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MINISTRY OF HEALTH - ETHIOPIA

JSI

DORIS DUKE
CHARITABLE FOUNDATION

ETHIOPIA DUP | DATA USE PARTNERSHIP

Doris Duke Charitable Foundation Supported Activity Summary Report

March 2024

Doris Duke Charitable Foundation
Supported Activity Summary Report

Contents

Acknowledgment

The Ethiopia JSI-Data Use Partnership (DUP) would like to express its gratitude to the Ethiopian Ministry of Health and its structures at all levels for their leadership and close collaboration over the past five years. We extend our sincere thanks to local universities without whom these massive accomplishments wouldn't have been possible. Our heartfelt appreciation also goes to the Bill & Melinda Gates Foundation (BMGF) and DDCF for their generous financial support that facilitated project implementation. We also acknowledge the tireless dedication of project staff who provided expertise and technical support that were crucial to achieve quality outcomes for the project.

Acronyms

AAU	Addis Ababa University
ARM	Annual Review Meeting
AHI	African Health Initiative
BMGF	Bill & Melinda Gates Foundation
CBMP	Capacity Building and Mentorship Program
CHIS	Community Health Information System
DDCF	Doris Duke Charitable Foundation
DHIS2	District Health Information software, version 2
DUP	Data Use Partnership
eCHIS	Electronic Community Health Information System
EMR	Electronic Medical record
ESV-ICD-11	Ethiopian Simplified Version International Classification of Disease 11
HCPs	Healthcare Providers
HIS	Health Information System
HIT	Health Information Technology
HMIS	Health Management Information System
HRIS	Human Resource Information System
HSTP	Health Sector Transformation Plan
HrU	Haramaya University
ZHD	Zonal Health Department
HU-CSH	Hawassa University College of Health Sciences
IR	Information Revolution
JU	Jimma University
JSI	JSI Research & Training Institute, Inc.
KM	Knowledge Management
LMICs	Low-and Middle-Income Countries
LQAS	Lot Quality Assurance System
M & E	Monitoring and Evaluation
MCH	Maternal and Child Health
MOH	Ministry of Health
MRU	Medical Record Unit
PBLA	Problem-Based Learning Approach
PMT	Performance Monitoring
PRISM	Performance of Routine Information System management
QIP	Quality Improvement Project
RHB	Regional Health Bureau
UHC	Universal Health Coverage
UoG	University of Gondar
WOrHOS	Woreda Health Office

Message from the director

Dear reader,

Over the past six years, JSI's Data Use Partnership (DUP) project, with financial backing from the BMGF and supplementary grant from the DDCF, has made significant strides in enhancing Ethiopia's Health Information System (HIS) performance. Our efforts have focused on instilling a culture of generating and utilizing quality health information for decision-making purposes. Specifically, during the initial phase of the project from November 2016 to February 2023, we collaborated with the Ministry of Health and Regional Health Bureaus to successfully implement the Information Revolution (IR) agenda. This national strategic initiative aims to transform health information collection, management, and utilization to facilitate improved decision-making through the use of quality data.

In the realm of healthcare, data transcends mere numbers. While this sentiment may sound like a cliché, its profound truth becomes evident when we recognize its invaluable role in saving lives. Health data becomes truly priceless when used effectively and consistently. With this understanding in mind, we have placed considerable emphasis and investment in strengthening health systems and infrastructure. Reflecting on our journey, we take pride in fostering awareness regarding the critical importance of utilizing quality data for informed action.

Our support has encompassed various areas, including the digitization of health information tools, transformation of information use culture, and the development and implementation of HIS governance and structure. Not only have we standardized procedures and practices across the country's health system, but we have also unified and integrated the national health data management system, thereby facilitating easy accessibility and exchange of data. Witnessing health leaders and workers accessing vital data for decision-making on their smartphones and tablets has been particularly gratifying.

At JSI's DUP, we are deeply mindful of not only what our interventions entail but also how they are delivered. We recognize that sustainable program outcomes require participatory and engaging implementation approaches. Therefore, our implementation strategy focuses on building local capacity that can independently design, plan, execute, and manage HIS interventions. Central to our initiative are principles of ensuring country ownership and accountability, fostering innovative and strategic changes, and promoting inclusive and collaborative engagement.

In this DDCF supported program end report, you will find a summary of our efforts and contributions in transforming information use culture, advancing digital health initiatives, enhancing HIS governance and structure, and monitoring and evaluating the IR agenda. It is my pleasure to extend a warm invitation for you to delve into this document and discover how we operate. I also encourage you to reach out to any member of our staff to deepen your understanding of our work and engagement areas. I am confident that you will find valuable and adaptable lessons both within this report and through conversations with our experts.

Wubshet Denboba
DUP, JSI, Project Director
Addis Ababa, Ethiopia

Executive summary

National health information systems (HIS) are vital in supporting all aspects of managing health systems, financing, policymaking, and service delivery. An effective HIS contributes directly and indirectly to improving health service quality, efficiency, effectiveness, and accelerating the achievement of universal health coverage (UHC). In support of the African Health Initiative (AHI), the Doris Duke Charitable Foundation (DDCF) provided grants to Ethiopia through the Ethiopia Data Use Partnership (DUP), implemented by JSI. AHI aims to promote the development of government-led health learning platforms in Sub-Saharan Africa, drawing on implementation research to help build resilient health systems.

DDCF funding objectives included enhancing the capacity of universities to train advanced health information technicians (HITs) and providing research grants for master's and PhD students to conduct implementation research to strengthen the HIS. Furthermore, the funding also aims to improve the capacity of stakeholders, including Ministry of Health (MOH) staff, regional health bureaus (RHBs), and local universities, to conduct implementation research to inform and enhance health information system and health program policy and performance. Through this support, the project improved human capacities through pre-service, in-service, and advanced standing training, which has contributed to the strengthening of the HIS. Local universities, MOH, and the Ministry of Education developed nationally harmonized bachelor and advanced standing curricula for HIT, data science, and health informatics master's programs, which are being implemented in all public universities. Moreover, this program has resulted in a significant number of skilled professionals ready to join the health system, bolstering the health workforce. More than 4,164 health professionals obtained in-service training, contributing to improved HIS in the country.

DDCF, in collaboration with Capacity Building and Mentorship Program (CBMP) universities, RHBs, zonal health departments (ZHD), and health facilities, spearheaded a significant initiative to create model sites for implementing effective HIS solutions. A variety of approaches are implemented to create demonstration sites, including capacity-building in-service trainings, mentorship, supportive supervision, resource mobilization, HIS-specific review meetings, and renovation of medical record units. With this support, 53 health facilities were supported of which 78% became models, 16% were high candidates, and 6% were low candidates with no emerging facility. Similarly, health data quality and an information use culture have significantly improved across intervention sites. DDCF-funded support also focused on building the capacity of MOH staff and stakeholders to conduct implementation science research, supporting operational, implementation science, and postgraduate student research. Through this effort, staff from MOH, RHB, ZHD, and health facilities obtained capacity-building training and can conduct research, including embedded implementation research. More than 142 research studies were supported and 88 manuscripts were published in reputable journals.

Finally, DDCF supported the documentation and dissemination of best practices produced during the project period. The project produced more than ten documented best practices that are scalable to other areas. These learnings were disseminated through presentations and participation at various national and international conferences.

1. Background

1.1. Introduction

National health information systems (HIS) are vital in supporting all aspects of managing health systems, financing, policymaking, and service delivery and a national asset that enhances health system performance. An effective HIS contributes directly and indirectly to the improvement of health services quality, efficiency and effectiveness, and to acceleration of universal health coverage (UHC). Cognizant of this, the Ethiopian Ministry of Health (MOH) developed the Information Revolution (IR), as a key transformational agenda in the first and second Health Sector Transformation Plans (HSTP 1 & 2) (1). The IR initiative aims to revolutionize data information management and bring about a cultural shift in how information is perceived and used (1, 2).

Zegenework Sileshi, HIT Worker Recording Tofik Asanti's Data , at Dilchora referral hospital in Dire Dawa

The MOH has demonstrated a strong interest in investing in the health system by strengthening the IR. However, there has been a lack of adequate funding to realize these initiatives and support the government's efforts to test strategies and gather evidence on effective health service delivery through HIS strengthening. To advance the country's healthcare through the IR, the MOH, in collaboration with the JSI, established the Ethiopia Data Use Partnership (DUP) as an engagement mechanism to garner further commitment and support. Additionally, the MOH devised another HIS implementation strategy, the Capacity Building and Mentorship Program (CBMP) (3), an innovative and collaborative initiative implemented jointly among DUP, MOH, RHBs, and local universities to create model sites for implementing effective HIS solutions.

The Doris Duke Charitable Foundation (DDCF) launched the African Health Initiative (AHI) to catalyze significant advances in strengthening health systems by promoting the development of government-led health learning platforms in Sub-Saharan Africa, drawing on implementation research to help build resilient health systems. The AHI seeks to foster significant progress in strengthening health systems by supporting partnerships that design, implement, and evaluate large-scale models of care. These models will connect implementation research and workforce training directly to the delivery of integrated primary healthcare in sub-Saharan Africa.

Within the context of the CBMP, DDCF's funding to Ethiopia has been focused on strengthening national capacity to use data and conduct implementation research on new, innovative mechanisms and examine how routine data can improve programs and policies, as well as influence service delivery and health outcomes. The objectives included enhancing the capacity of universities to train advanced health information technicians (HITs) and providing master's and PhD students research grants to conduct implementation research that contributes to the strengthening of the HIS. It also aimed to improve the capacity of stakeholders, including staff from the MOH, RHB, and local universities, to conduct implementation research in order to inform and enhance HIS and health program policy and performance. Lastly, the funding strived to establish demonstration sites; identify relevant and effective critical data use solutions; accelerate their introduction, adoption, and scale-up; and document and explore the pathway leading from increased utilization of quality data to improved service delivery and health outcomes.

In collaboration with the MOH, DUP centrally coordinated and managed priority setting, planning, implementation, and monitoring of activities. Aligned with the CBMP implementation modality, six universities — Addis Ababa University, Haramaya University, Hawassa University, Jimma University, Mekelle University, and the University of Gondar— provided technical assistance to support the RHBs and woredas in creating model health facilities through integrating capacity-building and digital tools to enhance data quality and use for decision-making at the administrative unit and health service levels. This report highlights the significant milestones accomplished with DDCF's support during the project's implementation period from 2018 to 2023.

1.2. Report organization

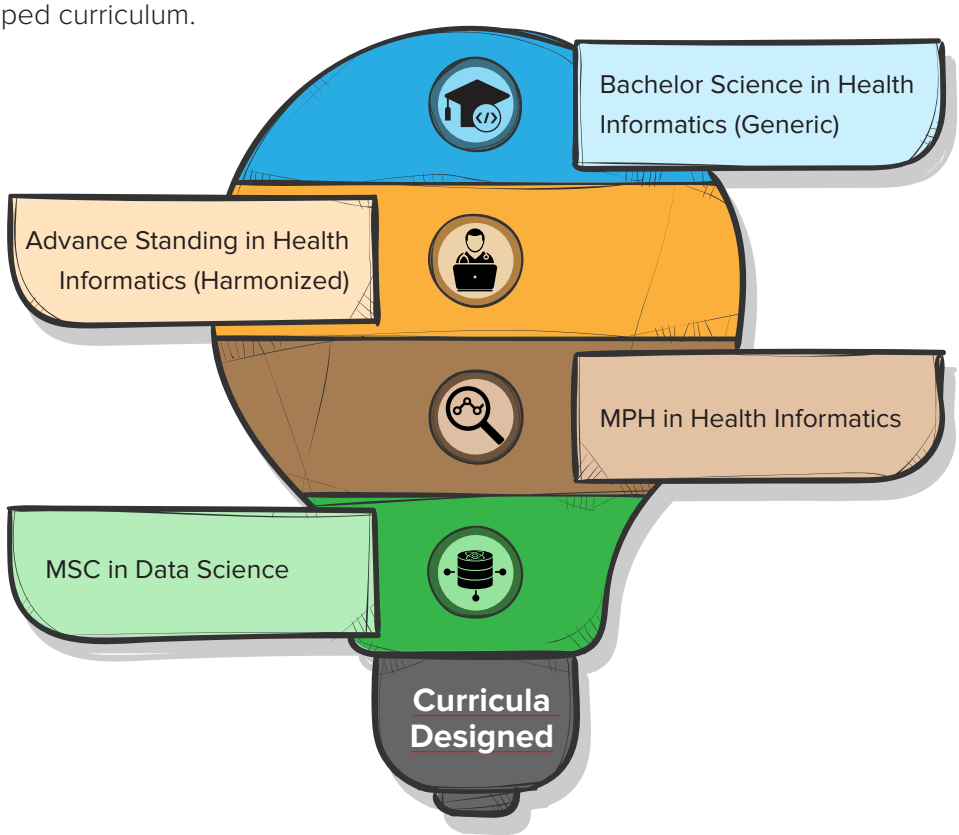
The report uses various data sources such as annual reports from DUP, universities, and RHBs from the last five years. It is divided into six major sections: (1) background; (2) human resource capacity building in HIS through pre-service training; (3) creating model districts; (4) health systems research; (5) documentation and dissemination; and (6) conclusion and key lessons.

2. Human Resource Capacity Building in Health Information Systems through Pre-service Training

Health care providers (HCPs) play a crucial role in implementing health interventions, with responsibilities including patient care documentation and data management. However, concerns have arisen regarding the skills and competencies of HCPs in handling data due to uncertainties about training curricula and delivery platform (4). To improve the quality and usage of health care data, it is essential to develop suitable capacity building programs for professionals (5). In this regard, the DDCF provided support to strengthen Ethiopia's HIS. This support included the development of human resources through pre-service training, such as creating curricula and course materials, integrating HIS courses into other health sciences curricula, expanding health information technology (HIT) advanced standing programs, and supporting master's (MSC) and PhD programs.

2.1. Curricula Preparation and Program Expansion

Strong pre-service training is critical for producing skilled health care workers, particularly in the field of HIT. To achieve this, it is necessary to standardize curricula, course materials, and expand advance standing and generic HIT programs. In support of this objective, DUP funded by DDCF, has been assisting the MOH and local public universities in developing nationally standardized and harmonized generic curricula for bachelor-level, post-basic, and master's level studies in health informatics and data sciences. In collaboration with CBMP universities, the University of Gondar and DUP revised and enhanced the HIT bachelor's degree and post-basic curriculum studies. Moreover, DDCF supported CBMP universities, MOH, and MOE to standardized and summarized previously delivered courses. With this support eight modules were prepared and endorsed. Additionally, Addis Ababa University developed the data science and health informatics curricula, along with approximately 24 course syllabuses to facilitate their implementation. Currently, eight universities — Gondar, Metu, Mekelle, Haramaya, Debre Markos, Arba Minch University, and Minilik Health Science College — adopted the newly developed curriculum.



Huda Mohammed, A Health Worker at Amir Nur Health Center in Harar City of Harari region

The program expansion focused on upgrading the skills of current diploma-level HIT staff who work at different levels of the health system. To support this effort, DDCF provided financial and technical support to CBMP universities to implement the programs and improve the HIS of the country. Currently, all CBMP universities are involved in harmonizing the post-basic curriculum and offering advanced standing programs. Throughout the project period, a significant number of students have graduated and been dispatched to the healthcare system.

Modules developed and approved

- Introduction to health informatics
- eHEALTH
- Data quality and information use
- Health data analytics
- Health operation
- Health programs
- Routine health information system- I
- Routine health information system- II

2.2. Innovation Laboratories to Support Ideation

DDCF has also supported the establishment of over ten different computer laboratories and excellence centers to ensure that HITs receive high-quality training and can build their capacity in the health sector. Centers of excellence are also used as demonstration and learning sites for the Connected Woreda program. DDCF funding provided the necessary materials and equipment to furnish these spaces, including 150 tablets, 300 chairs, 290 desktop computers, ten LCD projectors, and local area network supplies. Through these learning labs, the University of Gondar and Jimma University established the DHIS2 academy and electronic community health information system (eCHIS) centers, respectively, that serve the entire country and offer numerous national and international training sessions for HIT professionals. This investment has had a significant impact on IR implementation.

Innovation labs are an approach that follows a human-centered design (HCD) process to collaborative problem solving and breakthrough innovation, which is increasingly used in both the private and public sectors. These labs are created in Ethiopia to bring different perspectives and people together in order to co-create solutions to persistent data use challenges, refine those solutions through prototyping and demonstration projects, and then create routes for scaling their impact to all regions of the country.

2.3. MSc and PhD Students Research Support

DDCF believes that supporting MSc and PhD programs in HIS is vital to enriching the capacity of the workforce, which is needed to achieve and sustain the country's HIS objectives. This support was primarily intended to capacitate staff from the MOH, RHBs, and ZHDs and aimed to provide students with an opportunity to apply the scientific research methods learned in the classroom and document their learning from IR initiatives. Students were required to be enrolled in formal university academic programs and interested in conducting research in HIS.

Zenash Genebo, a HEW, Checking Up Terefech Mengesha's Baby at the Dila Afarara HP in the Shebedino district, Sidama.

Some of the Ph.D. and Master graduates were assigned in key leadership positions at MOH, and RHBs. For instance, Dr. Moges Assresie (Ph.D.) served as PPD director at Amhara RHB, Dr. Zeleke Abebaw (Ph.D.) worked for MOH's Policy, Strategy, and Research LEO, after they obtained their Ph.D. with DDCF research support.

The DDCF grant provided support for master's and doctoral students in selected universities to conduct research, gain knowledge, and generate scientific evidence related to HIS. It provided academic grants that allowed master's and PhD students to conduct HIS research and intended to strengthen the capacity of MOH, RHB, and other levels of the health system.

Tesfaye Beyene, Head of Shebedino District Health Office in the Sidama Regional State

During the project period, DDCF funded research of 76 master's students and 11 PhD students, with a total of 87 students. Fifty-two students have completed their study and defended their thesis. Out of 52students, 31 students (60%) published their papers in reputable scientific journals (Table 1).

Table 1: MSC and Ph.D. Students Research Work Supported

CBMP Universities	MSC	Ph.D.	Total	Thesis defended	Total paper produced	Total papers published
AAU	11	2	13	9	9	4
Haromaya University	15	0	15	9	9	5
Hawassa University	14	2	16	12	12	3
Jimma University	8	1	9	7	7	3
Mekelle University	8	0	8		0	0
University of Gondar	20	6	26	22	22	16
Total	**76**	**11**	**87**	**52**	**52**	**31**

3. Creating Demonstration Site

DDCF in collaboration with CBMP universities, RHB, ZHD, and facilities undertook a significant initiative to create model sites for the implementation of effective HIS solutions for critical data usage.

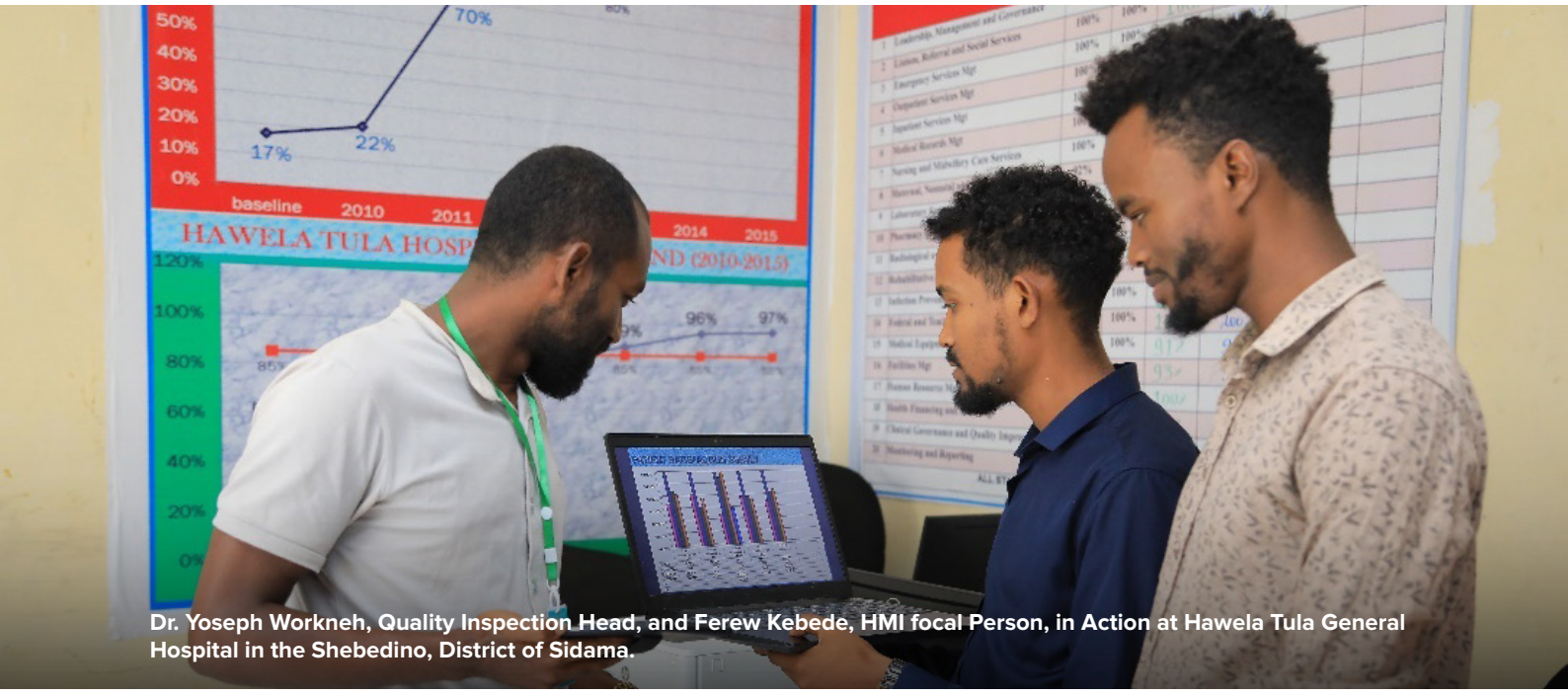
3.1. Objective, approach, coverage

Through the creation of model woredas, DDCF played a crucial role in operationalizing the IR agenda. DDCF funding supported CBMP universities, MOH, RHB, ZHD, and local facilities to bring the vision of a connected woreda strategy to fruition. It also enabled DUP to make a considerable contribution in ideation, strategy development, socialization, training, measurement tool development, subsequent monitoring, documentation of best practices, and sharing of experiences.

Major strategies or approaches used

- In-service capacity building training
- Mentorship and coaching
- Supportive supervision
- Resource mobilization
- Experience sharing
- Review Meetings
- Renovation of medical Units

The main purpose of creating a demonstration site in each CBMP-supported location was to establish a connected woreda that would enable the testing, demonstration, and dissemination of data use innovations. To create demonstration sites, a combination of multiple approaches and tailored interventions were designed and implemented by CBMP universities, MOH, RHBs, ZHDs, and health facilities. Interventions included capacity-building in-service training, mentorship, supportive supervision, resource mobilization, HIS-specific review meetings, and renovation of medical units, among others.



Dr. Yoseph Workneh, Quality Inspection Head, and Ferew Kebede, HMI focal Person, in Action at Hawela Tula General Hospital in the Shebedino, District of Sidama.

DDCF funding supported 11 woredas across all regions in Ethiopia. The project offered intensive technical and financial assistance to 53 healthcare facilities in these regions. When the project began in 2018, 61% of the selected facilities were emerging, 23% were low candidates, and 15% were high candidates with no model facility. However, upon completion of the project in 2023, 78% of the 53 facilities had achieved model status, 16% were high candidates, 6% were low candidates, and notably, none were emerging (Figure 1).

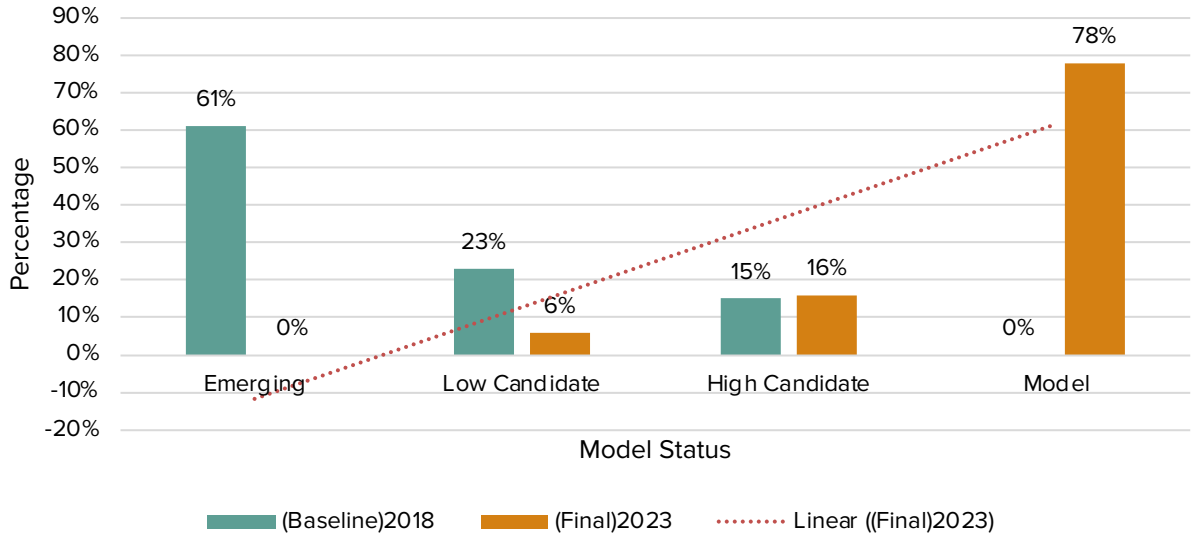


Figure 1: IR pathway progress status for DDCF-supported health institutions during baseline and endline

3.2. In-service Trainings

CBMP universities utilized DDCF funding to provide hands-on capacity building in-service training to professionals from MOH, RHBs, ZHDs, and local health facilities. Over 4,164 health professionals, managers, and others received a range of trainings that included local experience sharing, DHIS2, e-CHIS, HIS leadership, strategic problem-solving and analysis, revised HMIS, Quality Improvement Project (QI), Ethiopian simplified version of ICD-11 (ESV-ICD-11), IR implementation guideline, training on SMART care, clinical audit, data recording and reporting, data analysis and report write-up, operationalizing PMT functionality, HIS sustainability, practice-based learning approach (PBLA), HRIS, and basic computer maintenance and troubleshooting (Table 1).

Major training

01	02	03	04	05	06	07
DHIS2, e-CHIS, HIS leadership	Strategic problem-solving and analysis	Revised HMIS, QI projects, ESV-ICD-11	SMART care	Clinical Audit	HIS sustainability	PBLA, HRIS

Table 2: Number of Inservice training beneficiaries through the project period.

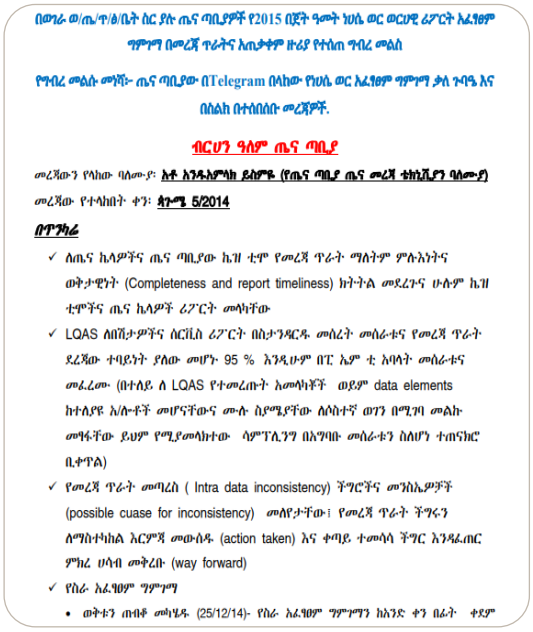
Sr. N	Partner University	Sex		# of beneficiaries from the training
		Male	Female	
1	AAU	485	535	1020
2	Haromaya University	253	172	425
3	Hawassa University			1061
4	Jimma University			119
5	Mekelle University	186	145	331
6	University of Gondar	697	511	1208
7	**Total**			**4,164**

3.3. Mentorship and Coaching

CBMP universities implement customized mentorship and coaching strategies to enhance the success of HIS strategies in the healthcare facilities. These approaches not only build the capacities of HIS staff, but also foster a better relationship among health professionals, HITs, program personnel, and academicians. Mentorship and coaching that involve an experienced mentor guiding a mentee in personal and professional development was integral to the process of improving and sustaining health service delivery systems.

The mentorship and coaching strategies were tailored to address specific problems that were identified during the baseline assessment. Quarterly and monthly mentorship and coaching sessions were provided, and the activities involved include assigning experienced mentors to each site and conducting baseline assessments to identify problems and their root causes. From there, joint action plans were created to solve these problems at the facility level. All activities were documented and shared with the local leadership to ensure accountability and sustain the changes made.

Considering local and regional conditions, CBMP universities have utilized various models of mentorship, including university-led mentorship, woreda-led mentorship, cluster mentorship, and remote or virtual mentorship. The university-led model involves the university providing mentorship, while RHB, ZHDs, and Woreda Health offices (WOrHO) collaborate to implement. In the woreda-led mentorship approach, the WOrHO conducts the mentorship independently. Under the cluster mentorship approach, high-performing health facilities choose staff to mentor other health facilities in their assigned cluster. Additionally, virtual or remote mentoring is an effective method to remotely address challenges faced by the health facilities and WOrHOs. This type of mentorship includes attending Performance Monitoring Team (PMT) meetings through conference calls using the mobile phones of university mentors.



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DUP played a crucial role in bringing this idea to fruition, implementing it harmoniously, and providing financial and technical support. During the project period, over 233 coaching and mentorship sessions were conducted at health facilities. These mentorship and coaching sessions facilitated the transfer of knowledge between academia and health system experts, fostered multidisciplinary team involvement, increased responsibility sharing to achieve the IR agenda, and improved health outcomes.

These mentorship and coaching sessions were extended to supplement the digitization efforts of the country, mainly in terms of tablet use policy development, troubleshooting, and maintenance, strengthening primary healthcare unit (PHCU) linkage, and providing written feedback by accessing the eCHIS dashboard among others.

3.4. Monitoring and learning (supportive supervision, review meetings, IR assessment, and, experience sharing)

Monitoring and learning through supportive supervision, review meetings, IR assessment, and experience sharing are examples of some of the activities carried out by CBMP universities through DDCF funding. In addition to mentorship and coaching, supportive supervision of health facilities was implemented in all facilities under the CBMP universities.

Supportive supervision is important in enhancing the capabilities of health workers involved in HIS. This helps them gain the necessary skills and knowledge to effectively use the system, enter data accurately, and interpret information for decision-making. DDCF's financial and technical support to CBMP universities was very important in achieving the intended objectives of health facilities. Several supportive supervision sessions in collaboration with CBMP universities, RHBs, ZHDs, and local facilities were implemented throughout the project period.

Serkalem Tesfaye, a HEW, Entering a Neonatal Information to eCHIS at Gusha Temela Health Post in Arsi Zone of Oromia.

During the CBMP project period, universities and local facilities used review meetings and experience sharing as an additional means to monitor and enhance the implementation of HIS agendas. Review meetings helped to assess the progress of HIS implementation against the set objectives. These meetings allowed different stakeholders, including CBMP universities, RHBs, ZHDs, and local facilities, to identify challenges and provide solutions.

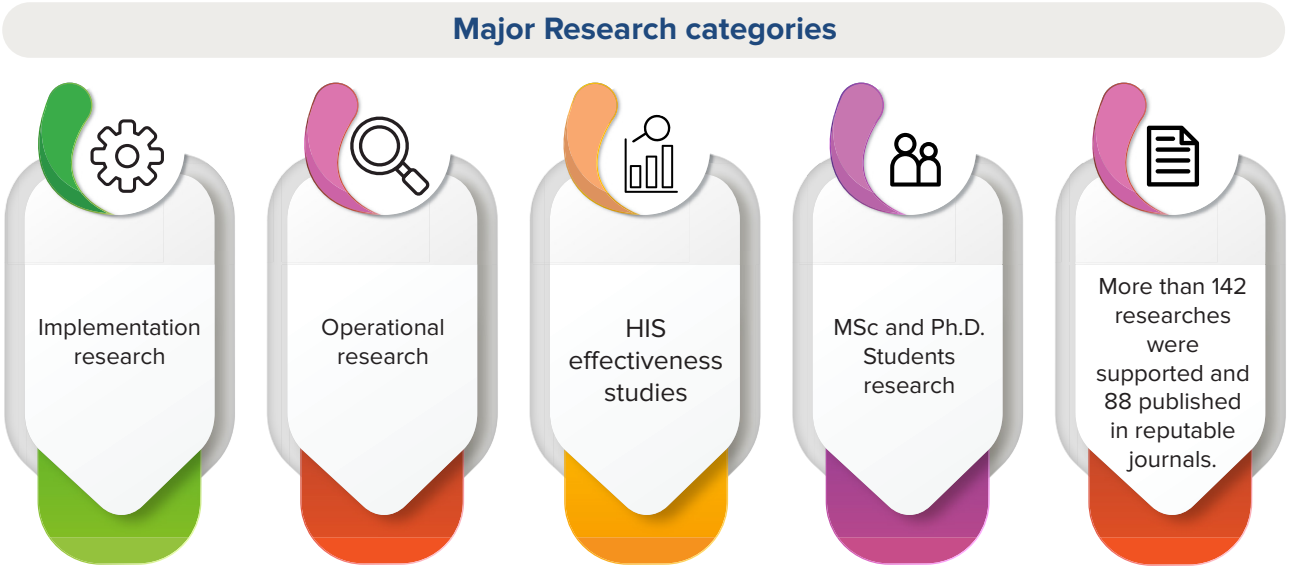
Experience sharing and review meetings also provided a platform for participants to discuss challenges encountered during the implementation of various interventions. This collaborative approach helped identify common issues, understand their root cause, and develop strategies to overcome them. Multiple types of experience sharing and review meetings were conducted by the CBMP universities with DDCF financial support. These initiatives helped share knowledge and scale up interventions to other areas. Throughout the DDCF project period, CBMP universities conducted 113 supportive supervisions, 78 review meetings, 79 IR assessments, and 18 experience sharing sessions (Table 3).

Table 3: number of supportive supervisions, review meetings, and experience sharing provided

Sr. N	Name of University	# Of Supportive Supervision	# Of review meetings	#Of IR assessment	# Experience sharing	# Of produced district health profiles
1	AAU	20	6	20	1	-
2	Haromaya University	14	8	18	4	-
3	Hawassa University	24	24	-	4	-
4	Jimma University	14	21		3	-
5	Mekelle University	8	3	1	2	-
6	University of Gondar	33	16	40	4	2
7	**Total**	**113**	**78**	**79**	**18**	**2**

4. Health Systems Research

A pillar of the DDCF project was the deliberate and strategic investment in building the capacity of researchers and implementers to contribute to and benefit from implementation research. To support this, DDCF allocated a significant budget towards research and learning to support HIS-related activities with scientific evidence. As a result, DDCF generated evidence, documentation, and publications of lessons related to implementing HIS interventions using various modalities and engaging key stakeholders, such as the MOH, RHBs, and CBMP universities. DDCF supports multiple types of research and learning, including implementation research, operational research, postgraduate student research, and evaluation of HIS effectiveness.



4.1. Implementation Research

DDCF aims to establish a culture of embedded implementation research to enhance the HIS of Ethiopia and improve health outcomes. This approach involves generating evidence while implementing proven interventions, through the collaboration of university researchers and implementers. To achieve this goal, staff from six CBMP universities, all RHBs, the MOH, and selected woredas were trained to develop, test, and scale up solutions to enhance HIS programs.

DDCF budgeted capacity building training to conduct implementation research in collaboration with different stakeholders. As part of the effort to increase the local pool of researchers, 45 individuals from various organizations such as the MOH, RHBs, local universities, and partners received the master level training on implementation research. After the capacity-building workshops, collaborative research teams consisting of experts from MOH, RHB, the six CBMP universities, and DUP were formed in each region.

The embedded research helped the collaborative research teams deepen their understanding of the barriers faced when programs are implemented in a real-world context and gain experience developing, testing, and scaling up evidence-based solutions to optimize HIS. To link research with policy and strategic decisions, DUP, in collaboration with the six CBMP universities, prepared regional and national policy briefs and organized various dissemination workshops. As a result, 12 implementation research projects were implemented to strengthen HIS by CBMP universities. From this research, more than 39 manuscripts were produced and 23 (59%) were published in reputable journals, and sharing evidence with the global scientific community (Table 4).

Table 4: Number of implementation science research conducted and published

Partner University	# of implementation science research	Number of papers		
		Published	Unpublished	Total
Addis Ababa University	1	4	3	7
Haromaya University	2	5	5	10
Hawassa University	2	2	3	5
Jimma University	2	2	3	5
Mekelle University	2	-	-	-
University of Gondar	2	8	0	8
DUP Head Office	1	2	2	4
Total	**12**	**23**	**16**	**39**

4.2. Operational Research

In addition to implementation research, DUP supported operational research to aid decision-making and generate evidence to improve the implementation of HIS programs. Multiple operational researches were conducted by the multidisciplinary team from DUP, MOH, RHB, and CBMP universities. Some of the synthesized evidence focused on:

- Implementing CHIS in urban areas; factors that drive or hinder the improvement of HIS data quality and use;
- Documented lessons learned and best practices from IR model woredas;
- Ethiopia's journey to unified DHIS2 to strengthen HIS;
- Practical challenges, best practices, lessons learned, and recommendations of health data quality and use in Afar region;
- Health workers' knowledge and skills in HIS that affect the quality and use of routine health facility data in Ethiopia; among others.

Moreover, some of the evidence was translated to policy briefs that enabled decision makers to use evidence for action. Throughout the project period more than 43 operational researches were conducted and out of these 31 (72%) published and shared to the global scientific community through DDCF support.

4.3. HIS Effectiveness Evaluation

DDCF funding not only focused on the implementation of multiple projects, but it also evaluated their effects on the existing HIS, and multiple HIS effectiveness studies were conducted.

DUP collaborated with the MOH to conduct an evaluation study aimed at evaluating changes in HIS structure and resources, data quality, and utilization. Additionally, the study examined the impact of performance coverage of maternal and child health (MCH) services. For the HIS effectiveness study, DUP utilized Performance of Routine Information System Management (PRISM) tools to assess the influence of the CBMP intervention package on HIS performance across selected study sites. The pre-post design involved evaluations at project baseline (2018), midline (2020), and end-line (2022), providing a comprehensive understanding of HIS performance at the health facility level in CBMP woredas and informing refinement of interventions. The assessment revealed improvements in most data quality and data use indicators, leading to enhancements in health service delivery, particularly in MCH and family planning (FP) service utilization (Figure 2 and 3).

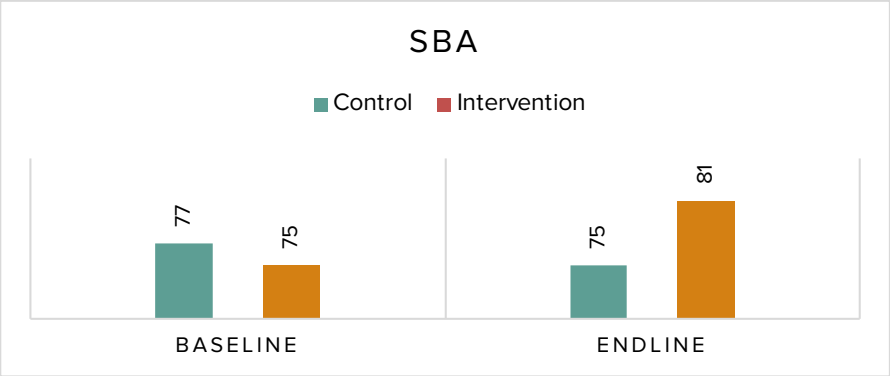
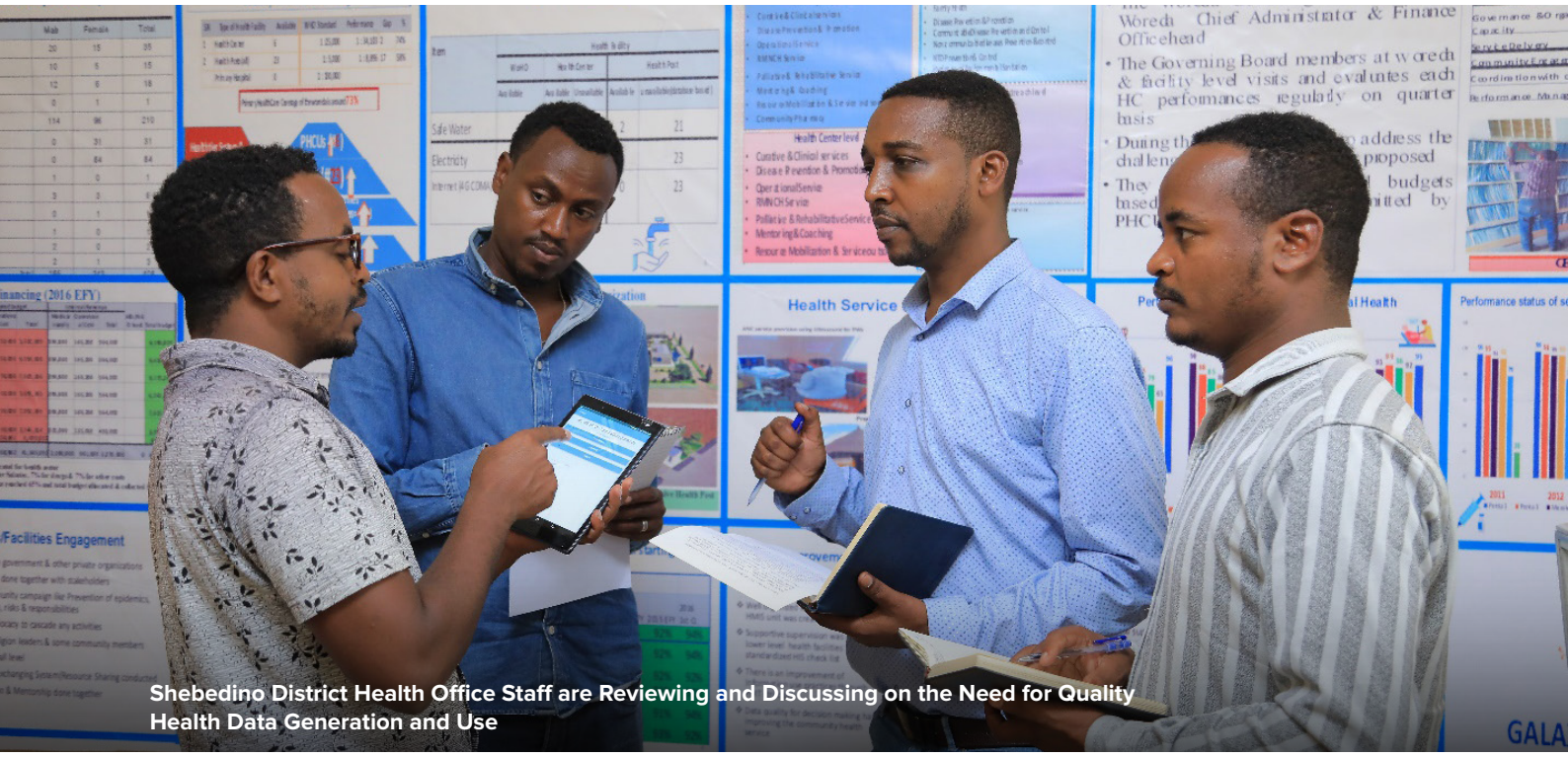


Figure 2: Effect of HIS on Skilled Birth Attendance



Shebedino District Health Office Staff are Reviewing and Discussing on the Need for Quality Health Data Generation and Use

The collaborative efforts between DUP and the MOH, encompassing the HIS effectiveness study and PRISM tool assessment, demonstrated positive outcomes in HIS performance. The interventions implemented across various regions of Ethiopia led to improvements in data quality and utilization indicators, subsequently fostering advancements in MCH and FP service delivery. The findings not only underscored the success of the interventions but also facilitated active learning in the implementation of the IR, highlighting the potential for continued enhancements in health care services.

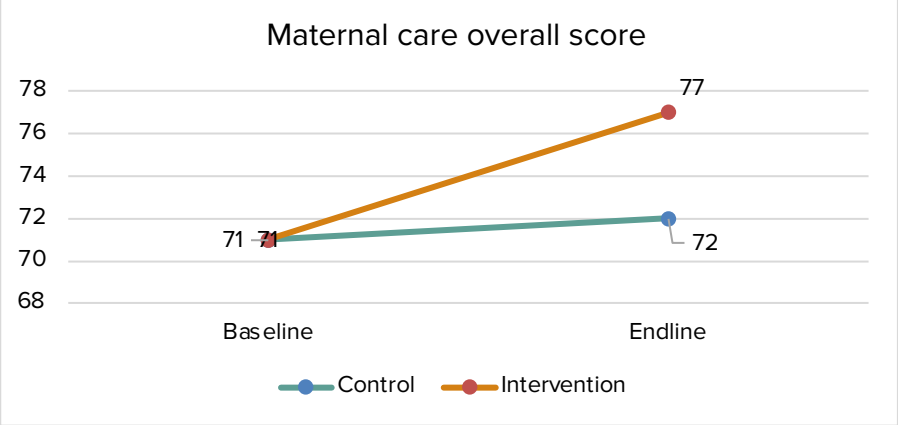


Figure 3: Effect of HIS on overall maternal care

DUP collaborated with the MOH to conduct an evaluation study aimed at evaluating changes in HIS structure and resources, data quality, and utilization. Additionally, the study examined the impact of performance coverage of maternal and child health (MCH) services.

5. Documentation, and Dissemination

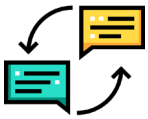
Documentation and dissemination serve as tools and practices for gathering, packaging, and transferring lessons and experiences from one implementation site to others. Within this conceptual framework, DUP ensured lessons were well documented and best practices disseminate widely so they can be adopted and scaled. Additionally, it supported the MOH in documenting, communicating, and disseminating progress and lessons learned from implementing the IR agendas to appropriate stakeholders. The CBMP universities have also been involved in documenting multiple best practices, and critical lessons that must be shared with all stakeholders through appropriate platforms.

5.1. Best practice

Through a supplemental grant from DDCF, the DUP supported CBMP universities in identifying, documenting, and disseminating best practices from their respective implementation sites. This initiative not only promoted their achievements nationally and globally, but also enabled universities to generate valuable lessons that can be replicated across the country's health system.

5.1.1. Summary of Best Practices with Description

1



Empowering Health Post Workers: Bridging Language Gaps Through Amharic Translation of Data Quality Assurance Tool (LQAS)- UOG

Description

The project identified a significant challenge that health posts were not implementing LQAS according to standards due to language barriers with the English version. To overcome this obstacle, the project translated the LQAS tool into Amharic. With the new tool in place, health posts started conducting LQAS as per standards, leading to notable improvements in data quality.

Results

With the introduction of the translated tool, there was a remarkable improvement in the performance of health post IR. All health posts initiated regular assessments of their IR implementation status and promptly submitted performance reports to their cluster health centers.

2

Boosting HIS Performance: Creating an Accountability Framework for Enhanced Performance-UoG

Description

In the absence of an accountability framework for HIS, facilities faced numerous challenges in managing their systems. To address this, the research team from UoG developed and implemented an HIS accountability framework, providing facilities with a structured monitoring and evaluation mechanism.

Results

Enhanced IR Performance: The implementation of the HIS accountability framework led to a significant improvement in health centers' IR performance, with a 25% increase from the baseline. This framework is highly recommended for scalability to other areas within the region and across the country.

3

Engagement of health professionals in Quality Improvement Projects (QIP) (UoG)

Description

Quality improvement projects are a common practice in clinical settings to uphold service standards. Leveraging this experience, the research team raised awareness among health workers about conducting such projects. This initiative has emerged as a key activity among health professionals, significantly enhancing data quality and information utilization.

Results

Improvement in Neonatal Care: At Wogera primary hospital, the incidence of neonatal admission due to high levels of hypothermia decreased significantly from 85% to 17%. This reduction was achieved by lowering the level of hypothermia from 70% to 24% through the engagement of health professionals in quality improvement projects.

4

Role of experience sharing and performance recognition on improving data management, data quality, and information use

Description

Experience sharing, and performance recognition were the main mechanisms to improve data quality and information use in almost all facilities. Thus, this best practice was identified and documented by many of the CBMP universities.

Results

This helps facilities to increase their level of knowledge and skills to achieve data quality and information use. Moreover, continuous and tailored experience sharing and performance recognition should be well documented, contextualized, and transferred to all health facilities.

5 Diffusion Innovation Strategy (HU-CSH)

Description

The study adopts Everett Rogers' Theory of Diffusion of Innovations to explore how innovative practices, like the Focus Group Discussion-Evidence for Change and Results (FGD-ECR) model, are adopted and spread in the Capacity Building and Mentorship Program (CBMP) in newly recruited woredas. It aims to assess how CBMP expands using the diffusion of innovation framework, highlighting the critical role of innovation in improving healthcare quality control, especially in Health Information Systems (HIS). Despite the potential of innovation to enhance HIS quality improvement, the study found that its uptake in CBMP-targeted healthcare settings has been suboptimal.

Using the FGD-ECR model, an augmented FADE model, as the innovation, the study engaged with experienced woreda health offices and HMIS focal persons. Three woredas—Sankura, Wonago, and Shabedino—acted as "diffusing woredas," sharing their FGD-ECR experiences with Hulbareg, Dilla Zuria, and Tula sub-city, respectively. Teams were sent to each diffusing woreda to oversee the transfer of innovations, with assessments conducted before and after to measure the impact.

Results

All 20 healthcare facilities (26 health centers, 3 WOrHOs, and 1 primary hospital) actively participated in the diffusion of the FGD-ECR approach. Pre-intervention assessments revealed that 95% of facilities were considered emerging, 5% were candidates, and none were model facilities. After the diffusion process, emerging facilities decreased to 30%, candidates increased to 60%, and model facilities reached 10%. The results indicate that the diffusion of innovation, specifically the FGD-ECR model, is a promising strategy for scaling up evidence-based interventions. The study successfully diffused the innovation to 50% of the initially targeted woredas, and the post-intervention outcomes show promising results, supporting the continued use of this approach in future implementation.

6 Use of Practice-Based Learning Approach (PBLA): an alternative responsive method for HIS change intervention (HU-CSH)

Description

The Practice-Based Learning Approach (PBLA) offers a hands-on alternative to traditional classroom learning, focusing on practical skills and real-world applications. In Ethiopia's Ministry of Health (MOH), implementing an IR agenda highlighted a gap in ensuring data quality and promoting an information-use culture at health facilities. Previous training approaches faced challenges such as theoretical focus, uncertainty in trainee selection, limited knowledge application, and high costs.

To address these gaps, the PBLA was adopted. Implemented in five CBMP-targeted districts or woredas (Shabedino, Hawela, Aleta Wondo, Wonago, and Sankura), the PBLA focused on one health center per woreda and selected registries (OPD and Emergency unit, FP and ANC, Delivery, PNC). The intervention included pre- and post-assessments using standard mentorship guidelines. This approach aimed to shift from traditional theory-based training and evaluate the effectiveness of PBLA in enhancing data quality and fostering an information-use culture at health facilities.

Results

Before the intervention, the percentage of proper data recording varied across health centers, ranging from 25% to 51%. However, after implementing PBLA, significant improvements were observed, with proper recording increasing from 80.1% to 97.2%. The overall data element recording increased from 40% before intervention to 90.71% after intervention. This improvement was deemed statistically significant (P=0.000). The cost-effectiveness of the PBLA approach in terms of achieving positive change while maintaining lower resource and budget costs was evident.

The findings suggest that the PBLA approach is not only effective and efficient but also cost-effective in inducing positive changes in HIS data quality. Its potential to bring about the intended change makes it a noteworthy example for similar health system activities.

7

FGD-ECR: An Innovative Change Approach towards IR Model Woreda Formation: Experience from Hawassa University CBMP (HU-CSH)

Description

In the initial phases of CBMP implementation in 2019, traditional mentoring, training, and supervision methods were found to be unsatisfactory, prompting the search for an alternative approach. The need for a more effective strategy for creating IR models in woredas became evident as the existing approach failed to deliver expected results. This led to the exploration and testing of an augmented FADE model, particularly the FGD-ECR model (Focus, Gap Analysis, Develop an Action Plan, Execute and Evaluate, Cascading the Change, Recognize and Reward Achievements).

The augmented FADE model, specifically FGD-ECR, aimed to develop IR models for woredas more efficiently and effectively. Shabedino and Hawella were selected as target woredas for creating model health facilities and their administrative units. The intervention involved using the FGD-ECR model, which included steps such as focus, gap analysis, action plan development, execution and evaluation, cascading the change, and recognizing and rewarding achievements. This approach was expected to bring significant improvements to the status of health facilities in the targeted woredas.

Results

The intervention had a significant impact on the health centers. At the beginning of the project, G/Kirsto's and Hawella health centers had an emerging status of 62% and 48%, respectively. However, after the intervention was implemented, their status was transformed into a model facility status of 91% and 94%. The intervention was then extended to other health centers for five weeks, resulting in all remaining eight health centers (100%) in both woredas becoming model facilities. As a result, both woredas were verified as IR model woredas by the Ministry of Health. This approach proved to be more efficient, cost-effective, and promising compared to conventional methods, leading to a recommendation for scaling up the intervention in other CBMP Woredas.

8

Clinical Data Auditing (DQA) embedded in existing forums, AAU

Description

In Lideta sub-city health centers in Addis Ababa there was low data quality practice, including incomplete and untimely data reporting, inconsistency between registers and medical folders, lack of data verification, and a generally low information use culture. The pre-intervention assessment identified gaps in data quality and completeness, highlighting the need for improvement. An intervention conducted in April 2022 aimed to address these issues by embedding clinical data auditing within the existing structure. The intervention involved comprehensive training in data quality audit, followed by four rounds of mentorship, mentor visits, performance discussions, and action plan preparation. Each facility established a Data Quality Audit (DQA) team, which held regular bi-weekly meetings to discuss progress and challenges, producing monthly reports sent to AAU.

Results

The achievements in the post-intervention included remarkable progress in patient card completeness and healthcare providers awareness within a three-month interval. Patient card completeness improved significantly from 72% to 96%. All teams delivered compiled monthly DQA reports to AAU, showcasing well documented meetings on DQA activities in most facilities. The DQA team actively participating in health centers contributing to the improvement of data completeness in various areas. Despite the success, challenges such as workload of the health care providers, less participation during morning sessions, and hesitancy to fill summary sheets were identified during implementation. Overall, the clinical data auditing embedded in existing forums proved to be a best practice, leading to substantial achievements in data quality and completeness.

9

Onsite Training-Mentoring to Improve Data quality (HrU)

Description

The intervention targeted poor health data quality at Jigjiga Wordea Health Office and Somali Regional Health Bureau, addressing issues like weak data recording, compilation, documentation, and reporting. Haramaya University and stakeholders implemented a three-phase intervention: onsite training-mentoring, continuous supervision, and review meetings. The strategy used bottom-up approaches tailored to the local context, involving professionals from Haramaya University, RHB, WOrHO, and Jigjiga University. The intervention engaged health workers from all units in each facility and emphasized collaborative problem-solving to improve data quality for effective decision-making and healthcare improvement.

Results

After the intervention significant improvements were observed, with overall data accuracy increasing from 88.12% to 95.0%, and data content completeness rising from 75.75% to 89.9%. The timeliness of data receiving and sending reached 100% in all facilities. Moreover, the intervention positively impacted the knowledge, attitude, and skills of workers regarding data quality activities.

The success of the intervention was attributed to the proactive engagement of regional and facility heads, which made the implementation process efficient. In this approach, hands-on mentoring and engagement in problem identification, prioritization, intervention, and progress monitoring were facilitated through a shift from hotel-based to facility-based training. This approach was deemed crucial in aligning the intervention with the context of the facilities, fostering a more practical and effective training modality than traditional programs that solely focus on instructing trainees. The key takeaway is that the proactive involvement of leadership, coupled with a shift in training methodology, significantly contributed to the success of the onsite training-mentoring intervention—this improved data accuracy, completeness, and overall data quality in the targeted health facilities.

5.2. Dissemination

It is not enough to simply document best practices — they must also be effectively shared with stakeholders through various forums and channels, including national and global conferences and convenings. Thus, CBMP universities, MOH, RHB, and DUP head offices utilize a range of modalities to disseminate their work and lessons, including the following:

- MOH's Health Sector Annual Review Meetings (ARMs)
- National level HIS review meeting
- National Research Conferences / Association/Universities
- Regional health bureaus HIS annual review meetings
- Open HIE Community Meeting
- Global Digital Health Forum
- Health Systems Research Symposium (HSR)
- African Health Initiative Review Meeting
- Publication through different scientific journals.

Furthermore, local universities, RHBs, and ZHDs utilize local and social media channels to share information. The project gained insights on how effective communication supports the implementation of institutional reform by developing a shared understanding among stakeholders regarding the strategies and guidelines of the transformation agendas. This, in turn, helped to strengthen the implementation capabilities at the lower tiers of the health care system. In addition, the project facilitated the documentation and dissemination of implementation progress and challenges, enabling decision-makers at the bureaus and MOH to take appropriate action.

6. Conclusion and Key Lessons

During the project period, DDCF played a significant role in fostering a robust linkage between the health sector and academia, proving to be beneficial for Ethiopia's overall health system, especially in strengthening its HIS. The project team conducted various multidisciplinary activities aimed at strengthening the country's HIS. DDCF was instrumental in building the capacity of human resources for HIS through pre-service, in-service training, and internship programs, strengthening and enhancing a qualified local workforce.

6.1. Key Lessons

- Academia can serve *beyond teaching:* The engagement of the six local universities and the remarkable performance they showcased proved that academia can serve beyond teaching by linking research with program implementation.
- Working with the universities encouraged local innovations that are sound, applicable and contextually feasible. The likes of a simple way of renovating medical record units, practice-based learning, integrating quality improvement, incentive mechanism for data use, and accountability framework
- Embedded implementation science research conducted by a team of policy/decision makers from the government office, academia and service providers played a pivotal role in setting the correct agenda, trust building in the findings and improved ownership and leadership in the subsequent translation of the evidence to action.
- Capacity building through pre and in-service trainings and jointly crafted mentorship/coaching programs for the health care workers and managers at all levels of the health system cultivated data use culture and the creation of IR model sites. The training of undergraduate and postgraduate students (Master's and Ph.D.) brought changes in the HR for HIS space and evidence generation.
- Beyond project period: Sustaining the gains and learnings beyond specific project cycles has been documented as a major problem in public health. Engaging the local universities and their strongest collaboration with the regional health bureaus and the health care workers at service delivery points become a vehicle for sustainability
- Creating HIS demonstration sites in order for other districts and health facilities to learn from has been instrumental strategy. Most regional leaders promised and passed directions to scale the learnings to their districts.

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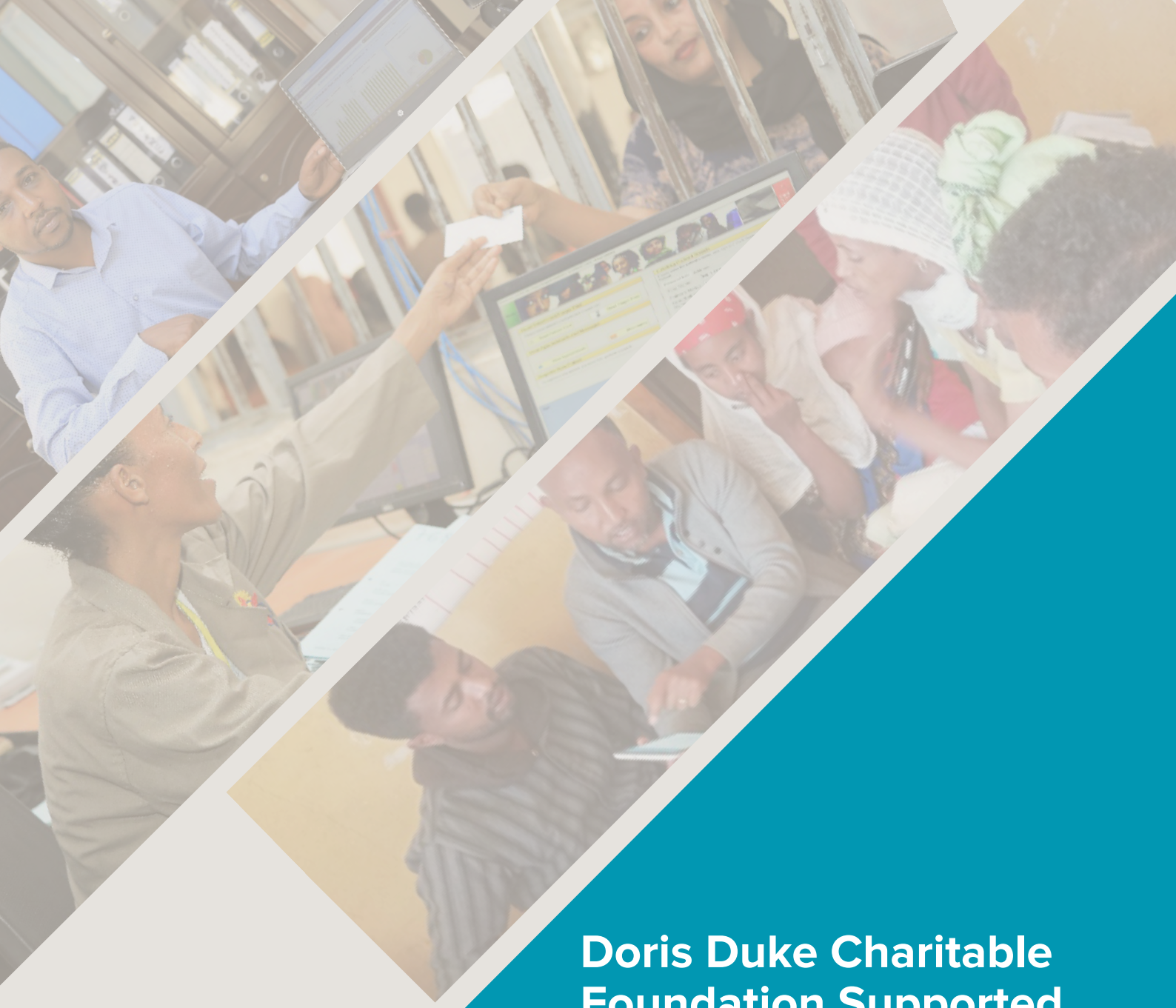

Doris Duke Charitable Foundation Supported Activity Summary Report