previously received an award, they found the selection process fair, based on real-time performance reports. A woreda expert, who was a member of the verification team, expressed a high level of satisfaction with the incentivization procedure and process. She emphasized the fairness and inspiration that the procedures ensure. She stated,

> "*I am satisfied with the process and the activities we undertook to come to the final decision about who should win. The process was fair and motivating.*" —Woreda focal person, Awabel woreda

To ensure fairness, the expert emphasized the need to provide consistent support and follow-up to all HEWs. Continuous support is crucial, particularly for those HEWs and supervisors who have poor performance to address their challenge and to be candidates for the next round. The respondents suggested that frequently displaying the performance and rank of each individual, HP, and HC could create a sense of healthy competition.

There were some levels of anticipation and curiosity during the announcement of the winners. According to the respondents, the awards were given to deserving individuals and health facilities. A woreda expert who served as a member of the woreda PBI validation committee expressed a strong belief that the award was fair and reached the deserving recipients. She explained that the committee relied on digital data from the eCHIS platform for the verification process. This approach has increased the objectivity and integrity of the results. According to the respondents, the verification process which involved meticulous evaluation with 2-3 rounds of assessment ensures its validity, credibility, and high confidence in the outcome of the award and the selected winners. The HEWs from three woredas who received the award, as well as those who did not, echoed this sentiment, emphasizing that the process was fair, transparent,

and reached the right individuals. The HEWs, the HPs, and the HCs did not expect the incentive to come true as they had experiences with broken promises. Consequently, the delivery of the first incentives came as a pleasant surprise for all.

Photo of Awabel woreda Awardees with their awards

Reach and Effectiveness

Improved eCHIS-based RMNCH Service Delivery

There was a significant increase in the mean number of maternal health services provided using eCHIS following the introduction of the PBI intervention in October 2022 as shown in Figure 6. The mean ANC 1st visit was about three times higher (mean=155) following the implementation of PBI than before the PBI (mean=56) (t-test p<0.001). By contrast, in the comparison woredas, the mean ANC 1st visit has reduced by half (mean=12) after the PBI intervention compared with the before (mean=27) (t-test p<0.001).
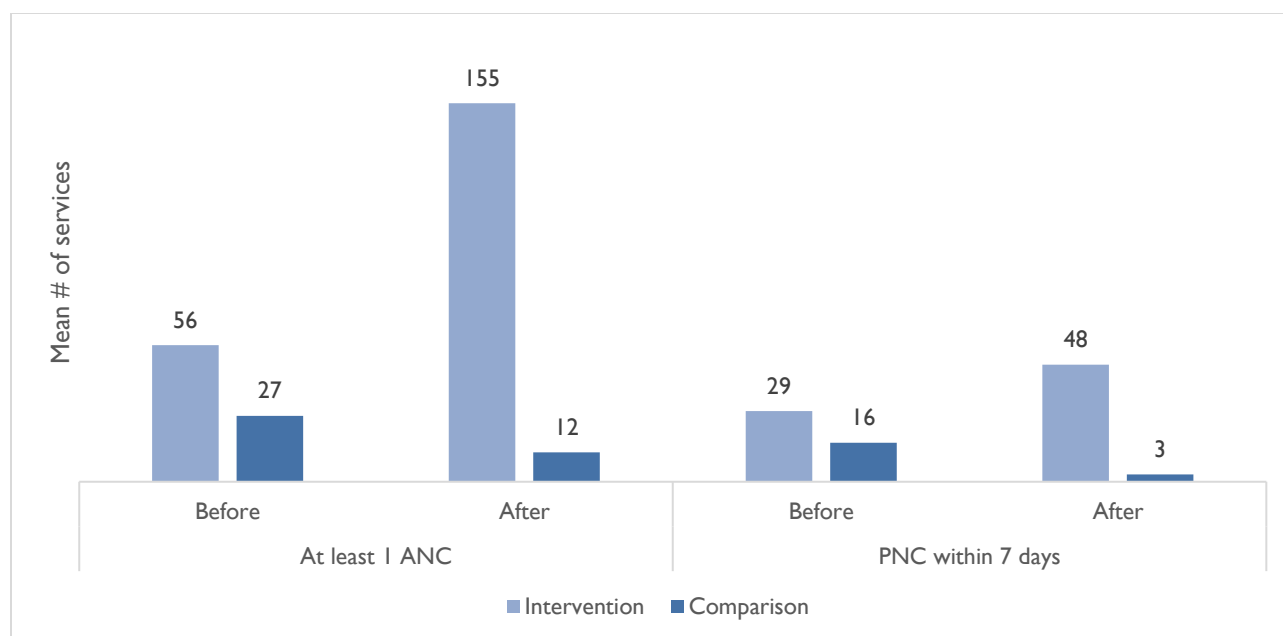
Figure 6: Mean maternal health services provided in PBI intervention and comparison woredas

Before the PBI intervention, the percentage of HPs providing BCG vaccine, while using eCHIS during the given month was similar both in the intervention and in the comparison woredas. Following the intervention, the percentage of HPs providing BCG vaccine using eCHIS showed a significant increase in the intervention woredas (t-test $P<0.01$), while a significant decrease (t-test, $P<0.01$) in the comparison woredas (Figure 7).
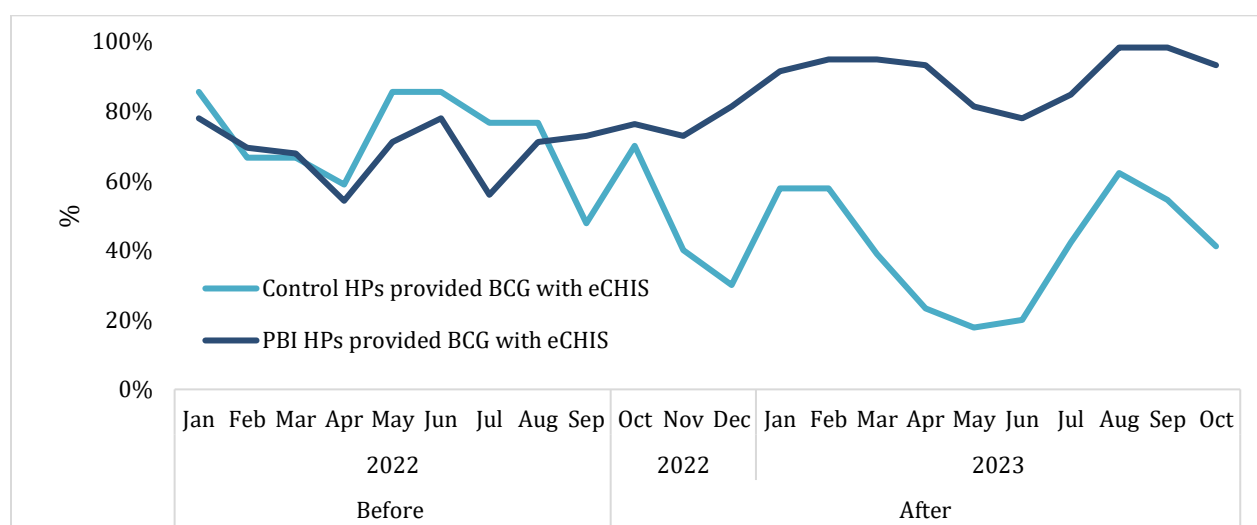
NB: Due to the active war in the Amhara region eCHIS implementation has been interrupted hence the data for the PBI woredas do not include data from Awabel since July, 2023

Figure 7: Percentage of HPs providing BCG vaccination service using of eCHIS from January 2022 to October 2023 in PBI intervention and comparison woredas

The mean childhood immunization services registered on eCHIS after the intervention have shown a significant increase in PBI implementing woredas (t-test p<0.01). In the intervention woreda, the mean Penta 1 vaccination registered on the eCHIS platform increased from 113 before intervention to 161 after. By contrast, the mean childhood immunization services registered on eCHIS in the comparison woredas reduced significantly after the intervention compared to before (t-test p<0.01), as shown in Figure 8.
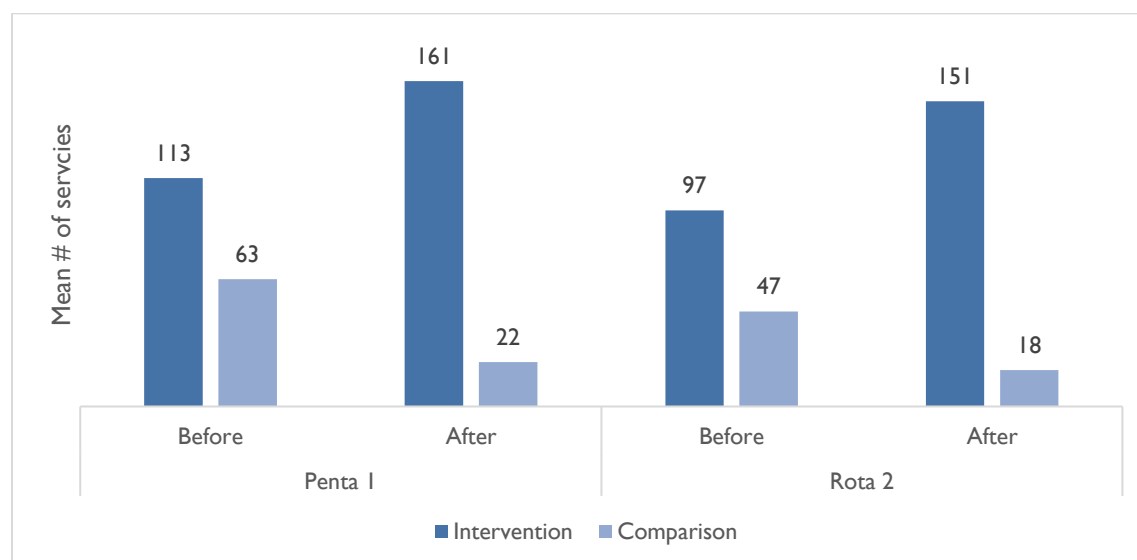
Figure 8: Childhood immunization services registered on eCHIS before and after the intervention

Improved Coverage of RMNCH-related KPIs

As shown in Figure 9, the first measles vaccination given at nine months of age registered on the eCHIS system has shown a significant consistent increase in the intervention woreda following the intervention according to the time series data from the eCHIS platform, (P< 0.01). Comparing intervention and control woredas, there was a non-significant difference in the pre-existing levels and trends of measles vaccination in the intervention and control woredas (P< 0.05), indicating that they are comparable. Following the intervention, the number of children who received measles vaccine increased by 47 per month (P<0.01). This was followed by a sustained change in trend (P<0.05).
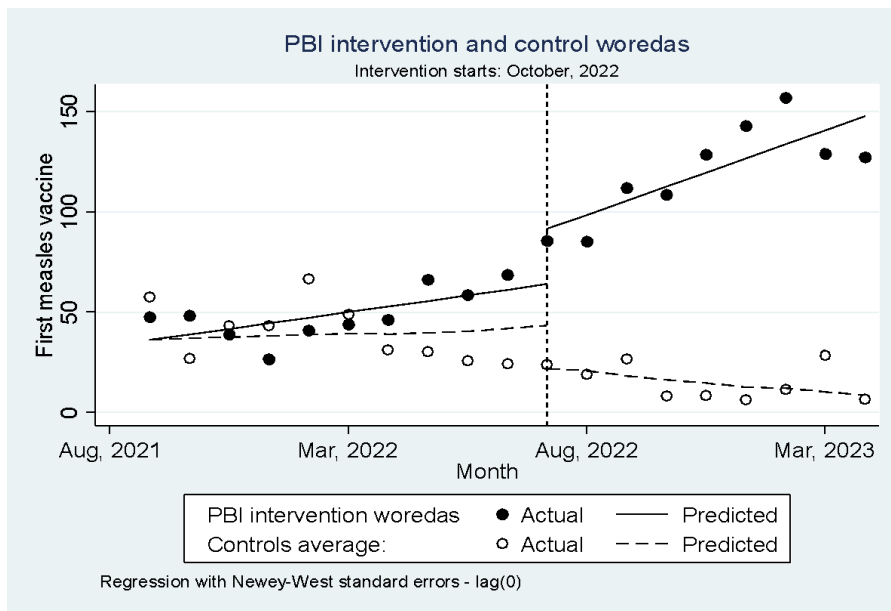
Figure 9: Time series showing first measles vaccination uptake in PBI intervention and comparison woredas, using data from the eCHIS platform

According to the time series data, the number of children who attended growth monitoring sessions in the HPs in the intervention and comparison woredas varied significantly according to the data from the DHIS2 platform. After the intervention, the number of children who attended the growth monitoring session in the PBI implementation woredas showed a significantly increasing trend compared to the counterfactual (P<0.05). By contrast, in the comparison woredas there was a decreasing trend in the mean number of growths monitored children compared to the counterfactual (Figure 10).
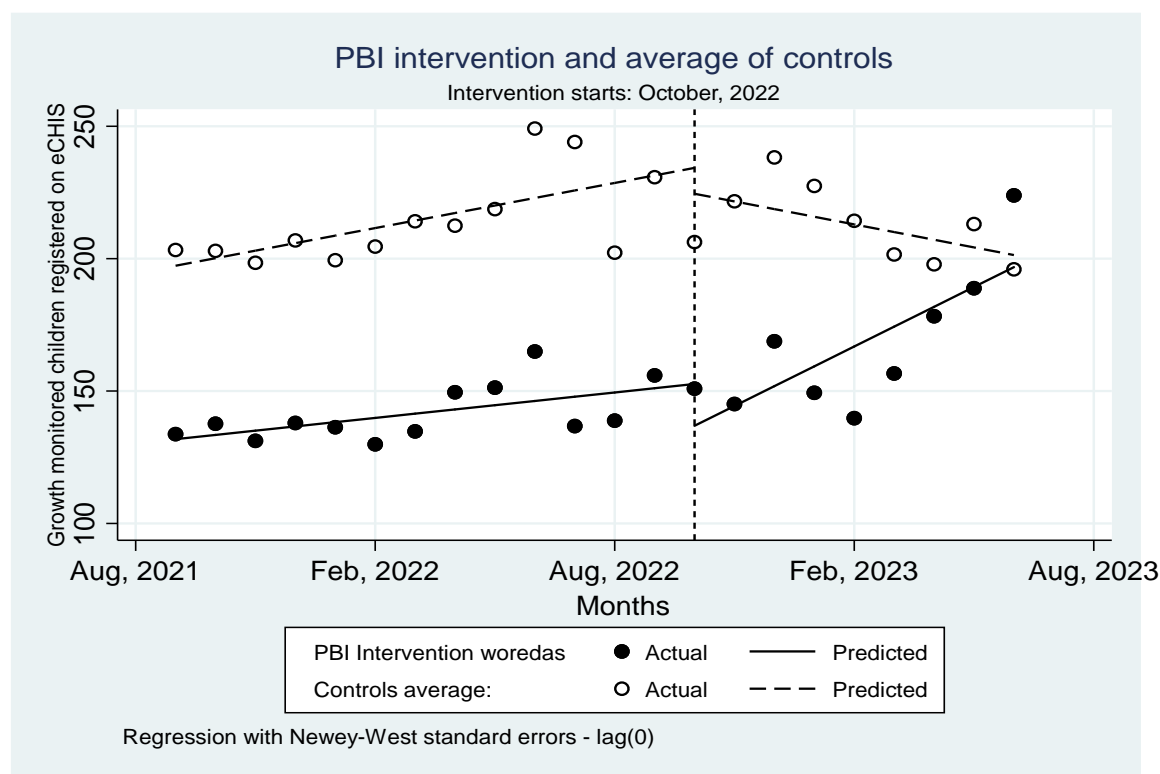
Figure 10: Time series graph showing growth monitoring performance in PBI implementing and comparison

Improved Performance and Motivation of HEWs

According to the data from the eCHIS platform, the KPI score during the second round of the PBI award was significantly higher than the score during the first PBI award in all categories as shown in Figure 12 (t-test p <0.05). For the HEWs, the average score for the 10 KPIs has shown an increase during the second-round award compared to the first round (t-test p <0.05). For HPs, the average score for the six KPIs has shown a significant increase during the second round compared to the first round (t-test p <0.05). Similarly, average scores for the six supervisor KPIs showed significant increase in the second round than in the first (t-test p <0.01).
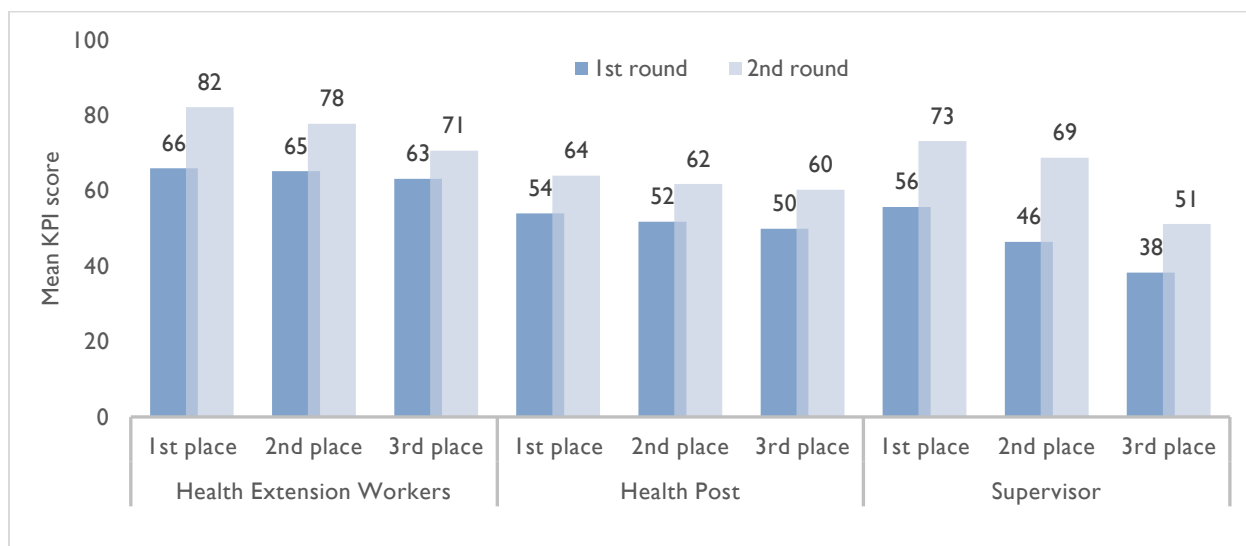
Figure 11: Average KPIs score and rank of PBI awardee in Gimbichu and Mirab Abaya woredas

According to the qualitative accounts, the digitally enabled PBI intervention improved HEWs' performance and motivation. This was witnessed by their supervisors, the woreda health office head, and themselves. The PBI award increased HEWs' level of motivation.

> *"The HEWs were highly motivated following the first incentive award. The ones who stood back were working hard to improve their rank. We have seen that practically. Digital-enabled PBI can improve performance because it enables the HEWs to properly follow cases that require their attention and receive appropriate feedback from their supervisors and HC."* —Head, Mirab Abaya woreda

> *"The incentive has increased our motivation. After seeing the first incentive award to high-performing HEWs, we were highly motivated to perform better and hence we got awarded in the second round. In the beginning, we were not aware that an incentive would be provided. Those who got incentives in the first round did not get it in the second round. The HEWs motivated by the incentive given in the first round took over those awarded in the first round. So, the PBI motivates the others to perform better".* —Award-winning HEWs, Gimbichu woreda

Availing digitally enabled support has been positively perceived by decision-makers for real-time tracking of performance gaps, which would enable them to timely avail needed support for improving performance

> *"The customary review meetings or evaluation approaches were undertaken by organizing performance review meetings at health centers and going through each paper report to examine performance. Currently, the HEW's performance data can be accessed in real-time while we are in the office. The system also allows us to see gaps even out of work hours when needed and tell HEW what she can do on the failed performances."* —M&E and HIT expert, Mirab Abaya woreda

Sustainability

Through qualitative data, the study assessed the sustainability of the PBI interventions and the factors that played out. Mixed perspectives surfaced, on the one hand, as the KPIs are those tracked by the routine health system and most of the implementation strategies are components of the routine support and performance management systems, sustaining the intervention would not be challenging for the community health system.

> *"We don't consider the implementation as an extra task. It assisted us in accessing the data easily and documenting service delivery in a quality way. The PBI KPIs are routinely planned HEP services that are being performed and are not new at all."* —Head of the woreda, Mirab Abaya

On the other hand, as the eCHIS program lacks dedicated resources, a budget, and a defined structure for ensuring accountability, there would be challenges to sustaining regular mentorship and incentivization which are not part of the routine support system.

> *"The government's current status can't let it organize training, incentives and provide required inputs. Allocation of budget for the program should precede before the handover."* — HEW, Mirab Abaya woreda

> *"… My fear is about the continuity of the incentives when it is entirely implemented by the government. Clear definitions and accountability of the eCHIS should be in place under the structure of the health system to intervene budget. So far, we are implementing the PBI strategies like the mentorship and review meetings through integration with other health system activities using other programs' budgets… unavailability of dedicated finance from the government would be a challenge for the continuity of mentorship and required support for the PBI. The eCHIS program has not appropriately set the woreda hierarchical structure. I have concerns about its continuity without it being budgeted."* —Head of the woreda, Mirab Abaya

The informants asked for continued support from JSI till the health system/government owned the intervention by creating an accountable structure and allocating the required resources.

> *"The partner should work until the government starts allocating budget to it. Continuity of logistics provision related to the tablet and other items should be there to ensure the running of the eCHIS. Apart from this HEP services provision is the routine work we are paid for."* —HEW, Mirab Abaya

> *"The tablet is now like a service-providing tool, the same as blood pressure apparatus, weight scale, etc.; so, the government should uninterruptedly supply it in case of damage, and maintenance should also be well planned before the partner handover it to the government. The absence of these supplies after the full-scale implementation means allowing the health extension program to collapse at some point. " … the solution to this is proper budgeting for the eCHIS program"* —Woreda head, Mirab Abaya

Facilitators and Ongoing Challenges

Participatory design and implementation with relevant stakeholders resulted in the testing of PBI for HEWs and their supervisors to improve the performance of HEP. Availability enabling environment for testing PBI intervention such as HEP optimization roadmap and information

revolution agenda, high motivation of HEWs and their supervisors, meaningful engagement of stakeholders, alignment of expectations and implementation plans, iterative, adaptive, and phase-based implementation process, and tailored support through mentorship and supportive supervision were the key facilitators for the effective implementation of PBI. However, several challenges and barriers were encountered during the implementation of PBI interventions. Most of the enablers and challenges were common across the woredas. Guided by the Consolidated Framework for Implementation Research (CFIR), the study was systematically explored and appropriate program adaptations were made for high-fidelity implementation of the strategies. Table 10 presents factors affecting implementation of PBI. Some of the key ongoing challenges are discussed below.

Measuring individual performance: Due to variables that include population size, topography, number of HEWs, tablet capacity, internet connectivity, and outreach service provision, not all HEWs are set up to perform at the same level. As a result, measuring individual HEWs performance for PBI had been a major concern for the HEWs, supervisors, and woreda experts. During the first round and second round PBI awards, the project team in collaboration with woreda teams designed multiple metrics taking into account the limitations of using a single metric (i.e., either based on the number of services provided or the percentage/proportion of services provided). Moreover, assigning targets for individual HEWs and assignments given for HEWs on additional kebele level leadership activities not listed as KPIs made it difficult to fairly distribute the targets to available HEWs. The project has proposed a reasonable individual performance measurement approach using multiple metrics (e.g., number, proportion/percentage, and average) and equally distributed HP targets to all assigned HEWs.

Denominator issues for reliable target setting: There have been serious concerns raised by HEWs and their supervisors on the target population/denominator for setting performance targets. They challenged the validity of the woreda-prescribed target for the KPIs as there were variations in the target population/denominator when the actual counted population was considered.

> *"The annual performance target given by the woreda is not in-line with the reality on the ground. This also includes the way the conversion factor is designed and developed. The conversion factor is high. Though we understand the challenges, we have no way out other than using the prescribed conversion factor and population estimate."* —Supervisors, FGD

There were significant discrepancies in the households and population estimates the woredas have and the actual number registered on eCHIS by the HEWs. The population figure of the woreda has come from the Central Statistical Agency projection/estimate based on the 2007 census, which has the potential to under or overestimate the current population. Taking Awabel woreda as an example, on the one hand, the population registered on eCHIS was 114% by July 2023, which was higher than the woreda estimate while the registration was ongoing. On the other hand, in Gimbichu, the household registration was 90% by July 2023 (less than the woreda estimate while the HEWs claimed that they completed registration). In digitally enabled PBI interventions, the HEWs performance target should ideally be based on eligible populations

registered on eCHIS. Hence, taking woreda prescribed KPIs target would potentially misrepresent HEW performance.

> *"Setting KPIs target should be based on the actual Kebele counted population. Even the target set at the woreda level has problem … but the woreda does not trust the eCHIS count."* — HEWs, FGD, Awabel woreda

Getting verification and endorsement from the woreda to use the household and population registered on eCHIS for official reports and decisions could solve these challenges. To reconcile divergent notions and to come up with a valid population estimate for setting credible targets, the study has made adaptations, which included formation of a verification team at the woreda involving HCs, kebele, woreda, and zone-level relevant experts and decision-makers. The team is responsible for verifying all the households and populations registered on the eCHIS system. HPs whose population passed the verification can use the population they registered on eCHIS/counted as denominators for setting performance targets. At present, two-thirds of the HPs have completed registering and updating their catchment household and population on eCHIS waiting for the verification to be done by their respective woreda and zone.

Insufficient mentorship and long supervision tool: The supervisors who used the FPA for supervision expressed their concerns that the lengthy supervision checklist would also deter them from consistently using it. It was time-consuming for them to complete all 14 sections of the checklist. They suggest revising the supervision checklist by segmenting it into being filled out in a monthly and quarterly manner.

> *"The supervision checklist on the FPA contains several sections, whereby some can be assessed quarterly while others monthly. In its current form, it is time demanding and boring and hence needs revision for improved performance''* —Supervisors FGD 2, Awabel woreda

Another factor discouraging some supervisors from using the FPA during early implementation of the intervention was that some decision-makers were not well aware of the eCHIS and PBI implementation in the woredas, and wanted to see minutes and manual documents on conducted supervisions. This put extra demand on the supervisors to copy the activities they did on the FPA into a paper format for official reporting, which was a duplication of effort.

The digitized supervision checklist on the FPA has task tracking features that enable the supervisors to monitor the availability of essential drugs and essential medical equipment in the catchment HPs and re-fill the missed ones, which are the two KPIs for measuring supervisors' performance. There are eight essential drugs and eight essential medical equipment pieces that should be available at the HPs all the time; their absence is detrimental to the success of PBI interventions.

Shortage of resources: Despite mentorship being a pragmatic approach for filling competency and technology-related gaps among HEWs in the early phase adopting the digital application/technology and providing the support as intended were challenging. Trained mentors from the HC and woreda presented some barriers affecting mentorship undertakings.

> *"Mentorship needs time, resources, and updating oneself…"* —Supervisor, Awabel woreda

The mentorship support was not provided with full fidelity in adherence and dose due to technical and logistic challenges. Most of the supervisors were not trained on mentorship undertakings some of them did not receive prerequisite basic eCHIS training and a few did not have training on digitally enabled PBI interventions. Some of the reasons included high staff turnover and changes in assignments/roles among the supervisors, who received the basic training. The lack of dedicated means of transport to the HPs, difficulty topography, and long distance from the HC were the other barriers inhibiting the supervisors from providing monthly mentorship support.

Poor maturity of eCHIS: The PBI interventions are implemented on the eCHIS platform, yet the eCHIS implementation and service provision using eCHIS is far below expected, threatening PBI intervention success. Maturity factors include low household and member registration, inconsistent verification of population count, uneven service provision using eCHIS, and technical and logistic issues including low-performing tablets and poor connectivity.

Table 10: Factors affecting implementation of PBI interventions

Domain	Ongoing challenges and key barriers	Enablers and facilitators
Outer setting	- Administrative and structural factors such as revisions in administrative boundaries leave some HPs without support while some others are to be added to the catchment - Multiple national campaigns often disengage the HEWs from their routine activities - Insecurity in the different parts of the country - Unreliable and low-strength signal internet coverage in some areas - Lack of reliable electric power supply in some settings - Poor availability of essential drugs and supplies	● Environment for testing PBI intervention (outlined in HEP optimization roadmap, information revolution agenda, and eCHIS being a flagship initiative)
Inner setting	- Low maturity of the eCHIS - Shortage of human resources including turnover of trained HEWs - Lack of financial resources to support PBI	- Meaningful engagement of stakeholders - Alignment of expectations and implementation plans - Governance mechanisms established to ensure government oversight and leadership
Interven	- Data quality, report consistency, and friendliness of the FPA and eCHIS dashboard - Insufficient and inconsistent mentorship supervisory support and performance review meetings due to a lack of resources at HCs and woredas.	- Employed DESC framework - Tailored strategies designed through consultation - Capacity building, and tailored and individualized post-deployment mentorship support

...tional Implementation process	• Contextual variations in population size, topography, HEW density per HP, tablet capacity, and internet connectivity hinder individual target setting and are concerns for individualized performance management/incentive. • Competing priorities among HEWs, supervisors, and woreda focal persons affecting full fidelity implementation of digitally enabled PBI	• Iterative, adaptative, and phase-based implementation process • Tailored support through mentorship and supportive supervision
Individual	• High turnover of trained staff, transfer of HEWs from non-eCHIS implementing sites, and new graduates joining • Competing priorities	• HEWs, supervisors, and woreda focal persons trained • High motivation of HEWs and their supervisors • Implementation team members including supervisors, some zonal coordinators, and woreda focal persons were savvy about the digital intervention

In the course of implementing the study, adaptions were made to some of the strategies to address ongoing implementation challenges. The evidence on fidelity gaps was either observed by the project team or reported by HEWs and their supervisors, HC heads, and field coordinators. Guided by the framework for reporting adaptations and modifications of evidence-based interventions (FRAME) [10], the study documented modifications made to the implementation strategies and some components of the interventions, as shown in Annex IV.

Lessons Learned

Digitally enabled PBI promotes data-informed decisions: JSI implemented a digitally enabled PBI system for service provision, support system, performance monitoring and evaluation, performance tracking, and performance scoring activities. The system uses real-time data to support decisions at all levels, including clinical decisions, monitoring progress, and producing reports for program monitoring and evaluation. The system ensures transparency and accountability in addition to improving HEWs' performance and quality of service provision. From the outset, using the Target Setting feature of the Focal Person Application, the HEWs, and their supervisors jointly set performance targets for selected KPIs. This exercise enables the HEWs and their supervisors to know what is expected from them and to devise workable alternative strategies to achieve the set target. The PM dashboard which is used to visualize the HEWs' performance on selected KPIs against set targets helped them to see their gaps and success. This approach not only helped the HEWs and supervisors to take corrective action to improve their performance but also improved transparency.

The digital system enables objectively incentivizing high-performers: Despite limitations to the digital system that do not account for population density and dispersion, topography, and HEW engagement with other services, the digitally enabled PBI system facilitated objective evaluation and identification of high-performing individuals and facilities for incentivization.

Digital-based performance verification drives credibility and satisfaction: Both for the first and second PBI awards, the performance verifications were made solely with digital data from the eCHIS national dashboard, eCHIS HEWs application, and FPA which were not liable for bias. The verification also incorporated taking a sample by going to the community level and verifying that clients received the services registered on the eCHIS app. Similarly, for the supervisors, the woreda verification team asked the HEWs in the HPs whether they received mentorship and supervisory support comparable with those registered on the FPA. These created objectivity in the evaluation and award.

Creating an enabling digital environment is critical for high-fidelity implementation: Several challenges affected service provision on eCHIS and performance monitoring related to the eCHIS application, tablet capacity, connectivity, power source, FPA, PM dashboard, and national eCHIS database. To this end, JSI provided high-spec tablets and power sources to address some of the problems. A HEW after receiving high capacity/performance tablet and photovoltaic (PV) solar and witnessing the first PBI award said the following

> *"We (HEWs) achieved what we can achieve so far with the poor tablets and weak infrastructure. We will record more success in the future because of improvements in our tablet capacity…. and the high motivation we currently have."* —HEW, Mirab Abaya woreda

Collaborative learning and remote support facilitated eCHIS/PBI implementation: Social media emerged as a reliable platform for providing remote support and collaborative learning. Telegram channel was used extensively in each woreda whereby the HEWs, supervisors, HC heads, HCs, and woreda focal persons joined the channel.

Conclusions and Recommendations

The digitally enabled PBI intervention and its implementation strategies were found to be easy to implement, acceptable, feasible, and well-adopted by the community health system. The intervention has great potential for monitoring performance, improving performance, and fostering evidence-informed decisions. We learned that the digitally enabled PBI is a promising system rendering various benefits:

- Improved HEWs and supervisors' motivation
- Improved performance of HEWs, HPs, and supervisors
- Promoted data-informed performance monitoring and support, performance improvement; performance measurement, and evaluation
- Availability of real-time data access for performance tracking including clinical decisions, monitoring progress, generating reports for program monitoring and evaluation, and rendering support upon demand
- Ensured transparency and accountability that drives improvement

However, there were ongoing implementation challenges including sub-optimal programmatic and technical support, a nascent eCHIS, denominator issues for reliable target setting, and logistic constraints (application, infrastructure, and tablets). The very digital nature of the PBI intervention requires a strong eCHIS foundation, where the required inputs in terms of digital tools, infrastructure, application, and support system should have been in place and functional for the successful implementation of the PBI intervention. Scaling up of digitally enabled PBI should consider the following 1) creating an enabling digital environment, 2) resource allocation for monitoring and sustained implementation of PBI, 3) balancing the individual vs team-based incentives, 4) developing metrics that account population density and topography, and 5) monitor unintended consequences such as improving individual performance at the expense of health system performance as poorly planned and implemented performance-based incentives can be counterproductive to the HEP, and HEWs and their supervisors motivation which could damage teamwork - one of the core values in health care and shared vision.

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Annexes

Annex 1: List of Key Performance Indicators for monitoring HEWs and HPs performance

Key Performance Indicators (KPIs) for HEWs and HPs
Contrastive acceptance rate (CAR)
ANC 4th visit
ANC 1st visit
Number of pregnant and lactating women screened for malnutrition
Number of children under 2 years who participated in growth monitoring and promotions
Number of children immunized for Penta 1
Number of children immunized for Penta 3
Penta 1 to Penta 3 dropout rate
Proportion of Model Household
Availability of tracer drugs in the HP
Availability of essential medical equipment in the HP
Integrated supportive supervision
HPs average KPIs
Mentorship support

Annex 2: List of quality improvement projects in PBI intervention woreda cluster HCs and project completion dates

Woredas and HCs	Selected Indicators	Baseline %	Target %	QI Projects end date
Mirab Abaya				June 2023
Wajifo	Improving ANC 1	56%	80%	
Birbir	Improving CAR	46%	85%	
Dega Birbir	Improving CAR	37%	70%	
Dega Barena	Improving ANC 4	30%	100%	
Awabel				April 2023
Lega	Improving ANC 1	48%	75%	
Lumamie	Improving ANC 4	60%	85%	
Shebla	Improving ANC 1	55%	90%	
Tsid Mariam	Improving model HH	11%	85%	
Wojel	Improving ANC 4	65%	85%	
Yesenbet	Improving ANC 4	50%	85%	
Gimbichu				March 2023
Areda	Improving skill delivery	48%	90%	
Chefe Donsa	Improving LAFP	25%	85%	
Dobe	Improving early ANC 1	32%	85%	
Goro Tigre	Improving early ANC 1	25%	85%	
Koka	Improving early ANC 1	28%	70%	
Areda	Improving skill delivery	48%	90%	

Annex 3: Major activities undertaken for awarding digitally enabled PBI

Major Activities	Specific Activities	Year III		
		Plan	Performance	Achievement %
Develop PBI Implementation Guide	Developed a PBI guide that will be used by the health system	1	1	100
Co-design workshops	One co-design workshop was conducted in each woreda involving implementers from the woreda, HCs, and HPs on digitally enabled PBI interventions and implementation approaches. For the list of items selected during the co-design workshop and HCD, see Annex III	3	3	100
Training	• Training on digitally enabled PBI interventions for HEWs and supervisors from HCs and woreda • Training on Focal Person Applications for supervisors from HCs and woreda	3	3	100
Setting performance standards and measurement	Set KPIs for measuring HP performance	6	6	100
	Set KPIs for measuring the performance of HEWs	10	10	100
	Set KPIs measuring the performance of HEW supervisors in availing needed support	6	6	100
Establish a Performance Verification Team at PBI implementing HC (HC) and woredas	Established an HC performance verification team at each PBI implementing HC	15	15	100
	Established a Woreda-level performance verification team at each PBI implementing woreda level	3	3	100
Determine the Incentive types through co-design workshops with HP and HC beneficiaries	Conducted codesign workshop and HCD insights	3	3	100
	Identified performance-based incentives (Monetary and non-monetary)	3	3	100%
	Selected Performance-based incentives to incentivize top performers	3	3	100%
Develop a formula to determine eligibility for PBI	Identified potential data sources to determine eligibility i.e HEW, focal person, Referral eCHIS applications, and dashboard	4	3	75%
	Calculated the performance of the HPs against their targets and weighting the KPIs based on the agreed weighting scale.	6	5	83%
	- Calculated the performance of individual HEWs against their targets and the absolute count of service the HEWs provided - Weighted the KPIs based on the agreed	10	9	90%

	weighting scale			
	- Calculated the performance of the HCs against their targets - Weighted the KPIs based on the agreed weighting scale	6	6	100%
Provide Performance-based Incentives for top-performing HEWs, HPs, and HCs in the 3 PBI woreda	Provided performance-based incentives for the top 3 HPs	9	9	100%
	Provided performance-based incentives for HEWs in the top 3 HPs	18	18	100%
	Provided performance-based incentives for top 3 individual HEWs	9	9	100%
	Provided performance-based incentives for top 3 HC supervisors	9	9	100%

Annex 4: Adaptations of PBI implementation strategies

Strategy	Reasons for change	What changes are introduced
Improving access to high-performance and capacity tablets, internet connectivity, and power	Poor performance tablets, limited internet connectivity, and lack of electric power for charging tablets affected digitally enabled PBI intervention and implementation. Distributing high-spec tablets, Wi-Fi and PV solar can resolve these constraints and can ensure consistent use of eCHIS for service provision, registration, and incentivization.	The change is a drift from the initial protocol, • JSI distributed high-spec tablets, wifi internet access, and solar power sources (JSI) (JSI was not responsive to do so) • The existing tablets can be re-distributed to the HC supervisors in consultation with woreda, HC, and zone office • Regular monitoring and troubleshooting of tablets by HC supervisors o Remote support through phone calls and using a telegram channel o Enhancing tablet functionality by clearing unnecessary files/documents from the tablets until newly procured tablets are distributed • Resolving issues on machine-to-machine sim cards in consultation with MOH and responsible bodies
Digital Supportive Supervision and mentorship	Poor fidelity in implementing digital supportive supervision and mentorship. It lacked consistency, regularity and the supervisory team often failed to use the integrated supportive supervision and mentorship checklist on the FPA	• The HC teams should provide mentorship and supervisory support regularly every month • Mentorship and supportive supervision should be conducted using the FPA all the time • Supervisors should master using the FPA through training, remote phone support, and using a telegram channel for sharing experiences and use it as a collaborative learning platform o Although the supervision is conducted as a team, only the supervisor should fill out the supervisory checklist, task follow, and submit the form on the FPA • Use the mentorship and supervision data from the FPA to make decisions and lobby the HC and woreda to avail missing essential drugs, medical equipment, and technical support • The supervision session which is a budgeted activity can also be used as an opportunity to provide mentorship support (technical and troubleshooting support) • The supervisors should use the FPA as a primary system for providing supervision, task follow-up, mentorship, and troubleshooting support

eCHIS usage for service provision and referral	There have been problems affecting eCHIS use for service provision and referral. Some HC supervisors did not receive training on the referral app (basic eCHIS), some did not have tablets and for some the eCHIS referral application did not work properly. Due to competing priorities, frequent campaigns, tablet dysfunction, competency gaps, and the early eCHIS release having limited HEP modules affected eCHIS use for service provision and referral	Improving fidelity and consistency Maximizing tablet use at the HC level (sharing tablets, developing guide) • Ensure provision of continuous feedback for referred cases (HC supervisor can consider phone communication with HEWs when needed) • Enable HEWs to consistently attend action card • Provide brief mentorship support to HEWs who have challenges resolving action cards and those who have a problem using referral applications during woreda-level review meetings and the monthly review meeting at the HCs
Digital target setting	To Improve KPIs and HEWs performance	Improving fidelity and tailoring to the local context • All HEWs and HC supervisors should have good knowledge of KPIs and PBI (they should discuss the KPIs at the HPs, HCs, and woredas using available opportunities) • The HC supervisors should involve the HEWs in setting KPI targets for the HPs • The HEWs should know the monthly and annual KPIs target for HEWs and HPs • The JSI office prepared and distributed a standard KPIs target monitoring chart for all PM and PBI implementing HCs and HPs • The KPI target monitoring sheet should be mounted on the wall at the HPs and HC • Monthly, quarterly, bi-annual, and annual performance should be filled out by the HEWs and supervisors regularly on the monitoring chart
Data use for decision	• HEWs and supervisors did not use eCHIS data and data from the FPA to the desired level for HMIS reporting and informed decisions. • The eCHIS does not capture out-off-catchment service • Discrepancies in population registered on the eCHIS and the one estimated by the Central Statistical Agency • Lack of knowledge that the eCHIS has a reporting module • The eCHIS does not have all the HEP modulesAll these make the data registered on CHIS much higher than the one registered on eCHIS. These have limited the use of eCHIS to be used for HMIS	Consistency/fidelity in implementation Provide training for HEWs on the newly released eCHIS (which contains all the HEP modules) Update the HEWs on the current eCHIS version that has the HMIS report-generating feature Encourage the HC to use eCHIS data for triangulation. Based on the findings advise the HPs to improve data quality and minimize report discrepancy b/n CHIS and eCHIS •The zone coordinator has been made responsible for tracking FPA usage regularly, communicating with supervisors not using it regularly, and providing remote support through phone and telegram.

	reporting by the HEWs and HC heads.	
Quality improvement (QI) project	QI approach is primarily for addressing a single priority problem at a time to improve performance at the HC level. Since the study focus is on improving performance at HPs and HEWs level and for all the selected KPIs, the classic QI approach did not work. This called for adapting to make it a performance improvement project focusing on improving HEWs and HPs performance on the selected KPIs	Tailoring to context • • At the HP level the QI needs to be adapted to the PI project • The HC team should have at least one of their QI projects be among the HP KPIs • One HEWs from each HP should be a member of their catchment HC QI project The HEWs should work equally to improve all KPs • For the sake of maximizing resources, the HC QI project meeting involving HEWs can be conducted along with the HC PRM