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MINISTRY OF HEALTH - ETHIOPIA

# DIGITAL HEALTH ACTIVITY (DHA)

## ANNUAL REPORT

ACTIVITY YEAR II (OCTOBER 1, 2020-SEPTEMBER 30, 2021)



SUBMITTED TO: USAID/ETHIOPIA  
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CONTRACT NO. 72066320D00001

**Cover Caption:** A Health Extension Worker uses eCHIS to record health data during treatment of a child, SNNPR, Ethiopia

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## List of Acronyms

<b>AaBET</b>	Addis Ababa Burn Emergency and Trauma (Hospital)
<b>AACAHB</b>	Addis Ababa City Administration Health Bureau
<b>AAD</b>	average absolute deviation
<b>AEFI</b>	adverse events following immunization
<b>AHMC</b>	Adama Hospital Medical College
<b>ANC</b>	antenatal care
<b>AWS</b>	Amazon Web Services
<b>AY2</b>	Activity Year 2
<b>CBNC</b>	community based newborn care
<b>CDC</b>	Centers for Disease Control and Prevention
<b>cGMP</b>	Current Good Manufacturing Practice
<b>CHAI</b>	Clinton Health Access Initiative
<b>COP</b>	Chief of Party
<b>CPD</b>	continuous professional development
<b>CSV</b>	comma-separated values
<b>DHA</b>	Digital Health Activity
<b>DHBP</b>	Digital Health Blueprint
<b>DHIS2</b>	District Health Information Software 2
<b>eAPTS</b>	Electronic Auditable Pharmacy Transactions and Services
<b>eCHIS</b>	Electronic Community Health Information System
<b>EDC</b>	Entrepreneurship Development Center
<b>EFDA</b>	Ethiopian Food and Drug Administration
<b>eHA</b>	Electronic Health Architecture
<b>eHIS</b>	Electronic Health Information System
<b>EHR</b>	electronic health record
<b>eIPLS</b>	Electronic Integrated Pharmaceutical Logistics System
<b>eLMIS</b>	Electronic Logistics Management Information System
<b>EMR</b>	electronic medical record
<b>EPHI</b>	Ethiopian Public Health Institute
<b>EPI</b>	Expanded Program on Immunization
<b>EPSA</b>	Ethiopian Pharmaceutical Supply Agency
<b>eRIS</b>	Electronic Regulatory Information System
<b>ESW</b>	electronic single window
<b>F&amp;O</b>	finance and operations
<b>FHIR</b>	Fast Healthcare Interoperability Resources
<b>GHSC-PSM</b>	Global Health Supply Chain Procurement and Supply Management
<b>GOFR</b>	Global Open Facility Registry
<b>GSI</b>	Global Standards One
<b>GTIN</b>	Global Trade Item Number
<b>HC</b>	health center

<b>HEP</b>	Health Extension Program
<b>HEW</b>	health extension worker
<b>HIS</b>	health information system
<b>HITD</b>	Health Information Technology Directorate
<b>HIT</b>	health information technician
<b>HMIS</b>	Health Management Information System
<b>HP</b>	health post
<b>HR</b>	human resources
<b>HRA</b>	Human Resources Administration
<b>HRIS</b>	Human Resources Information System
<b>HRL</b>	human resources licensure
<b>HSC</b>	Health Sciences College
<b>HSTP-2</b>	Health Sector Transformation Plan-2
<b>ICCM</b>	integrated community case management
<b>ICT</b>	information and communications technology
<b>ICT4D</b>	Information and Communications Technologies for Development
<b>IHRIS</b>	Integrated Human Resources Information System
<b>IOM</b>	International Organization for Migration
<b>IPLS</b>	Integrated Pharmaceutical Logistics System
<b>IR</b>	Information Revolution
<b>IST</b>	in-service training
<b>IT</b>	information technology
<b>IVR</b>	interactive voice response
<b>JCC</b>	Jobs Creation Commission
<b>JSI</b>	John Snow, Inc.
<b>KPI</b>	Key Performance Indicator
<b>LI0</b>	Last Ten Kilometers
<b>LAN</b>	local area network
<b>LLIN</b>	long-lasting insecticidal net
<b>LMS</b>	learning management system
<b>LQAS</b>	Lot Quality Assurance Sampling
<b>MDR-TB</b>	multidrug-resistant tuberculosis
<b>MFL</b>	Master Facility List
<b>MFR</b>	Master Facility Registry
<b>MHNT</b>	Mobile Health and Nutrition Team
<b>NCD</b>	noncommunicable disease
<b>NGO</b>	nongovernmental organization
<b>NPC</b>	National Product Catalog
<b>NTD</b>	neglected tropical disease
<b>ODK</b>	Open Data Kit
<b>OJT</b>	on-the-job training
<b>OPD</b>	outpatient departments

<b>OS</b>	Occupational Standard
<b>PACS</b>	Picture Archiving and Communication System
<b>PHCU</b>	primary health care unit
<b>PHEM</b>	Public Health Emergency Management
<b>PLSO</b>	Partner Liaison Security Operation
<b>PMT</b>	Performance Monitoring Team
<b>PO</b>	purchase order
<b>Q&amp;A</b>	question and answer
<b>QR</b>	quick response
<b>RDQA</b>	Routine Data Quality Assessment
<b>RHB</b>	Regional Health Bureau
<b>RMNCH</b>	Reproductive, Maternal, Newborn, and Child Health
<b>RRF</b>	Reporting and Requisition Form
<b>RTOT</b>	regional training of trainers
<b>SDQME</b>	Surveillance Data Quality Monitoring and Evaluation
<b>sGTIN</b>	Serial Number Global Trade Item Number
<b>SI</b>	strategic information
<b>SIM</b>	subscriber identity module
<b>SMT</b>	Senior Management Team
<b>SNNP</b>	Southern Nations, Nationalities, and Peoples
<b>SOCI</b>	Stages of Continuous Improvement
<b>SOP</b>	Standard Operating Procedure
<b>SS</b>	supportive supervision
<b>TAT</b>	turnaround time
<b>TB</b>	tuberculosis
<b>TBGH</b>	Tirunesh Beijing General Hospital
<b>TIC</b>	treatment initiation center
<b>TOT</b>	training of trainers
<b>TVET</b>	Technical and Vocational Education and Training
<b>TWG</b>	Technical Working Group
<b>UN</b>	United Nations
<b>UNDS</b>	United Nations Department of Safety and Security
<b>UPS</b>	uninterruptible power supply
<b>VF</b>	verification factor
<b>VPN</b>	virtual private network
<b>VRF</b>	Vaccine Request Form
<b>VRF</b>	virtual routing and forwarding
<b>WBHSP</b>	woreda-based health sector plan
<b>WHO</b>	World Health Organization
<b>WoHO</b>	woreda health office
<b>YE</b>	youth enterprise

## I. Executive Summary

This report summarizes the performance of the US-AID Digital Health Activity (DHA) for Activity Year 2 (AY2) from October 1, 2020 to September 30, 2021. AY2 was marked by achievements on many fronts. The quality, reach, and utilization of many subsystems has improved. The Activity has built the capacity of institutions to effectively use different subsystems. Significant changes have been observed in generating and using quality data for decision-making at many levels of the health system. Efforts have been made to foster an enabling policy environment to support the implementation of digital health activities.

During this Activity year, the **electronic community health information system (eCHIS)** remained a priority subsystem for the health sector. To support the objectives of the Ministry of Health (MOH), DHA played a catalytic role in driving both the development and implementation of the system. For context, for the four years prior to the establishment of DHA, the only eCHIS modules developed were those related to the family folder and reproductive, maternal, newborn, and child health (RMNCH), with deployment limited to 1,000 health posts (HPs). During DHA's first two years, the development of the tuberculosis (TB), malaria, leprosy, neglected tropical disease (NTD), and noncommunicable disease (NCD) modules has occurred. Additionally, the pastoralist family folder has been completed. Nationally, the first release is deployed in 6,200 HPs. DHA directly supported eCHIS deployment of the RMNCH module in 2,265 HPs (37 percent).

To build the capacity of system users, DHA trained 5,207 health workers to use eCHIS. The Activity supported the piloting and implementation of the nutrition, TB, malaria, and leprosy modules in over 220 HPs. This included the integrated community case management (ICCM) and community based newborn care (CBNC) submodules. Ongoing supervision and mentoring reports reveal improvements in health workers' clinical decision-making, follow up, and referral management skills. DHA has also actively supported optimization of the eCHIS platform to facilitate large-scale deployment. During this period, the average time for health extension workers (HEWs) to receive updated modules was reduced from 30 to four minutes. This significant reduction in lead time contributes to increasing uniformity of service delivery and boosts providers' confidence in eCHIS. As eCHIS transitions to being deployed in all

health posts, DHA, with the MOH, is studying the acceptability and usability of eCHIS among health extension workers (HEWs) to gain additional insights into how best to manage deployment at scale and enhance usability.

The deployment of the **electronic medical record (EMR)** system at the learning sites (two hospitals and three health centers) is progressing well. Outpatient clinics, laboratory services, and other key service points have fully implemented the EMR system. Observations during field visits and testimonies from facility leaders and healthcare providers have revealed reduced patient waiting time and improved client satisfaction. Use of the EMR has also improved standards of care, clinical decision-making and prescription refill rates. DHA trained 643 system users and helped to migrate the historical medical records of 870,000 patients. Most importantly, MOH leadership has approved the electronic health record (EHR) standard. It is believed that the standard will pave the way for a uniform, fast, national rollout of the EMR system.

During AY2, DHA provided onsite technical support for District Health Information Software 2 (**DHIS2**) in 1,161 health facilities to ensure the functionality of the system, data quality, and data use. This support helped to maintain service report completeness at 85 percent nationwide. To improve the comprehensiveness of the national health management information system (HMIS) report, DHA engaged high load private facilities to report through DHIS2. To facilitate this process, the Activity trained and mentored 84 staff to be HMIS experts, which resulted in a 21 percent increase in the number of private facilities reporting through DHIS2 (from 3,678 to 4,454 facilities). The tracker for multidrug-resistant TB (MDR-TB), customized using DHIS 2, has been deployed in four TB treatment initiation centers. As a result, the verification factor during data quality assessment in the treatment centers was 100 percent. The MDR-TB tracker has also enabled real-time access to data for early course correction in the management of the national TB program and the number of cases lost from follow-up has declined.

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**“Nationally, the first release is deployed in 6,200 HPs. DHA directly supported eCHIS deployment of the RMNCH module in 2,265 HPs (37 percent).”**

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**To build the capacity of system users, DHA trained 5,207 health workers to use eCHIS.**

During this Activity year, DHA completed development of three modules on the **Human Resources Information System (iHRIS)**: human resource administration (HRA), human resource development (HRD), and human resource licensure (HRL). All three modules were piloted at Addis Ababa city administration health bureau and Oromia Regional Health Bureau, including the MOH, Ethiopian Food and Drug Administration (EFDA), and selected health facilities. DHA trained 1,626 users from all regions on HRD and HRA. Following the training, biodata for 40,325 individuals was cleaned and migrated to the new system. It is believed that this will improve the management of human resources for health in the country.

To ensure end-to-end visibility of supply chain operations, DHA has continued to support the development, maintenance, and use of Electronic Logistics Management Information System (eLMIS) tools at the national and facility levels. **VITAS** is a warehouse and logistics management information system used by the Ethiopian Pharmaceutical Supply Agency (EPSA). During the previous Activity year, the new VITAS contract management module significantly lowered hand-offs between transactions, thereby reducing procurement lead time. DHA also supported the development and enforcement of unique item coding. This endeavor, together with other system enhancements, has improved inventory management, thereby improving the availability of lifesaving commodities and decreasing wastage. The reduction in wastage from 3.5 percent to 0.5 percent is equivalent to an annual health commodity budget of ten high load health facilities.

The new **Dagu 2.1** provides central access to stock visibility at the facility level. During AY2, Dagu 2.1 was deployed in 568 facilities, while all Dagu ver-



**DHA trained 1,626 users from all regions on HRD and HRA. Following the training, biodata for 40,325 individuals was cleaned and migrated to the new system.**



sions were deployed in over 1,000 facilities. As part of building capacity in Dagu 2.1, 235 individuals were trained in five regions. Another application, **mBran-na**, was deployed and revitalized in 540 woredas. The vaccine stocks (EPI antigens and COVID-19 vaccines) can now be centrally monitored. With the mBran-na app (which supports woreda level tracking) and interactive voice response (used for household level tracking), DHA supported tracking of the 2.9 million long-lasting insecticidal nets (LLINs) distributed in selected regions throughout the year. These steps have facilitated monitoring the delivery of LLINs to the woredas and households for effective malaria prevention.

**The electronic regulatory information system (eRIS)** continued to mature over the course of the year. Key transactional features of the permit, registration, import, and clearance processes have been automated and are maturing. DHA is adding features to the **Electronic Single Window system (ESW)**. The i-verify app has been downloaded by more than 1,000 users, empowering clients and the community to verify the authenticity of medical products and the EFDA to conduct active pharmacovigilance.

DHA implemented the **connected woreda** strategy in 86 woredas and 263 health facilities. This included developing staff's data management capacities, providing eCHIS implementation support in agrarian woredas, conducting mentorship and supportive supervision, providing on-the-job training and material and data quality assessment support. Performance Monitoring Team members of 300 woreda health offices (1,961 staff) were trained on integrated data quality and use. Routine data quality assessments (RDQA) were conducted during the final three quarters of the Activity year in the DHA woredas. The number of facilities conducting RDQA increased by 82 percent (from 171 to 311). After implementation of the tailored interventions, the number of model institutions increased from zero to five, candidate health institutions increased by 137 percent (from 62 to 147), and the number of emerging facilities decreased by 32 percent (from 272 to 184). This resulted in an overall score improvement of 56 percent. When facilities progress along this pathway, they typically experience improvements in quality health data collection, consumption, and communication.



**Candidate health institutions increased by 137 percent (from 62 to 147), and the number of emerging facilities decreased by 32 percent (from 272 to 184).** ”

Throughout AY2, DHA has supported the national and regional **COVID-19** response. A suite of five digital tools used in the national COVID-19 surveillance and tracking system was developed and is being maintained. The surveillance and tracking system supports the enrollment and tracking of suspected cases; captures symptoms, demographics, risk factors, and exposures; and monitors patient outcomes. In addition, a port-of-entry health declaration system was developed and is being implemented to record personal identification information, including phone numbers, travel history, health symptoms, and geo-location of Ethiopian residents. An application for home-based isolation and care was developed and is being used to follow up on home-based patients. To ensure that the COVID-19 vaccination program is equitable and targeted appropriately, a client tracker system has been piloted and is ready for scale-up.



**The number of facilities conducting RDQA increased by 82 percent (from 171 to 311).** ”

To ensure sustainability of the gains made, DHA has partnered with local universities to build their capacity, foster their partnerships with the health sector, and support them to excel in specific subsystems. At **Mekelle University**, DHA supported the development of the Digital Health Blueprint, and the master plan for digital health. The blueprint was endorsed by leadership and officially launched during the first national digital health conference. The first interoperability academy training, conducted during this reporting year, brought together experts from universities, organizations working on health information systems, and the MOH. The Center for Digital Health at Mekelle University is now leading national conversations about interoperability and electronic health architecture (eHA). DHA is supporting **Jimma University** to become a center of excellence in Electronic Community Health Information systems (eCHIS). The university has established a nation-

al eCHIS training center and is providing advanced trainings. It has also identified a learning woreda and is documenting learnings.

After successfully reviewing the health information technicians' (HITs) curriculum, DHA trained instructors from all **health science colleges** to ensure that new enrollees in the colleges experienced a smooth transition to the new curriculum. The new curriculum is designed to build the graduates' competence on the subsystems deployed nationally. To enable health workers to access training at their place of work, DHA completed the development and deployment of eLearning modules on the integrated pharmaceutical logistics system (IPLS), health information system (HIS) core competency, eCHIS, Dagu, and DHIS2. Through the **eLearning** system, 1,262 individuals were trained. In this era of COVID-19, these platforms will advance capacity development across the health sector and contribute to significant cost savings.



**Through the eLearning system, 1,262 individuals were trained.** ”

To nurture a culture of self-sufficiency, create a mechanism for local support, and develop young **entrepreneurs**, DHA continued to support the growth and development of the 13 social enterprises with a special focus on the development of their business management, technical, and soft skills. The youth enterprises assisted over 1,000 facilities to deploy DHIS2, Dagu, mBrana, HealthNet, and other HIS tools. Seven of the 13 enterprises are women-led.



**The Activity has built the capacity of institutions to effectively use different subsystems.** ”

During this implementation year, security issues in multiple areas of the country, internet blackouts, and leadership changes at key touch points have posed implementation challenges, but we were able to mitigate the challenges and continued to deliver high-quality results while ensuring the safety of our staff.



**DHA supported tracking of the 2.9 million long-lasting insecticidal nets (LLINs) distributed in selected regions throughout the year.**

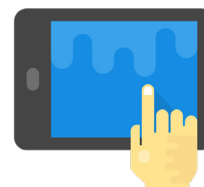


**Throughout AY2, DHA has supported the national and regional COVID-19 response.**

## II. Achievements by Objective

### II.1. Objective I: Support Information Technology (IT) Systems, IT Infrastructure, and Data Repository

#### II.1.1. Sub-Objective 1.1: Support Development, Operation, and Maintenance of Various Existing Health Information Systems



##### II.1.1.1. Electronic Community Health Information System (eCHIS)

The eCHIS is a mobile application that digitalizes the family folder of the community health information system (CHIS) and the service packages of the health extension package (HEP). The application, built on a mobile platform, is used by health extension workers (HEWs) as a data collection, reporting, visualization, clinical care, and decision-support tool. The eCHIS provides data for decision-making at all levels and helps HEWs to comply with service standards.

DHA played a critical role in automating the manual CHIS and the packages of the Health Extension Program (HEP) for improved service provision. The eCHIS now supports reporting, service delivery, referrals, and data use in primary health care units (PHCUs). By enabling HEWs to perform their daily activities in a timely manner, it has contributed to improvements in the quality of care.

During this Activity year, DHA completed the development of the TB, malaria, leprosy, neglected tropical disease (NTD), and noncommunicable disease (NCD) modules in the eCHIS application. To continue to enhance the usability and maturity of the app, based on user feedback, improvements were made to the RMNCH module and other previously implemented modules. Additional reports and dashboards were also developed, including service delivery reports and pattern reports. In addition, by synchronizing patient data, the eCHIS app now handles referrals from and to health centers and HPs. ECHIS's disease follow-up and adverse effect monitoring features allow HEWs to quickly follow up with their patients. The application is able to track and push notifications to providers and patients related to chronic follow-ups, thereby advancing adherence, treatment outcomes, and patient empowerment.

Dimagi, DHA's subcontractor, has been working with DHA to foster a stable local environment for the CommCare platform, upon which eCHIS app is built. Dimagi has deployed periodic security updates, conducted ongoing infrastructure monitoring, and provided consultation regarding systems maintenance, disaster recovery, and backup processes.

Core platform optimizations implemented during this second Activity year (AY2) included implementing the Data Export Tool to ensure performance, moving data into the eCHIS data warehouse, carrying out user-facing performance improvements to key screens in the application, decreasing the build time for deploying new versions of the application, and continued back-end performance enhancements to enable horizontal scaling of the system. In addition, through Dimagi, DHA has been working to increase the MOH's capacity to own, maintain, and scale the eCHIS platform. In the application building workstream, Dimagi led ongoing improvements to the Focal Person and Health Center Referral applications and collaborated with the MOH's eCHIS team to make related updates to the HEW application.



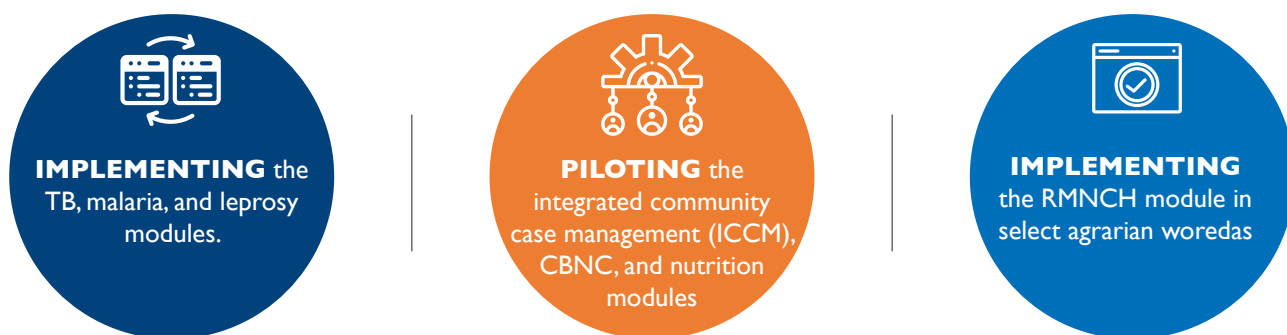
**DHA completed the development of the TB, malaria, leprosy, neglected tropical disease (NTD), and noncommunicable disease (NCD) modules in the eCHIS application**



These efforts have greatly contributed to eCHIS implementation by improving the application's response time and enabling eCHIS to meet its scale targets. User-facing performance improvements have included optimizing case search to improve the performance of reporting and analytics on the

CommCare platform, decreasing the time to build new versions of the mobile applications from 30 to fewer than four minutes in some cases, and optimizing the speed and user experience of multiple interfaces within the application.

In this reporting year, DHA continued to deploy eCHIS to additional agrarian woredas with a focus on the following:



DHA supported the deployment of the RMNCH module in 97 agrarian woredas with 2,265 health posts (HPs). The Activity also trained 5,207 HEWs, health center staff, Health Extension Program (HEP) focal persons, nurse midwives, PHCU directors, and woreda and zonal health department staff.

A training of trainers (TOT) was provided on the ICCM submodule and the module was piloted in the Lume woreda in the Oromia region. The nutrition module was also piloted in the West Hararge Zone in the Anchar woreda. Feedback on the pilot experience has been collected and the eCHIS team is incorporating the feedback.

After leading the development and piloting of the TB, malaria, and leprosy modules during the first Activity year, during this reporting year DHA focused on deployment, training, and support. DHA deployed the TB, malaria, and leprosy modules in seven woredas with 178 HPs in the Sidama, Oromia, Amhara, and Southern Nations, Nationalities, and Peoples (SNNP) regions (Table 1).

**“DHA supported the deployment of the RMNCH module in 97 agrarian woredas with 2,265 health posts (HPs).”**

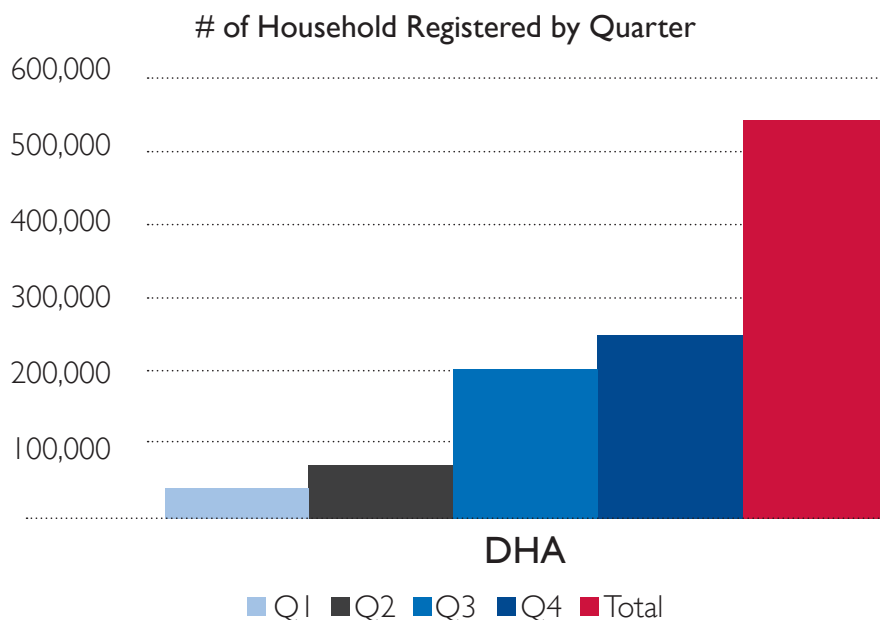
**Table 1. Training Planned Versus Training Delivered on eCHIS Modules by Region**

Region	eCHIS RMNCH Training				eCHIS TB, Malaria, and Leprosy Training			
	# of Woredas Targeted	# of Woredas Covered	# of HPs Covered	# of Participants Trained	# of Woredas Targeted	# of Woredas Covered	# of HPs Covered	# of Participants Trained
Benishangul	1	1	46	92	0	0	0	0
Oromia	15	18	382	753	3	3	78	222
Amhara	11	25	677	1590	3	1	15	40
Dire Dawa	-	6	18	54	-	-	-	-
SNNPR	9	45	1097	2628	2	2	58	124
Sidama	2	2	45	90	1	1	27	87
<b>Total</b>	<b>38</b>	<b>97</b>	<b>2265</b>	<b>5207</b>	<b>9</b>	<b>7</b>	<b>178</b>	<b>473</b>



Following the training, DHA provided intensive onsite support. The support centered on helping trained HEWs register households in their catchment areas and begin service provision using the application. During this reporting year, 541,361 households were registered (Figure 1).

**Figure 1. Household Registration by Quarter**



DHA filled a gap by providing tablets for HEWs to conduct house-to-house registration in the Harari and Sidama regions and Dire Dawa City Administration. The Activity also provided strategic guidance to all of the regions on leading and managing deployments.

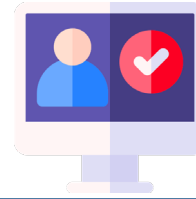
Early anecdotal evidence shows that the implementation of eCHIS has increased efficiency and standardization in service delivery by enabling HEWs, their supervisors, and healthcare providers in health centers to easily review household and individual data and tailor service delivery accordingly. ECHIS has also helped to prevent the creation of duplicative household and individual records in health posts.

Referral linkages have been facilitated between HPs and HCs for antenatal care (ANC), delivery, and postnatal care (PNC) services, which are essential to save lives and ensure quality and the continuum of care. Using eCHIS, HEWs are now planning service delivery and reporting based on the demographics of their actual catchment population, which has significant positive implications for service prioritization, resource allocation, and the requisition of important health service inputs, such as medicines and vaccines.



**DHA deployed the TB, malaria, and leprosy modules in seven woredas with 178 HPs in the Sidama, Oromia, Amhara, and Southern Nations, Nationalities, and Peoples (SNNP) regions.**





## II.1.1.2. EMR

Most public health facilities in Ethiopia manually manage data tasks related to their clinical services, needs for statistics and information, and data analysis. DHA, through its partnership with OrbitHealth, has been working diligently to customize an open-source EMR tool and implement it in select health facilities.

The new open-source EMR has continued to mature, gain features, and become user friendly. During the last quarter of AY2, features related to data exchange in laboratory (Polytech) and radiology services (Picture Archiving and Communication System—PACS) were added to the EMR system and end-to-end testing was completed.

DHA supported EMR implementation in Tirunesh Beijing General Hospital (TBGH). Her Excellency Woizero Alemtsehay Paulos, the state Minister of Health, with the USAID Ethiopia mission Deputy Director, Sinu Kurian, launched the implementation. DHA supported TBGH by installing a local area network in the hospital through youth enterprises (YEs).

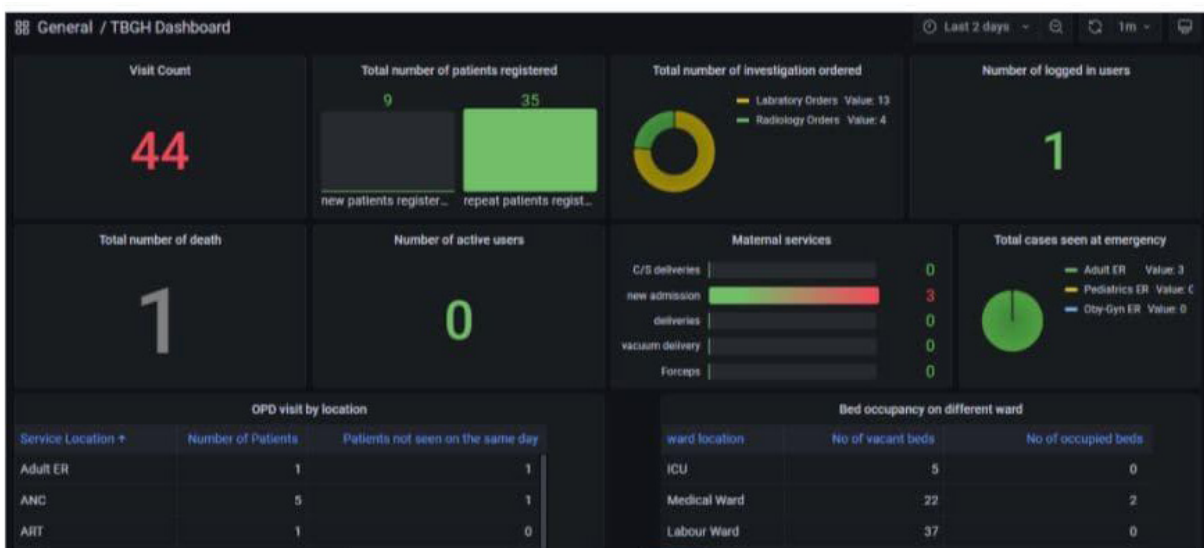
To support EMR implementation, DHA supplied essential equipment like tablets, desktops, printers, and a server. DHA provided high-level technical training to support staff and OJT and refresher training to all health service providers. Leadership changes, staff redeployment, and the transition to new

hospital building have posed significant challenges to becoming fully paperless at TBGH. The DHA team will continue to engage with leadership to ensure successful deployment.

Addis Ababa Burn Emergency and Trauma (AaBET) hospital has been the second EMR implementation site. Implementing EMR at AaBET required a unique configuration as the hospital provides specialized trauma and emergency services. The EMR was adapted to and was used to automate this unique workflow. EMR implementation has begun in the registration, emergency triage, and outpatient departments (OPDs) of the hospital. The radiology and laboratory integrations are complete and will be deployed in AY3.

DHA also scaled up the EMR system to three HCs, where health workers quickly adopted the system. The commitment of HC leadership and positive attitudes from staff were key to the success of this implementation. Data related to patient demographics, clinical information, laboratory services, and billing have been digitized. Reports for outpatient services have been customized and deployed. Report dashboards were also customized and deployed at the HCs to support the management of data for decision-making.

**Figure 2. Sample EMR dashboard at Tirunesh Beijing General Hospital EMR, 2021**



During the last quarter of this Activity year, DHA organized an experience-sharing visit at Ferensay HC for facilities implementing the EMR. The HC demonstrated the strategies they had used to implement the EMR and the role leadership played in the successful implementation. Through implementation of the EMR, 879,624 individual patient data were migrated, which has enabled health service providers to easily access patients' records, document medical histories, and order investigations and procedures electronically.

Early results from the EMR deployment demonstrate that health care providers have enhanced capacities to provide standardized care, gather comprehensive patient histories, conduct complete physical exams, remotely access patient records, and retrieve records for analysis and medico legal issues. Clients now experience faster triaging and intra-facility transitions as well as standardized care. Institutional leaders are now able to measure staff productivity and analyze service indicators in real time. In the long run, implementation of EMRs improves the quality of care, patient outcomes, and compliance with guidelines, and results in significant cost savings. During this reporting year, EMR requirements gathering, validation sessions, and documentation were completed and shared with leadership.



**To support EMR implementation, DHA supplied essential equipment like tablets, desktops, printers, and a server.**



**Through implementation of the EMR,**

**879,624**

**individual patient data were migrated,**

**Figure 3. Partial View of Participants during EMR Experience-Sharing Visit at Ferensay Health Center, August 20, 2021**





### II.1.1.3. District Health Information Software (HMIS/DHIS2)

District Health Information Software 2 (DHIS2), a web-based application, is the platform for the National Health Management Information System (HMIS). DHA has provided onsite coaching to improve data quality, system efficiency, and the use of DHIS2 as an analytic platform.

During AY2, DHA conducted 1,161 onsite supportive supervision visits and provided OJT to 1,631 staff. Four hundred seventy-three (40.7 percent) of the visits were made to monitor DHIS2 use at health facilities and deploy DHIS2 in new health facilities. Over the course of the year, on-the-job support gradually evolved to focus on data analysis and use, reporting, and data visualization.

During the first Activity year, DHA developed a multidrug-resistant tuberculosis (MDR-TB) patient tracking system. The app, built on DHIS2, facilitates the capturing, transmission, and analysis of quality individual-level patient data, thus enabling improved decision-making by service providers and program implementers. The tracker has improved data quality and contributes to alleviating the burden of MDR-TB in the country.

End-user training on the application was provided to staff in all 67 treatment initiation centers (TICs) nationally. During this reporting year, offline capabilities were added and the manual data management system and report generation functions were automated. These enhancements were guided by a national update to TB treatment protocols and

lessons learned during the pilot phase. In addition, dashboards were developed for end users and program leads to conduct patient monitoring and follow up. During TIC follow-up visits, users expressed satisfaction with the dashboards, in particular the ability to publish dashboards from current and old records to monitor facilities' MDR-TB responses. DHA also provided support to four TICs (Yirgalem, St. Peter, Alert, and Gonder Hospitals) to set up the tracker, which included infrastructure upgrades. DHA also supported the encoding and migration of all MDR-TB patient records from earlier in the year.

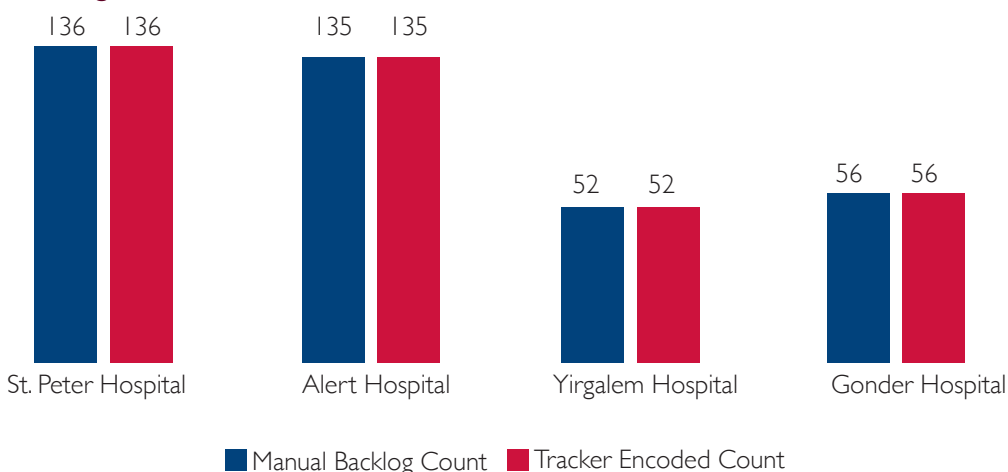
The MDR-TB tracker solved challenges related to individual-level data for MDR-TB patients, the quality of reporting for programmatic management of MDR-TB (PMDT), and lengthy reporting lead-time, with reports now available real time. As a result, the verification factor during data quality assessment in the treatment centers was 100 percent. The MDR-TB tracker has also aided real-time access to data for early course correction in the management of the national TB program and the number of cases lost from follow-up has significantly declined.

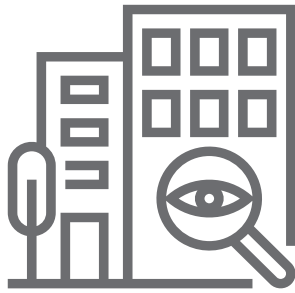


**DHA has provided onsite coaching to improve data quality, system efficiency, and the use of DHIS2 as an analytic platform.**



**Figure 4. Comparison of MDR-TB Tracker-Reported Data to Backlog Source Documents (Verification) by Learning Site, 2021**





### **Public Health Emergency Management (PHEM) Data Management**

To improve PHEM data management and reporting, a concept note was developed and submitted to the Ethiopian Public Health Institute (EPHI), following which a consultative workshop was conducted to discuss next steps. During the workshop, agreement was reached to conduct a refresher TOT for the regions, with the regions then cascading the training to lower PHEM-reporting health facilities. Agreement was also reached to conduct requirement analyses on diseases where case-based tracking is appropriate.

Although PHEM reporting is now over 95 percent nationwide, no single platform is consistently used for reporting. The PHEM concept note details a strategy for improving reporting through use of a single platform. Leveraging lessons from customization of the COVID-19 tracker, DHA will continue to customize additional reportable diseases.

DHA supported training for Ethiopian Public Health Institute (EPHI) field officers in PHEM data analysis and visualization using ArcGIS. Fourteen EPHI staff were trained over five days. Training participants included data managers, researchers, public health experts, and EPHI directors. In addition, DHA provided technical assistance and facilitation support for the development of the Surveillance Data Quality Monitoring and Evaluation (SDQME) guideline. Twenty-five professionals drawn from the MOH, EPHI, regions, the Centers for Disease Control and Prevention (CDC), and DHA drafted the guideline document.





#### II.1.1.4. Human Resource Information System (HRIS)

To support workforce planning, development, deployment, and tracking in the health sector, DHA has identified, adopted, and begun customization of a human resource information system (HRIS). During the second Activity year, an HRIS was developed with three major subsystems, human resource administration (HRA), human resource development (HRD), and human resource licensure (HRL). Significant development work in all three subsystems was carried out in keeping with the requirements shared by the MOH's Technical Working Group (TWG).

In collaboration with IntraHealth, DHA's subcontractor, the HRA subsystem was developed with a focus on performance management, leave management, reports, dashboards, and interoperability. The performance management function enables supervisors to record employees' performance information and human resource (HR) managers to quickly review performance scores. Custom reports and dashboards summarize aggregate information by geography and facility. Information on the age, gender, professional category, job title, type, and quantity of health workers as well as their pensions are readily available. Data are made accessible according to a user's assigned location so that sensitive information is kept confidential and secure.

Development of the HRD training module, pre-service management module, and user access management were completed in AY2. The training module contains training registration and tracking functionalities that enable the tracking of courses and continuous professional development (CPD) activities as well as trainers, trainees, and training events held in all CPD centers. The HRD module is also used to track pre-service training enrollment and prospective graduates and to assist decision-making related to the placement of new graduates.

During this reporting year, important HRL subsystem functions used by applicants and experts were completed. These functions enable health professionals to renew or request a license, document verification, and good-standing letters. To build the MOH's capacity to handle scale up, monitor usage, provide remote support, and maintain the interoperability of the three IHRIS subsystems, a two-week in-person technical training was conducted by IntraHealth.

DHA selected MOH, the Ethiopian Food and Drug Administration (EFDA), and the Addis Ababa City Administration Health Bureau (AACAHB) as pilot sites for the HRA subsystems. The MOH, AACAHB, and Oromia RHB were selected to pilot the HRD subsystem. After completing the pilot for the two subsystems, DHA conducted a TOT on the HRA and HRD modules for 99 individuals from the RHB and select facilities. Following the TOT, 1,626 end users were trained. DHA helped to migrate 40,325 pieces of personnel data from the legacy HRIS to the new HRIS-HRA module.

DHA conducted trial runs of the HRL subsystem with applicants from St. Paul Hospital, St. Peter Hospital, Adama Hospital Medical College (AHMC), and TBGH. The trial run demonstrated that the system was ready for piloting. DHA selected AACAHB, Oromia RHB, and the MOH as pilot sites (Figure 5).



**During this reporting year, important HRL subsystem functions used by applicants and experts were completed.**



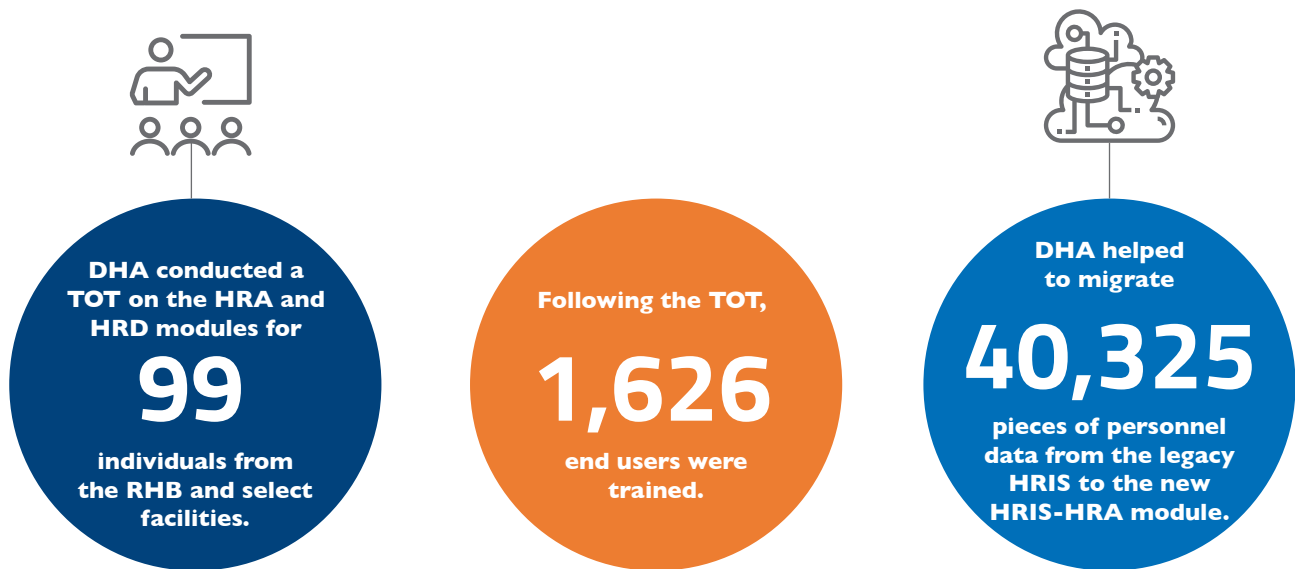


Figure 5. Partial View of Participants at HRL Pilot Training



**In the annual review meeting organized by MOH's HRA Directorate, DHA received a recognition award for its contribution to improving HR management processes.**

## II.1.1.5. Electronic Logistic Management Information System (eLMIS)-EPSA



### Vitas

Ethiopian Pharmaceutical Supply Agency (EPSA) provides health commodities to all public health facilities. For a country's supply chain system to function, digitizing its process is vital. In this reporting year, the Activity provided maintenance support for VITAS and automated additional critical functions. These enhancements helped to speed up the process of receiving items, warehouse operations, distribution, financial transactions, and fleet management. The helpdesk team was able to resolve 96.5 percent of the 230 issues reported with VITAS throughout the year. In addition to resolving user issues, the Activity visited each hub and supported synchronization of the reporting and requesting form (RRF) for health facilities using Dagu 2.1, provided assistance with virtual routing and forwarding (VRF) synchronization to Vitas from mBrana sites, and followed up with users to promote increased use of the synced VRF and RRF.

In the past, RRFs were sent to the EPSA manually, with data encoders copying data from requesting facilities into the system, which negatively affected the EPSA's efficiency. Dagu 2.1 virtually synchronizes the RRF to the EPSA. Because this new feature was dependent on the facility store having an internet connection, most health facilities were unable to sync the RRF online. To address this issue, an offline RRF syncing solution using either Quick Response (QR) code or a comma-separated values (CSV) format was introduced.

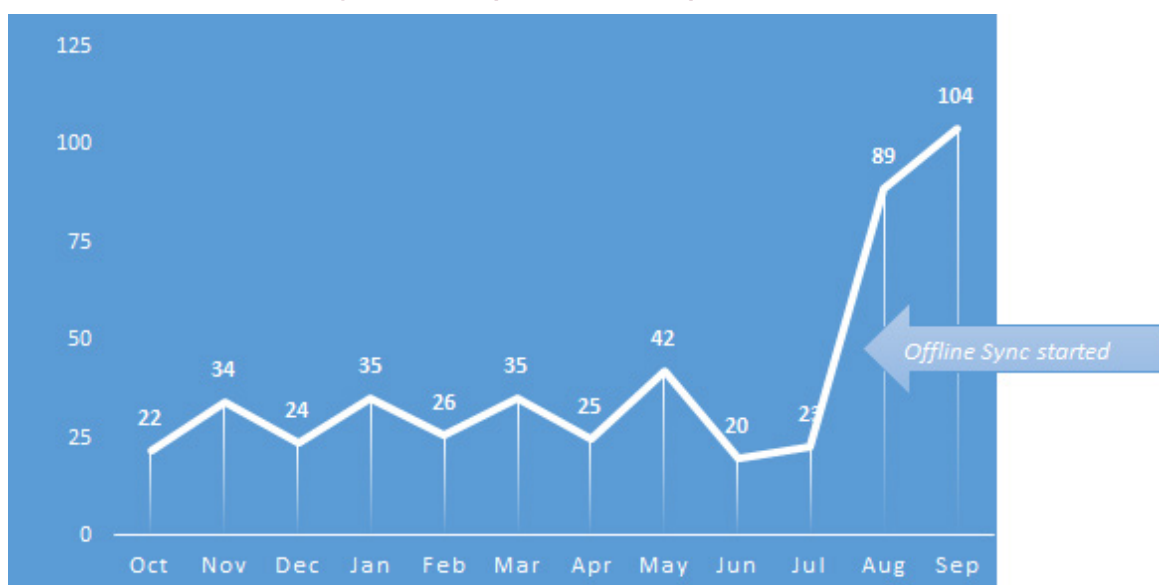
This intervention resulted in a significant increase in the number of facilities synchronizing their RRF to their respective EPSA hubs (Figure 6). The electronic RRF synchronization reduced the average turnaround time (TAT) for health facilities to refill stock from seven days to just one hour, which helps health facilities to deliver quality services without interruptions caused by stockouts.



**The electronic RRF synchronization reduced the average turnaround time (TAT) for health facilities to refill stock from seven days to just one hour.**



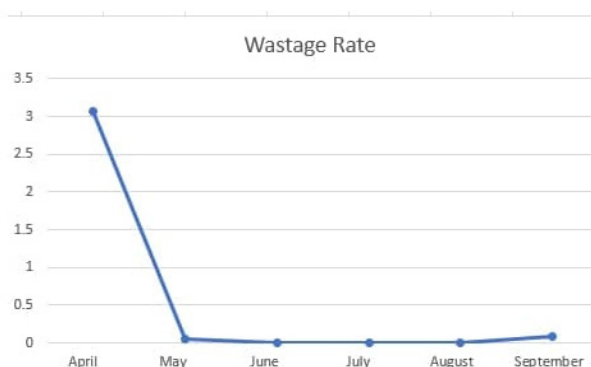
Figure 6. RRF Synchronization by Month , 2021



The following are four additional Vitas features developed this year:

- **In-house barcodes:** In-house barcodes for warehouses were introduced to track items beginning at the receiving point. The barcode helps to track items during internal movement and dispatch and plays an important role in strengthening warehouse security.
- **Unique item code:** assigning unique identification to health commodities improves inventory tracking, which results in reduced wastage due to oversight and improved hub and facility refill rates (Figure 7). . Introducing unique item codes and enhancement in the modules has improved RRF data quality at the EPSA center, hubs, and facilities. Reducing wastage rates leads to significant resource savings; more importantly, it saves lives in locations where artificial stockouts occur due to maldistribution of products.

**Figure 7: Average Wastage Rate Trends for 77 Items over a Six-Month Period in 2021**



- **Online ordering for facilities:** this feature provides private health facilities with a fast, easy, accountable requisition process. It also minimizes

data entry for requisition officers, which allows them to focus their attention on the approval stage. An online ordering training session was conducted for 102 private health facilities, 184 public facilities, and 31 EPSA employees. At the end of the reporting year, 283 private health facilities used this solution to send requests, resulting in 1,981 requests from them being processed at the EPSA. The EPSA has enforced online ordering and stopped accepting manual requisitions from private health facilities in Addis Ababa.

- **Purchase order tracking:** Pipeline stock monitoring has been a significant challenge in EPSA's supply chain operations. With the aim of creating better visibility, accountability, and ease of work in EPSA's contract management department, all transactions from raising purchase orders (PO) to closure of contract were automated in AY2. This enables EPSA to track transactions, monitor the pipeline, and design interventions to delay or fast-track commodity flow. DHA conducted PO tracking refresher trainings for 533 participants throughout the year.

DHA provided training on Fanos dashboard to 46 Global Health Supply Chain Procurement and Supply Management (GSCM-PSM) staff, including directors, managers, warehouse, and distribution experts. Refresher training has also been provided to 36 EPSA hub managers and members of the EPSA Center quantification and inventory management team. During the last quarter of the reporting year, an average of 147 users per month have used the Fanos dashboard for decision-making and intervention, a 22 percent increase from the target of 120 users and a 63 percent increase from DHA's first year.



**DHA conducted PO tracking refresher trainings for**

**533**

**participants throughout the year.**



## II. 1.1.6. ELMIS Facility Store and Dispensary Level

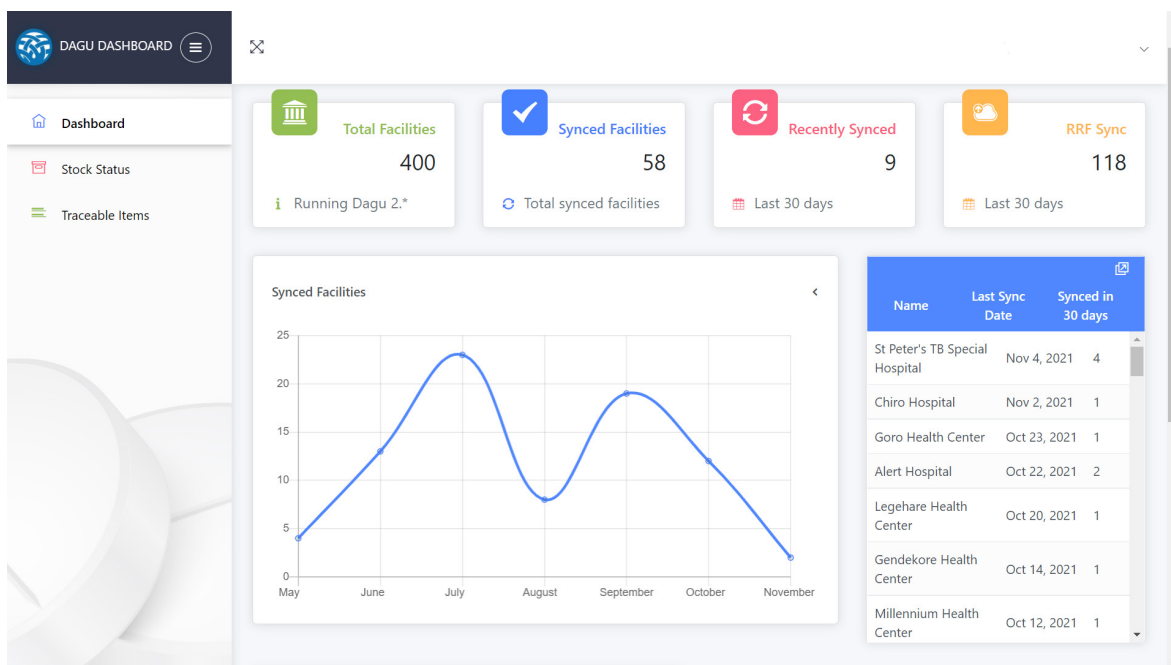
### Dagu and Electronic Auditable Pharmacy Transactions and Services (eAPTS)

Delivering health commodities without interruption to health facilities is key to providing quality of care. Managing commodities is vital to avoid stockouts and expiry and to create real-time stock visibility for clinicians. Dagu, a facility stock management application with the eAPTS dispensing unit module, can play a crucial role in addressing these challenges and optimizing facility health commodity management. While Dagu allows users to manage

requests, issuance, and reporting, Dagu's eAPTS module manages the dispensing of drugs based on the Auditable Pharmacy Transactions and Services guideline.

During this Activity year, DHA supported the development of significant Dagu functions that advance the eLMIS in stores and dispensary units, including a dashboard that provides central visibility into facility stock status. Thus far, the stock status of 400 facilities can be accessed centrally by RHBs, the EPSA, and the MOH (Figure 8).

Figure 8. Sample Dagu Dashboard with the Number of RRF-Synchronized Facilities over Time



To ensure Dagu ownership and sustainability, the Dagu Technical Working Group (TWG) was revitalized and a detailed assessment of both Dagu and eAPTS systems was conducted. The assessment, which was intended to enhance ownership of the system by the MOH, was conducted in collaboration with MOH experts, facility users, partners, and system developers. The MOH's approval of the Dagu and eAPTS systems resulted in a deep sense of ownership going forward. In collaboration with the MOH, a countrywide capacity-building initiative was conducted to increase Dagu and eAPTS use among zonal supply chain coordinators, health information technician (HIT) officers, facility users, and partner organizations that support the supply chain. Regional

TOTs were provided to 169 individuals and end-user trainings to 233 facility staff in the Amhara, Oromia, SNNP, Harari, and Somali regions and to the Addis Ababa and DireDawa city administrations. Post-training follow-up, mentorship, and OJT was provided to 420 staff who had been trained during the first two Activity years.



**Thus far, the stock status of 400 facilities can be accessed centrally by RHBs, the EPSA, and the MOH.**





DHA has coordinated closely with GHSC-PSM to provide comprehensive support to health facilities on the Integrated Pharmaceutical Logistics System (IPLS). Forty GHSC-PSM regional supply chain supervisory field staff received a two-day training on Dagu 2.1.

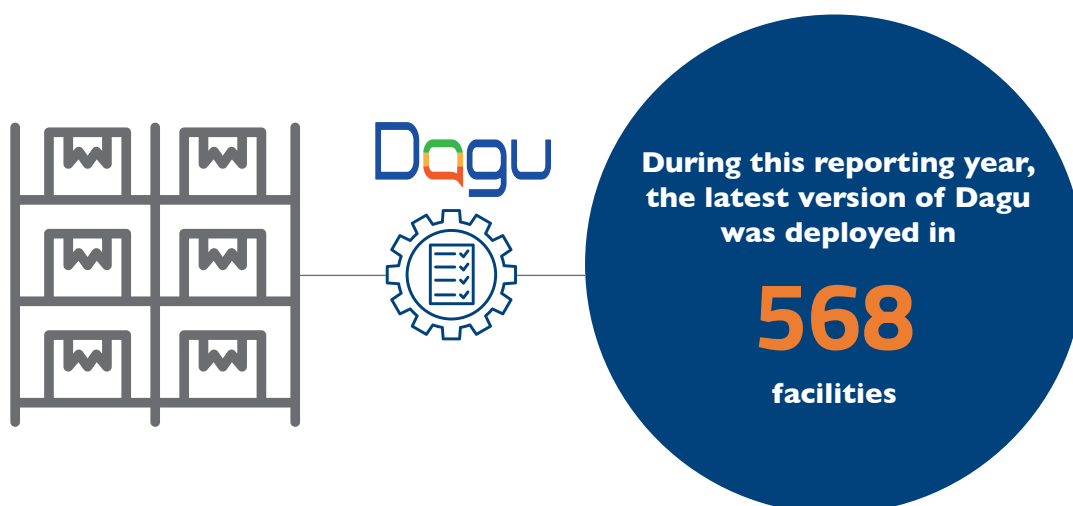
During this reporting year, the latest version of Dagu was deployed in 568 facilities (i.e., 337 new sites and 157 facilities receiving upgrades). Seven hundred fifty-four site using older and newer versions of Dagu received technical support on remedying database issues and dealing with database corruption and operating system failures (Table 2).

**Table 2. Dagu Implementation by Quarter and Type of Support**

Dagu Activities	Q1	Q2	Q3	Q4	Total
Number of facilities provided technical support	135	133	119	367	<b>754</b>
Number of individuals provided OJT	181	329	254	420	<b>1,184</b>
Number of facilities where Dagu 2.1 was newly deployed	-	-	204	133	<b>337</b>
Number of facilities where Dagu 2.1 was upgraded	-	-	125	32	<b>157</b>
Number of facilities where Dagu 2.0 was upgraded	39	35	-	-	<b>74</b>
Number of facilities where RRF was synchronized	-	-	20	215	<b>235</b>

After piloting eAPTS in two facilities in the first year, to mature the application and ensure usability in AY2, it was deployed in five learning sites. Drawing on feedback from users, additional enhancements to eAPTS were made, including six new reports, features for facility-to-facility transfer, and the incorporation of antiretroviral therapy (ART) modules at the dispensary level. Thus far, eAPTS is deployed in 17 facilities, including the pilot and learning sites. OJT was provided to 178 health facility staff.

Dagu 2.1 and eAPTS implementation has created central visibility into facility stock; enhanced accountability at the dispensary level; facilitated fast, smooth transactions; improved health commodity availability, and decreased wastage. The pharmaceutical supply chain head of AACARHB testified that over \$300,000 USD worth of stock that would have expired at health facilities was saved because of the extensive deployment of Dagu 2.1 and eAPTS in Addis Ababa.



“ The pharmaceutical supply chain head of AACARHB testified that over \$300,000 USD worth of stock that would have expired at health facilities was saved because of the extensive deployment of Dagu 2.1 and eAPTS in Addis Ababa. ”



### II.1.1.7. mBrana

The mBrana-vaccine application is used at the woreda level to track vaccine transactions such as electronic vaccine request (eVRF), inventory management, and the distribution of vaccines to health centers). The application also facilitates central visibility into woreda-level stock.

In anticipation of broad-scale implementation of mBrana, the development team has focused on improving the performance of the mBrana mobile application and dashboard. During AY2, major changes included performance improvements in speed and user management and the simplification of implementation activities.

mBrana implementation became a priority during the last quarter of this Activity year because of the pressing need for greater visibility into vaccine transactions, including those related to COVID-19 vaccines. Sensitization meetings were held at the regional level to launch the application, showcase its use, and emphasize the importance of promoting the application to the woredas. The meeting was attended by 129 people, including regional and zonal EPI focal persons. During mBrana deployment, each woreda EPI focal person was provided OJT and a phone, which facilitated the deployment of mBrana in 540 woredas (Figure 9).

**Figure 9. MBrana Deployment and Phone Donation in the Somali Region**



Use of the mBrana-LLIN mobile app and interactive voice response (IVR) system facilitated the distribution and tracking of LLINs in woredas and households in the Harari and Somali regions and the Dire Dawa city administration. To enhance adoption

of the system, alleviate bottlenecks (e.g., latency, poor reporting rates), and continue making mBrana more user-friendly, improvements have been made in all of the modules, including the following:

## IMPROVEMENTS



**Expanding the number of IVR lines to handle more traffic and enhance availability**

**Providing users with an option to select and report back in their native language**

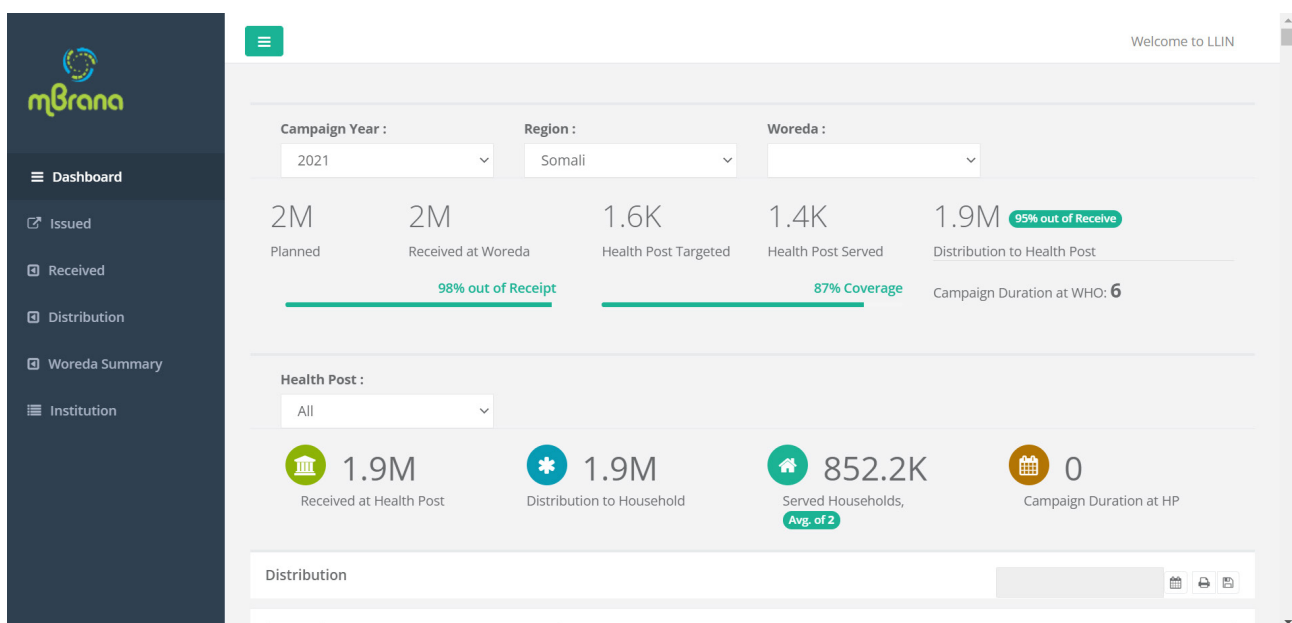
**Assign each HP an ID number to be used for reporting distribution**

**Conduct orientation trainings with PSM to facilitate mBrana use**

“  
**During this reporting year, 2.9 million LLINs were distributed to regions.**  
 ”

The mBrana has improved the delivery of LLINs to beneficiaries (Figure 10).

**Figure 10. The mBrana Dashboard Used by Malaria Program and EPSA Staff to Monitor Performance**



## II.1.1.8. Ethiopian Food and Drug Administration (eRIS Federal and Regional)



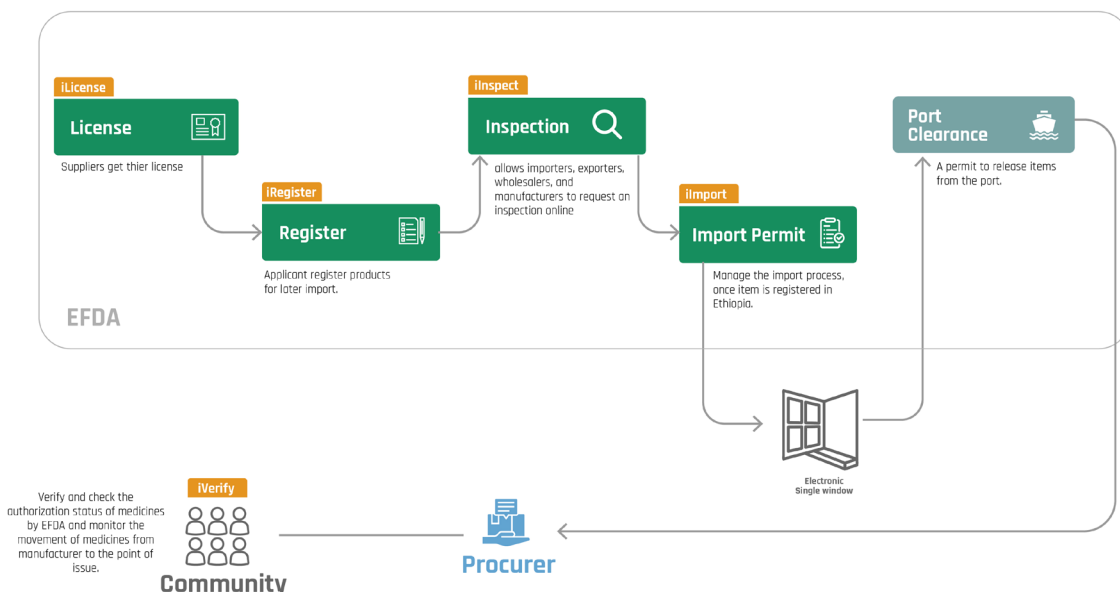
DHA has been supporting EFDA to automate the licensing, registration, importation and clearance, inspection and pharmacovigilance functions. Over the course of the year, all applications for the specific process and sub-processes have matured and critical functionalities have been added. The EFDA is now very close to becoming paperless which will be very significant to the public in ensuring transparency, accountability and safety.

In April 2020, as a part of the country's digital transformation, the Government of Ethiopia introduced a new directive for traders to use the Electronic Single Window (ESW) service. ESW aims to enhance efficiency in trade logistics by accelerating customs processes. The EFDA and its clients are the primary users of ESW. To facilitate optimal use of ESW while retaining the paperless transactions of the Electronic Regulatory Information System (eRIS), DHA integrated the two systems. By integrating eRIS with ESW, the import permit process was greatly simplified, which made the trading/import/export environment more accessible to and simpler for traders. Since ESW-eRIS integration, more than 343 medicine and medical device importers/traders used ESW to process more than 1,652 import permits, which were then reviewed by EFDA experts in eRIS.

Prior to the introduction of ESW, the EFDA approved import permits using pre-import permit applications in i-Import, an eRIS module. Since all importers and traders are mandated to use ESW to import products, it was not possible for EFDA staff to review unregistered products before their entry. To address this issue, DHA is developing a Pre-Import Permit Item Manager; which will render visible items whose import permits have been approved on eRIS prior to an ESW import request. This enables government organizations, NGOs, UN agencies, and health facilities to request multiple product approvals through one application, manage the attachment of documents based on the products requested, and facilitate access to approved products on ESW to request import permits for approval. These features will allow the EFDA to manage unregistered items requested from organizations, who will then be able to locate their products in ESW and make pre-import permit requests once the items are approved by EFDA (Figure 11). Development of the Pre-Import Permit Item Manager is 70 percent complete.

**“The EFDA is now very close to becoming paperless which will be very significant to the public in ensuring transparency, accountability and safety.”**

Figure 11. ERIS workflow



Once an import permit is approved and the product is imported, the EFDA inspects and lab tests the product, then allows its release to the market. The release of products will be handled by the i-Clearance module of eRIS, which includes two major processes—pre-shipment document verification and physical product assessment. Development of the first phase of integration between ESW and i-Clearance is complete (i.e., allowing traders to request pre-shipment document verification through ESW).

One hundred traders have received training on the application process. Another virtual training was also provided to more than 30 port inspectors across the country. The trainings covered topics such as how to verify documents in a pre-shipment application and basic instructions for using the system. When the pre-shipment module is released, the EFDA will be able to track items coming to the country ahead of their arrival. The module will also allow applicants to have their documents verified before the products arrive at port, minimizing the length of time before the products are released after they arrive in the country. The i-Clearance module is now ready for deployment.

I-Verify is a mobile application that monitors the movement of health commodities and products from manufacturers to the point of issue. I-Verify tracks, traces and verifies medicines in the supply chain, ensuring that government and private sector facilities has the medicines they need to provide high-quality services. Most importantly, it empowers the community to check the legality and authenticity of medicines before use. This application can be used at any point in the supply chain to verify product authenticity. It is expected that i-Verify users will employ the platform to report unauthorized products, product defects and counterfeit products

present in the market, which will help the EFDA and public users to track and trace the products imported to Ethiopia. I-Verify has been downloaded from the Google Play store by more than 1,000 users and has an average review rating of 4.5 stars. An iOS version of the application is under development. The DHA team has continued to fine-tune the application, for example, by adding a feature that allows public users to scan and search a product using a global trade item number (GTIN) and a serial number (sGTIN) or to identify the packaging type of a product (i.e., primary, secondary, or tertiary packaging). This feature can be used to aid detection of counterfeit COVID-19 vaccines.

The DHA automated this process by designing and developing an inspection subsystem in eRIS, i-Inspect. I-Inspect will be used by EFDA inspection team leaders to assign an inspector to a facility and will enable the inspector to conduct the inspection and submit their review and recommendations. The inspection team leader and director will then be able to access the review on i-Inspect and determine whether to approve or reject the result based on the inspector's recommendation. The development of an inspection module for pre-licensing and post-licensing inspection is complete and the module is currently being tested. The module will help to facilitate facility licensing, promote cGMP certification to local manufacturers, and motivate overseas manufacturers to obtain a cGMP certification and waiver.

Overall, the eRIS has improved transparency and accountability; workforce management and performance; virtual working environment; and efficiency of the authority as described by the Director General.

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**“**  
**Since ESW-eRIS integration, more than 343 medicine and medical device importers/traders used ESW to process more than 1,652 import permits.**  
**”**

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**I-Verify has been downloaded from the Google Play store by more than 1,000 users and has an average review rating of 4.5 stars.**



## II.1.2. Sub-Objective 1.2: Digital Health Maturity Assessment

During this reporting year, DHA supported the MOH to conduct the HIS maturity assessment using the Stages of Continuous Improvement (SOCI) tool.

**Figure 12. The Maturity Assessment Team during the Assessment Planning and Reporting Workshop**



DHA and its subcontractor Mekelle University supported the assessment planning and report writing. The SOCI tool includes five major domains, 13 components, and 39 subcomponents. The maturity assessment covered the entire SOCI tool in three phases: a desk review of the HIS and relevant legislation and policies; a workshop with key stakeholders to carry out the assessment; and technical write-up meetings.

Because it incorporated a detailed review of existing governance documents and practices, the HIS maturity assessment helped to establish a baseline. For all subcomponents of the HIS to progress through SOCI, a goal, roadmap, and action plan for improvement have been prepared through the end of HSTP2 in 2024. The maturity assessment maps the status of and provides useful details about leadership and governance in the Ethiopian health sector.

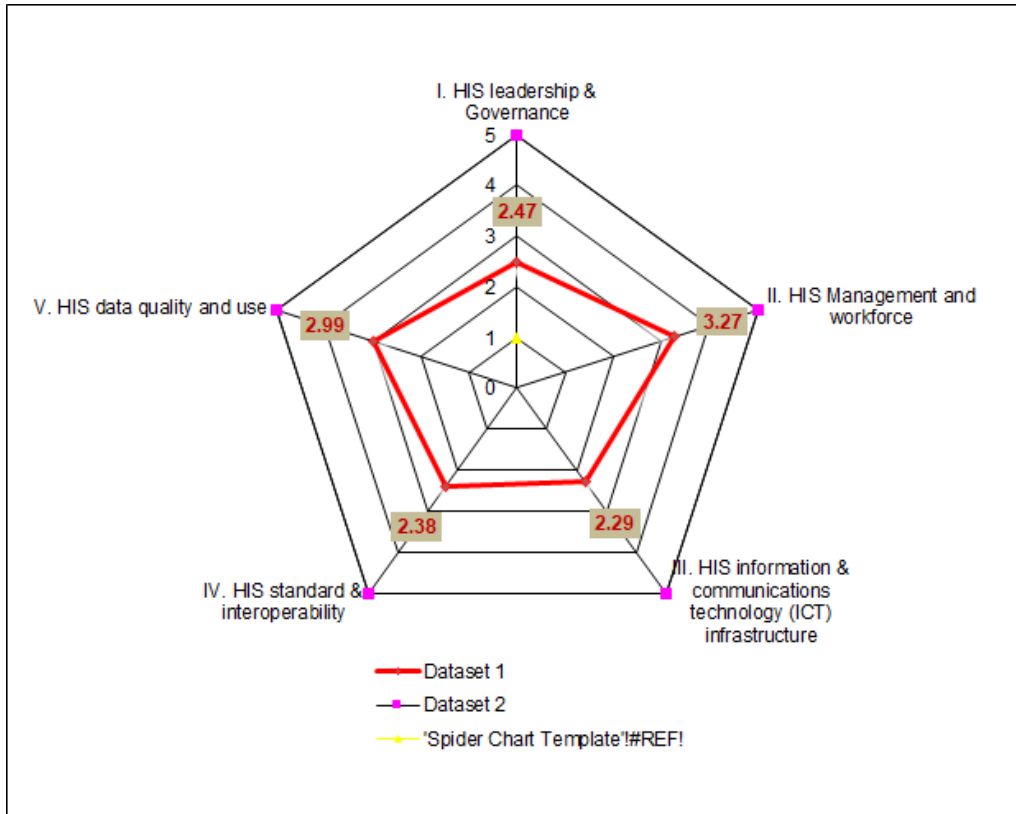
The HIS maturity assessment resulted in varying scores across the five domains (Figure 13). Reviewing the components of each domain, we can further understand the pain points and where to invest in the years to come, as well as the importance of maintaining what has worked well, including the enforcement of policies and legislation, data exchange among systems, and the use of ICT infrastructure business continuity plans.



**The HIS maturity assessment resulted in varying scores across the five domains**

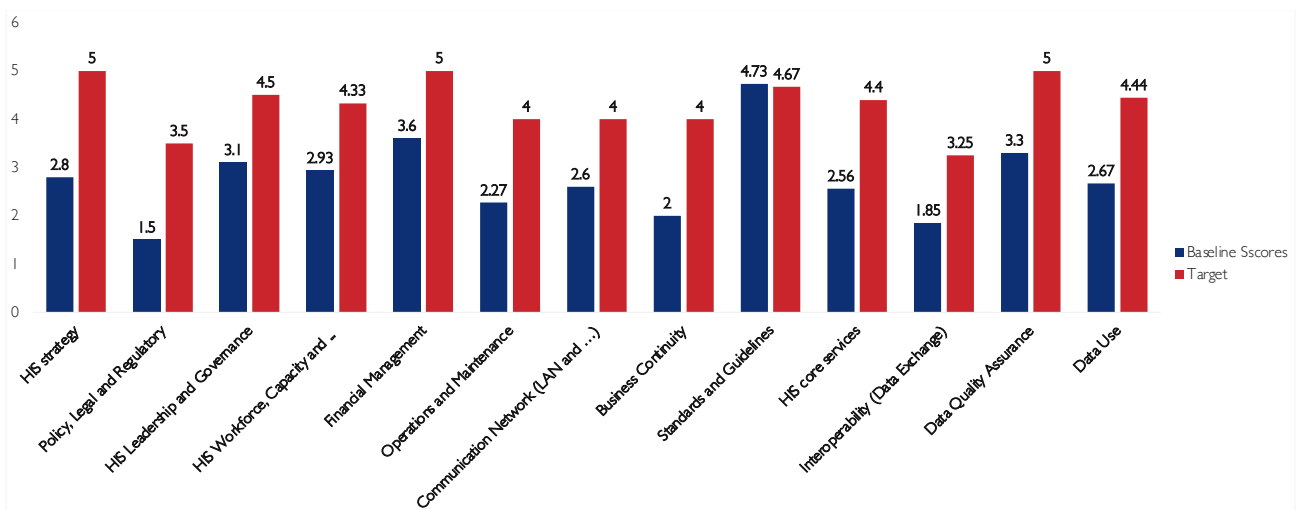


Figure 13. HIS Maturity Assessment Scores across the 5 SOCI Domains



The HIS maturity assessment results and 2024 targets for the 13 SOCI components are presented in Figure 14.

Figure 14: HIS Maturity Assessment Results and 2024 Targets for the 13 SOCI Components



## II.1.3 Sub-Objective 1.3: Establish and Operationalize a National eHA, Track and Trace, and Interoperability Academy

### Track and Trace

The National Product Catalogue (NPC) is a shared service in the HIS that contains a list of commodities. NPC is approved as the single source of product information in the supply chain and predominantly in the shared service component of the country's eHealth Architecture (eHA). To populate NPC with products, the i-Register subsystem, used to register a product prior to importing to the country, was selected as the primary source of information. To assemble a clean list of products for initial seeding in the NPC, the DHA team did the following:

- Performed data cleanup work to remove duplicate generic names and standardize the nomenclature used for these pharmaceuticals generic naming
- Held a workshop with the EFDA and EPSA teams to create a guideline for standardization of generic names
- Cleaned pharmaceutical item naming based on the standards and prepared the item list for importing into NPC.

Traceability in the pharmaceutical supply chain will improve patient safety by making sure that patients are not exposed to falsified, expired, recalled, or other otherwise harmful pharmaceuticals; it will also improve supply chain efficiency. Because there has been no legislation in Ethiopia related to the implementation of global standards for barcoding, unique identifiers, and the sharing of master data on pharmaceutical products and locations, the movement of products and information across the supply chain is currently not traceable. To address this issue, the EFDA, with the support of DHA, developed and endorsed a pharmaceutical products traceability directive. The directive, which aligns with the requirements of Global Standards One (GS1), addresses issues related to issues such as unique identification, data carriers, human readable interpretation, master data, and data capture and sharing.

DHA supported the EFDA to develop guidelines for pharmaceutical product master data sharing and management. Deploying a proper master data management platform for these products and assuring the availability of standardized master data lists helps to create a single point of reference

among the supply chain stakeholders. The fact that there is no standard guideline that ensures the management of the master product list is the cause for the non-standard and non-consistent information flow in the pharmaceutical supply chain system. The Pharmaceutical Products Master Data Guideline was developed consistent with global standards, which establish requirements and provide guidance to supply chain stakeholders for establishing robust, transparent, sustainable, and unified information sharing from a single source of truth. The guideline addresses master data requirements, master data sharing modalities, steps to synchronize master data, and the roles and responsibilities of key stakeholders.

To enhance product traceability, information should be captured using DataMatrix barcodes during the movement of products from the point of manufacture to the point of dispensing. The DataMatrix barcode helps to detect and thereby reduce medication errors in health care settings by enabling health care professionals to verify that the right medication at the correct dose and via the right route of administration is given to the right patient at the right time. Currently, there are no mechanisms that capture information about pharmaceuticals in the country's healthcare settings due to the absence of guiding documents and proper enforcement. In response to this, the EFDA has developed and endorsed a barcode guideline, which describes requirements related to data encoding; the placement, printing, reading, and proper use of barcodes; and the roles and responsibilities of supply chain stakeholders in barcoding.



**DHA supported the EFDA to develop guidelines for pharmaceutical product master data sharing and management.**



Uniquely identifying pharmaceuticals is critical to maintaining the integrity of the supply chain and protecting the public from illegal pharmaceutical products. The unique identification of pharmaceuticals and the communication of this information among supply chain stakeholders are essential to ensure that the correct product is made available and moves through the supply chain. Likewise, uniquely identifying parties or locations is also important. To enhance the allocation of unique identifiers to products and locations, the EFDA, with the support of DHA, has developed and endorsed the GTIN allocation guideline and Global Location Number allocation guideline.



**To enhance the allocation of unique identifiers to products and locations, the EFDA, with the support of DHA, has developed and endorsed the GTIN allocation guideline and Global Location Number allocation guideline.**



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### Interoperability Academy

The DHA team collaborated with the Mekelle University team to organize a hackathon for 11 final-year students and new graduates from four universities. The hackathon was conducted at St. Peter Innovation Lab over three days. The problem that participants were asked to solve was the interoperability of the components of eHealth architecture. After the hackathon, select students were given internship opportunities.

One of the many use cases identified in the eHA is the interoperability of EMR with eAPTS. Point-to-point integration between the two products for the use cases defined by MOH has been completed and all use cases have been tested and deployed at the TBGH instance. The integration will next be deployed in other EMR- and eAPTS-implementing facilities.

DHA, in collaboration with Mekelle University, also hosted the first Interoperability Academy training in Addis Ababa. Training participants were drawn from the MOH, Jimma University, DHA, and partner organizations such as the Clinton Health Access Initiative (CHAI), Project Hope, ICAP, the Last Ten Kilometers, and Jhpiego. The training covered concepts such as enterprise architecture design, data exchange standards, and mediators used for interoperability like OpenHIM and OpenFn. The final day of the training focused on identifying and discussing the use cases for the interoperability of subsystems in the eHA. Based on the valuable inputs provided by training participants, Mekelle University drafted a guideline document on the approach and methodology to enhance the interoperability of the eHA subsystems. Once the document is finalized and endorsed, it is expected to become a national guideline for interoperability developers to use in selecting interoperability methodology and technologies appropriate for specific use cases.



**DHA, in collaboration with Mekelle University, also hosted the first Interoperability Academy training in Addis Ababa.**



## II.1.4. Sub-Objective 1.4: Master Facility Registry Data Collection and Finalization

One of the foundational systems of the Ethiopian eHA is the Master Facility Registry (MFR). The MFR serves as a shared service in the eHA by providing facility data to all of the eHA subsystems. DHA has completed the development of the second version of the MFR, which resolves all identified problems related to performance and usability. The new version features a redesign and update of the MFR backend to include more robust and efficient technology with the same functional requirements as the first version. The second distinguishing feature of the new version is that it complies with the Fast Healthcare Interoperability Resources (FHIR) standard, which facilitates robust and seamless data exchange between the MFR and other standard-based tools. Two user acceptance trainings (UAT) were conducted with seven participants from the MOH HITD and regulatory directorates to vet the new version with stakeholders.

As part of developing MOH ownership of the MFR, DHA provided training to eight HITD staff on the technology used to develop the MFR. In addition, DHA provided MFR system administrator training to 13 MOH staff to enable them to support users during the implementation process.

DHA organized a three-day workshop and provided technical support to clean and reconcile health facility lists obtained from the MFR, DHIS2, and the geospatial coordinates of health facilities. DHA also supported the cleaning and reconciliation of data from over 18,000 public health facilities, including geospatial coordinates, using the customized Global Open Facility Registry (GOFR) tool. DHA is actively participating in the MFR TWG and providing technical support on the development of an MFR roadmap to create a single authoritative Ethiopian master facility list (MFL).



**DHA has completed the development of the second version of the MFR, which resolves all identified problems related to performance and usability.**



**DHA supported the cleaning and reconciliation of data from over**

**18,000**

**public health facilities**



## II.1.5. Sub-Objective 1.5: Support to Improve Information Communication Technology (ICT) Infrastructure and Connectivity at Health Facilities

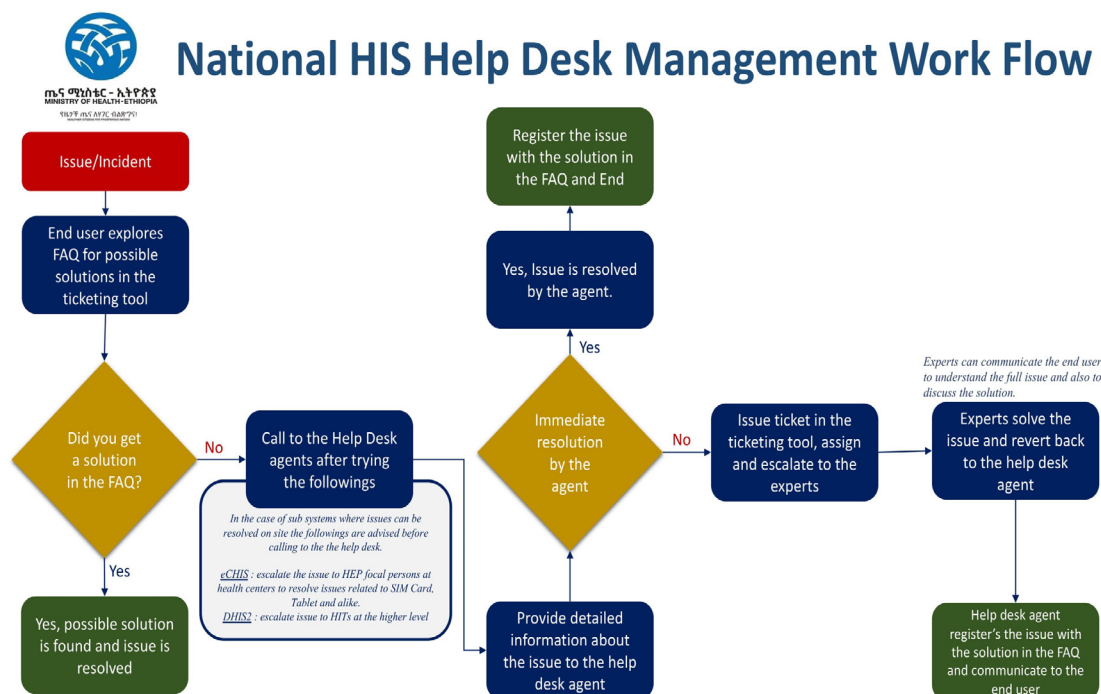


### II.1.5.1. Set Up a National HIS Help Desk in the Innovation Lab

Establishing a national help desk is one of the MOH's key activities for the current Ethiopian fiscal year. During this Activity year, DHA supported the creation of a help desk with six agents at the national Innovation Lab. The DHA team conducted a five-day

training for the agents. The project also designed a workflow for the helpdesk and oriented the agents to it (Figure 15). Health facilities have begun calling the helpdesk hotline for assistance.

Figure 15: National Health Information System (HIS) Help Desk Management Workflow



### Digital health and data support for conflict affected areas in northern Ethiopia

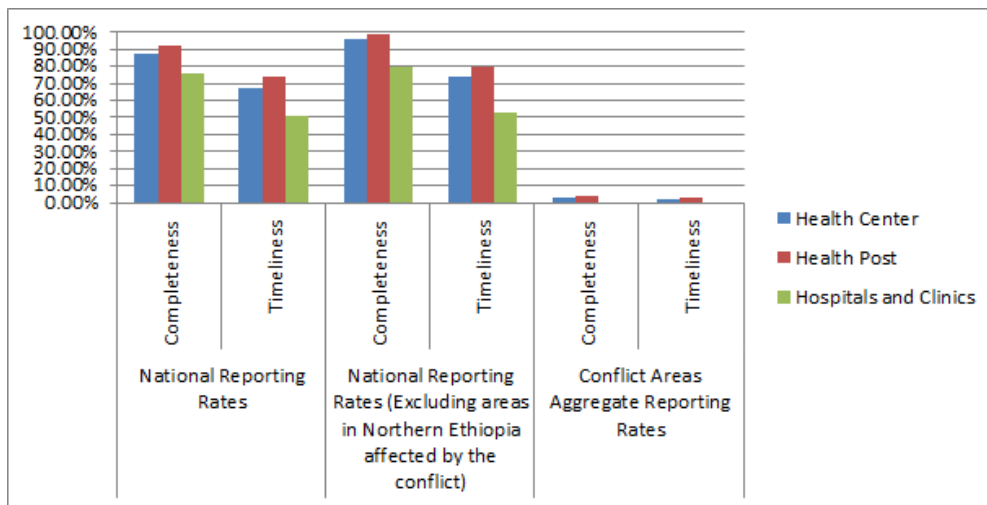
Armed conflicts are known to disrupt the provision of health services. Ethiopia has been experiencing armed conflicts in its northern regions of Tigray, Amhara, and Afar resulting in disruption of healthcare services and a significant number of internally displaced people (IDP).

Data on the effects of the conflict on the public health system is limited. The aggregate reporting rates at the national level for conflict affected areas in northern Ethiopia (Tigray, North Wollo, Wag Hemra, North Gondar (Only Aderkay and Telemt woredas) Zones of Amhara region, and Zone 02 of Afar Region) is

shown in Figure 16. In the conflict affected areas, monthly HMIS report completeness is three percent for health centers, four percent for health posts, and zero percent for the hospitals and clinics. The impact of the conflict on the national reporting rates is also significant. For instance, the national report completeness and timeliness are 87.19 percent and 67.39 percent respectively whereas these two figures jump to 96 percent and 72 percent when the facilities from conflict affected areas are excluded from the denominator. Similar trends are also observed in the hospital/clinic and health posts reporting.



**Figure 16: The effect of the conflict in Northern Ethiopia on HMIS reporting rates**



With such a level of data quality, it is difficult to understand the health situation of the population in the conflict areas through the routine reporting system. With this understanding, DHA has been working towards developing and implementing alternative reporting mechanisms with varied degrees of success. DHA, in collaboration with the Tigray RHB, has introduced alternative reporting mechanisms. This included reducing indicators to 27 to only monitor essential health services and making biweekly reporting every two weeks. An interactive voice response (IVR) reporting is used in areas where there is telephone connectivity. With these interventions, it was possible to collect routine health information weekly and use it for decision making at regional and national level. DHA also supported the inventory management and analysis at Mekelle and Shire hubs with special focus on programmatic commodities like HIV, TB and malaria, facilitated refill from central stores and tracked availability at facility level. DHA also trained over 180 newly deployed staff in the functional health facilities (when the region was accessible) and have been supporting the collection,

analysis and interpretation at both national and regional levels. DHA has engaged with Amhara RHB and the emergency team at MoH (when the conflict broke in the region) on how best to support the IDP sites. Leveraging the tools developed for Tigray, DHA will deploy an IVR and a digital tool which will help the clinics in the IDP sites to collect, analyse and use the data for decision making. It will also assist primary health care units supporting the internally displaced population by providing support in supply chain information, health data collection, analysis and interpretation.

“**DHA, in collaboration with the Tigray RHB, has introduced alternative reporting mechanisms. This included reducing indicators to 27 to only monitor essential health services and making biweekly reporting every two weeks.**”

“**DHA has engaged with Amhara RHB and the emergency team at MoH (when the conflict broke in the region) on how best to support the IDP sites.**”

## Support for the National COVID19 Response



DHA has supported the national **COVID-19** response at both national and regional levels. A suite of digital tools used for the national COVID-19 surveillance and tracking system have been developed and maintained. The system supports the enrollment and tracking of suspected cases; captures symptoms, demographics, risk factors, and exposures; and monitors patient outcomes.

In addition, a port-of-entry health declaration system has been developed and implemented to record personal identification information, including phone number; travel history, health symptoms, and the geo-location of Ethiopian residents. A home-based isolation and care application has been developed and is being used for follow-up with home-based patients. Thus far, 394 patients have been managed using the application. To support an equitable and targeted COVID-19 vaccination program, a client tracker system has been piloted and is ready for scale up.

Beginning with the country's first case identification of the COVID-19 pandemic, the MOH, through Her Excellency Dr. Lia Taddesse, has published a daily COVID-19 report (via social media and other communication platforms) that includes data on lab tests conducted, critically ill patients, deaths, and recovered cases (Figure 17). From the inception of this effort, DHA has supported it by deploying data analysts and providing data management tools for collecting, cleaning, and reporting data to the MOH. The daily report is disseminated broadly to raise awareness and monitor the pandemic.

**DHA has supported the national COVID-19 response at both national and regional levels.**

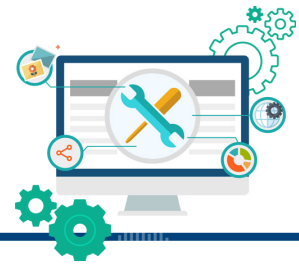
**Figure 17. Dashboard of COVID-19 Reported Cases in Ethiopia 09/10/2021**



vaccinated beneficiaries, and make decisions based on the reports. The application has been deployed and published in the Google Play Store. In addition to the mobile app, DHA has developed a Telegram and Messenger bot for reporting AEFI. The bot captures basic information such as the identity of the reporter, the date of vaccination, and symptoms experienced.

To record and organize data on adverse events following immunization (AEFI) for COVID-19 vaccines, the DHA team has developed a mobile application for a standard AEFI reporting form. The application allows vaccinated individuals and health professionals to report adverse reaction events. It will also enable the EFDA to track the reports and risks associated with the vaccines as well as the status of

## II.1.5.2. Maintenance and Support of HealthNet



Connectivity is key for the successful implementation of an HIS because it enables real-time access to data for effective decision-making and contributes to improvements in the quality of health care interventions. HealthNet is a virtual network that health facilities use to report HMIS data. DHA has worked to extend the benefits of HealthNet connectivity to additional health facility service delivery rooms, with a focus on enabling GeneXpert devices and facility stores to connect to HealthNet. GeneXpert devices diagnose TB and allow clinicians to detect the presence of TB bacteria in the human body. The device is able to send detailed data to a central server at the EPHI that can be accessed by the National TB Program (NTP). The data, which incorporates daily testing information and operator-related data (including operator errors), supports the NTP to enact timely programmatic interventions. The GxAlert provides a timely report about the device to a focal person at the EPHI, who uses a customized dashboard to remotely track the functionality of the GeneXpert devices as well as errors by device operators to guide tailored onsite support. Similarly, the NTP and partners working on TB programs use the dashboard to understand gaps and provide support for laboratory services.

Connecting GeneXpert devices enables uninterrupted reporting to the central server. DHA, through its consortium WebSprix, has been working on extending the local area network (LAN) of select high load TB sites in Addis Ababa. During the last two quarters of this reporting year, DHA has engaged youth enterprises (YEs) and WebSprix in this activity nationally and has extended HealthNet connectivity to 38 GeneXpert sites (13 in the regions and 25 in Addis Ababa).

Working closely with the EPHI GeneXpert national focal team and the USAID Eliminate TB Project, DHA selected 96 remote GeneXpert sites to expand connectivity using dongles. Ninety-six HealthNet-subscribed SIM cards have been delivered to the EPHI to be used with dongles readied by the Eliminate TB Project. The GxAlert dashboard provides such updates as the facilities' connectivity status, total tests conducted, errors, and results (Figure 18). GxAlert reports consumption data, a crucial input for effective cartridge forecasting and quantification, which contributes to reducing stockouts and cartridge expiration. Via the dashboard, one can easily calculate facility error rates and conduct a need-based training.

**Figure 18. GxAlert Screen Capture**

Device	Status	Reporting For	Last Seen	Total Tests	MTB	MTB+Rif	MTB+Rif+	MTB+Rif++	Errors	Incid	No. Rpt
Borumeda Hospital	Active	2 years	11 days ago	2,298	1,977	166	53	7	59	11	25
Burie hospital	Active	3 years	19 hours ago	3,220	2,881	180	10	3	48	11	87
Chagni Hospital	Active	4 years	17 hours ago	6,659	5,873	335	13	5	116	32	285
Dangila Hospital	Active	3 years	an hour ago	2,502	2,214	125	13	3	89	12	46
Debark Hospital	Active	5 years	2 months ago	8,661	6,894	591	27	14	255	271	609
Debrebirhan Referral Hospital Laboratory M1	Active	3 years	20 days ago	4,328	3,276	485	17	8	402	90	50
Debrebirhan Referral Hospital Laboratory M2	Active	5 years	15 days	14,935	11,845	1,488	134	31	1,084	201	152

HealthNet connectivity has been extended to facility stores to enable internet access to the Dagu stock management application so that refill requisition and reporting can be sent electronically to EPSA distribution hubs. During AY2, DHA also conducted a joint supervision with the EPHI team at GeneXpert

sites in Addis Ababa whose LAN has been extended. Moreover, the HealthNet monitoring tool deployed in the regions in the previous quarter is being used to remotely monitor HealthNet connectivity uptime at health facilities.

## II.2. Objective 2: Build a Culture of Data Use

Data generated from health services are used for evidence-based planning, performance monitoring, resource allocation, and other clinical and administrative decision-making intended to improve service quality and health outcomes. However, data produced from health services is of poor quality, which limits its usefulness. The major causes of poor data quality and use are technical, organizational, and behavioral factors, including the lack of data

management skills, inadequate supervision and feedback, and the paucity of resources. To address these issues, DHA has implemented interventions that aim to build a culture of data use at the health facility and woreda levels. In addition, DHA provides systems-strengthening support to the MOH and RHBs.

### II.2.1. Sub-objective 2.1: Roll-Out Gender Balanced Data Use Strategies and Ensure Data Quality to Strengthen National and Regional Data Use and Quality Endeavors

**Support revision and cascading of national HMIS indicators:** During this reporting year, DHA supported the MOH in the revision of national HMIS indicators. This revision followed the health sector transformation plan (HSTP-2), which introduced new programs and changes in national priorities that generated new data demands. The revision of indicators necessitated updates to recording and reporting tools, including the introduction of new patient-level cards, program-level registers, tally sheets, and reporting forms. DHA also provided logistics support in the Oromia and SNNPR regions for timely distribution of recording and reporting tools. In the coming year, the project will continue to support cascading of the new HMIS by building the capacity of staff in health facilities and woreda health offices.



**DHA supported the MOH in the revision of national HMIS indicators.**



**Strengthen data review, analysis, and feedback processes:** DHA has supported RHBs and zonal health departments to improve the quality of data in HMIS reports through periodic desk reviews. Findings from the desk reviews were shared with the woredas. In addition, the Activity played a key role in supporting the production and dissemination of the MOH's quarterly HMIS analytics report, which focused on COVID-19 and the availability of essential commodities. DHA introduced new components to the analytics report, including incorporating data

from additional sources, such as COVID surveillance and health commodities supply chain systems. DHA also supported the EPHI to develop surveillance data quality assurance guidelines, which involved convening 25 surveillance data experts from the MOH, the EPHI, Regional PHEM offices, and CDC to deliberate and draft the Data Quality Guideline. The new guideline will be incorporated in upcoming capacity-building activities for PHEM officers.



**DHA has supported RHBs and zonal health departments to improve the quality of data in HMIS reports through periodic desk reviews.**



**Improve reporting rates and the timeliness of reporting from private health facilities:** The HMIS service coverage and disease reporting by private health facilities have been poor, which contributed to underreporting of data in the national HMIS report on service coverage, disease burden, and health outcomes. During this reporting year, DHA supported the MOH to conduct a rapid assessment to understand the root causes of the poor reporting and design interventions. DHA supported the provision of a three-day training on DHIS2 recording, reporting, and data use for 84 health information officers from high load private health facilities. The training and other advocacy interventions by the MOH and RHBs have increased the number of private health facilities

reporting through DHIS2 by 21 percent (from 3,678 to 4,454), boosted reporting rates from 25.3 to 30.6 percent, and improved the timeliness of reports from 14.9 to 20.9 percent. Despite this progress, there remains much to be done to raise private health facility reporting rates to parallel those of public health facilities.

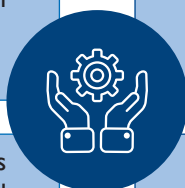


**The training and other advocacy interventions by the MOH and RHBs have increased the number of private health facilities reporting through DHIS2 by 21 percent (from 3,678 to 4,454), boosted reporting rates from 25.3 to 30.6 percent, and improved the timeliness of reports from 14.9 to 20.9 percent.**



Technical and financial support to RHBs in Oromia, Afar, Benishangul, Gambella, Sidama, and SNNPR regions to conduct annual regional level performance review meetings.

Technical and financial support for every region's information revolution (IR) model woreda planning and review meeting. These meetings resulted in the development of joint intervention and implementation plans.



Supported five rounds of review meetings in the Amhara region in which woreda and zonal planning and HMIS officers participated. During the meetings, data quality, data use, the implementation of DHIS2, eCHIS, and EMR, and connected woreda implementation were discussed. The Activity supported the development of zonal level action plans developed to respond to identified gaps and priorities. The action plans focused on improving data quality, accelerating the implementation of digital systems, and enhancing data-use practices.

Supported two rounds of review meetings in Addis Ababa that primarily assessed the progress of the connected woreda and IR hospital implementation. The meetings identified limited engagement and support from leadership as major barriers to strengthening HIS throughout the health system.



**DHA supported regularly scheduled data review meetings at the national, regional and woreda levels.**



**Support to the EFDA and EPSA centers and hubs to enhance data use for decision-making:**

DHA supported the EPSA in refining the agency's key performance indicators (KPIs). The corporate-level KPIs and other key health commodity supply chain indicators were automated and made publicly available. Each week DHA shares with USAID and the MOH the Fanos dashboard, which highlights product availability on selected indicators from the hubs and warehouses. DHA has also provided health sector leaders with much-needed insight into EPSA's operations. . On average, there have been about 85 active users of the Fanos dashboard per month. In addition, DHA has continued to regularly review indicators and develop dashboards on the eRIS to support the EFDA's use of evidence for decision-making. The data generated by eRIS modules such as i-License, i-Register, and i-Import are being reviewed to streamline key indicators useful in decision-making and improve the level of additional analysis.



**Each week DHA shares with USAID and the MOH the Fanos dashboard, which highlights product availability on selected indicators from the hubs and warehouses.**



**Build the capacity of health workers in data quality verification and information use:**

DHA supported the MOH and RHBs to cascade the national Integrated Information Use and Data Quality training to the woreda level. One thousand nine hundred sixty-one woreda Performance Monitoring Team (PMT) members from 300 woreda health offices across the regions participated in the training. The training aimed to build a culture of data use by enhancing participants' skills in using DHIS2, applying key data quality procedures, and advancing their understanding of the role of the PMT.

DHA provided support by preparing training materials, assisting with logistics, and supporting the training in select areas. In addition, DHA delivered advanced data analytics training to RHB program staff. During this reporting year, two rounds of training were conducted for health program experts in the Somali and Sidama RHBs.

**Provide support to national and regional supportive supervision:**

DHA provided technical and logistics support to national and regional level integrated and HIS-specific supportive supervision. The support helped improve the documentation of supervision findings for use in subsequent supervision, included the following:



**DHA supported the EPSA in refining the agency's key performance indicators (KPIs).**





Developed an open data kit (ODK) system for data collection during supervision, which facilitated electronic data collection and transmission to a central server, resulting in improved data quality and reporting. The ODK enhanced the timely provision of on-the-spot oral and post-IS written feedback and improved the quality of documentation for subsequent follow up supervision.

Provided support to the Amhara RHB during integrated supportive supervision, which has included logistics support and deploying DHA's field staff as part of the supervision team



Supported the Oromia RHB to conduct supportive supervision to monitor the implementation of eCHIS, HealthNet, and LAN installations at health facilities in select zones.

Through multiple rounds of HIS-specific supportive supervision in Addis Ababa, and the Afar, Amhara, and other regions to monitor and provide support on data quality and information use at the point of data generation

### **Support data-driven strategic and operational planning (HSTP2 and woreda-based planning):**

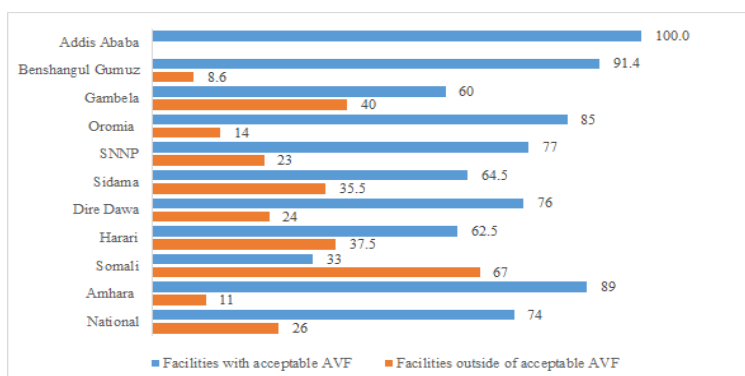
DHA supported the MOH during the development and finalization of HSTP2. Technical support was provided to articulate the health information and digital health sections of HSTP2. DHA supported the translation and final revision workshop, including the final editing and design of the HSTP2 document. This support enabled the MOH to develop a national health sector strategic plan based on evidence from routine and non-routine health data. The Activity also supported woreda-based planning, promoting a bottom-up planning process in the Somali region. DHA supported the implementation of joint woreda-based health sector plan (WBHSP) supportive supervision in the SNNPR region and helped to customize the WBHSP template.

Across the three RDQA rounds, five common indicators (i.e., skilled birth attendance, Penta 3 coverage under one-year age, percentage of people living with HIV who know their status, TB case detection—all forms, and malaria positivity rate) were assessed in all regions except Addis Ababa, where the malaria positivity rate was excluded, and in the Harari and Somali regions, where the percentage of people living with HIV who know their status was excluded. The verification factors (VFs), computed as the percentage of recounted values from those reported for all indicators, are calculated (Figures 19-20). The VFs between 90 and 110 percent are considered an acceptable range, values over 110 percent are considered significant under-reporting, and values below 90 percent are considered significant over reporting.

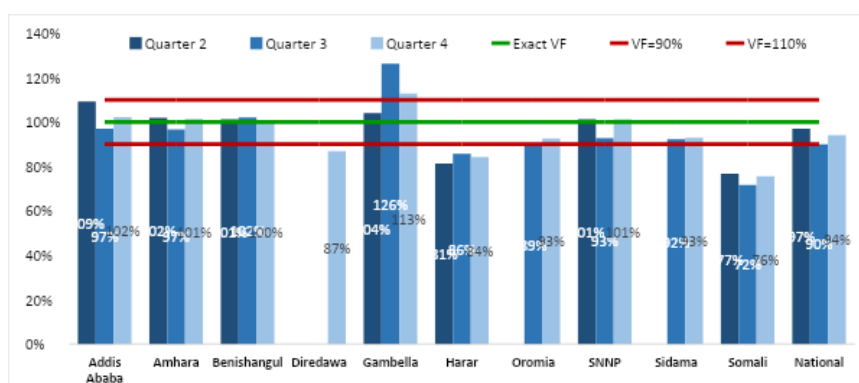
### **Data Quality Verification**

During the last three quarters of this Activity year, DHA has supported woredas to conduct quarterly routine data quality assessment (RDQA). Three rounds of RDQA have been conducted using data reported by health facilities. In the first round assessment, 47 woredas conducted the RDQA at three hospitals and 171 health centers. During a second round assessment, 57 woredas conducted RDQA in 209 health centers and three hospitals. The third round assessment included 311 health facilities.

**Figure 19. Percentage of Facilities with an Acceptable Average Verification Factor for 5 Selected Indicators during the Third Round Assessment (n=311)**



**Figure 20. Trends of Average Verification Factor over the Three Assessment Rounds by Region**



Trends in regional average VF measure the changes in data quality for the selected indicators over the three assessment rounds. The average verification factors based on the data obtained from all facilities were 97.5 percent in the first round of assessment, 89.5 percent in the second, and 96.98 percent in the third round. Because the number of facilities varied significantly between the first round of assessment and the final two rounds, it is important to interpret these data cautiously.

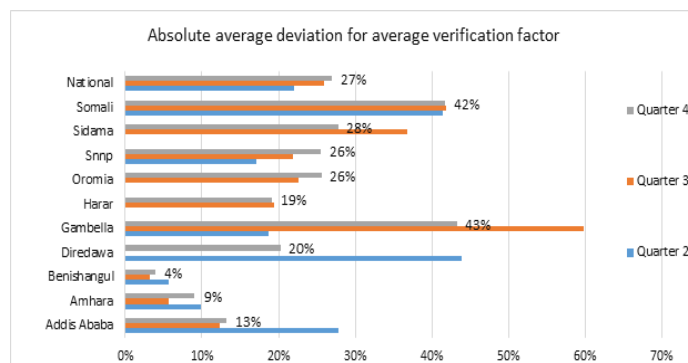
While the average percentage of verified data was between 90 and- 110 percent in five of the seven regions included in the first round assessment, it was less than 90percent in the Somali and Harari regions, which indicates over reporting. During the second round assessment, the average regional verification factor was out of the acceptable range in four regions, namely Gambella, Oromia, Harari, and Somali. In the third round, six of 10 regions included in the assessment registered average verification factors within an acceptable range, but the average verification factor for the Gambella, Harari, and Somali regions and Dire Dawa were outside the acceptable range. The average verification factor should be interpreted cautiously because over reporting would

be canceled out by underreporting, resulting in an average within the normal range.

The average absolute deviation (AAD) from 100 percent (the highest attainable data quality) was calculated for the three assessment rounds, yielding an AAD of 22, 26, and 27percent, respectively (Figure 21). The increase in AAD over time shows increases in the variability of data accuracy among regions over the three assessment periods. In all regions except Amhara and Beneshangul Gumuz, the AAD exceeded 10 percent, indicating either over- or underreporting. A very high AAD occurred in all assessment rounds in the Somali region. In at least one of the rounds, the AAD is very high in the Gambella region and Addis Ababa City Administration. In general, the deviations primarily involved overreporting in most of the regions.

**“ The average verification factors based on the data obtained from all facilities were 97.5 percent in the first round of assessment, 89.5 percent in the second, and 96.98 percent in the third round. ”**

**Figure 21. Average Absolute deviation (AAD) of the VF by Region**



**The average absolute deviation (AAD) from 100 percent (the highest attainable data quality) was calculated for the three assessment rounds, yielding an AAD of 22, 26, and 27 percent, respectively.**



## II.2.2. Sub-objective 2.2: Supporting Implementation of the Connected Woreda Program in 100 Woredas

During this reporting year, DHA has supported 86 woredas and 263 health facilities to implement the connected woreda strategy. Unfortunately, 11 woredas became inaccessible due to security reasons after DHA began these interventions. Using findings from the baseline assessment conducted in each health institution, DHA, in collaboration with the RHBs and woreda health offices, developed a joint intervention plan for each woreda. The interventions included developing data management capacity, providing eCHIS implementation support in agrarian woredas, conducting regularly scheduled mentorship and supportive supervision, providing OJT, and providing material and RDQA support. The interventions targeted improvements in the three components of the connected woreda strategy: HIS capacity and infrastructure, data quality, and information use.

A comparative analysis of grading (baseline versus first post-implementation assessment) for woreda health offices and health facilities supported by DHA was made during the year. The result shows that most of the health institutions supported by DHA (n=272) were at the emerging level at baseline, while the remaining 62 were at candidate level. There were no model level health institutions at baseline. The overall average score of the health institutions at baseline was

44.3 out of 100. Following nine months of tailored interventions, reassessment was conducted at the end of AY2. At that point, while five health centers had achieved model status, the number of candidate health institutions increased from 62 to 147, and the number of emerging facilities decreased from 272 to 184. The average post-intervention score increased by 14.3 points, resulting in an average of 58.6 out of 100, which represents a 56 percent increase from baseline.



**During this reporting year, DHA has supported 86 woredas and 263 health facilities to implement the connected woreda strategy.**



Of the 10 regions involved in the assessment, four demonstrated improvement higher than the national average: Addis Ababa at 72 percent, Harari at 70 percent, Dire Dawa at 91 percent, and Somali at 83 percent. Of the 335 health institutions involved in the baseline and post-intervention assessments, 232 (69 percent) demonstrated improvement of at least 15 percent from baseline. Of the 106 health institutions that did not show improvement, 51 (15 percent) had higher scores at baseline than at post-intervention.

This drop in assessment scores has been attributed to the following factors: disruption of support due to local conflict situations and inflated grading during the baseline assessment (Figure 22, Table 3).

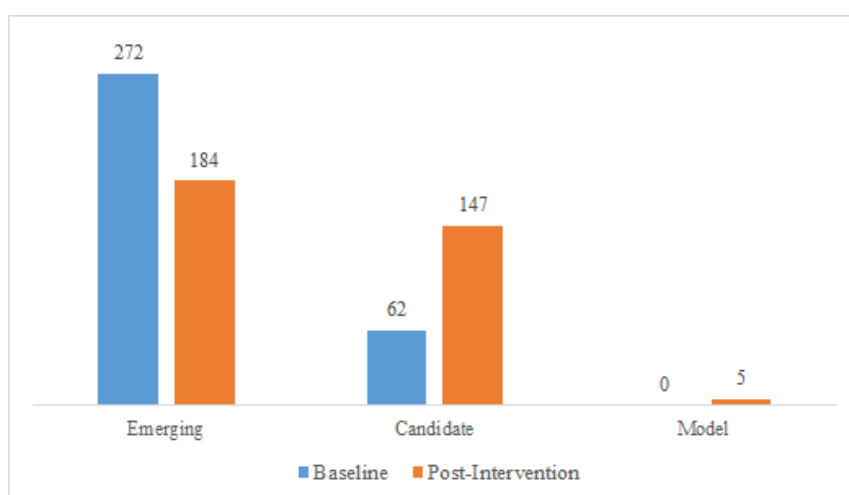


**The number of candidate health institutions increased from 62 to 147, and the number of emerging facilities decreased from 272 to 184.**



**The average post-intervention score increased by**  
**14.3**  
**which represents a**  
**56**  
**percent increase from baseline**

**Figure 22. IR Woreda and HC Grading at Baseline and 9 Months Post-Intervention**



**Table 3: Average Connected Woreda Scores at Baseline and 9 Months Post-Intervention by Region**

Region	# of health institutions supported	Average IR Score		Average score improvement	Average percentage improvement
		Baseline	Post-intervention		
Addis Ababa	21	44.02	71.88	27.86	72%
Gambella	15	41.2	51.4	10.2	41%
Benishangul G.	12	45.5	59.75	13.25	44%
SNNPR	53	42.35	56.44	14.09	49%
Sidama	20	52.75	67.24	14.49	39%
Dire Dawa	3	38.2	69.0	30.8	91%
Harari	5	43.1	66.3	23.2	70%
Oromia	86	46.33	59.59	13.26	50%
Amhara	65	61	74.94	14.17	37%
Somali	64	27.1	37.18	9.79	83%
<b>National</b>	<b>344</b>	<b>44.3</b>	<b>58.61</b>	<b>14.34</b>	<b>56%</b>

## 2.2.1. Health Information System (HIS) Capacity and Infrastructure



At baseline, the average HIS capacity and infrastructure score was 11.4 out of 30. The post-intervention assessment reveals a 52 percent average national improvement (the post-intervention average score

was 17.26) (Table 4). The Harari, Oromia, Dire Dawa, and Amhara regions demonstrated improvement above the national average.

**Table 4. Average HIS Capacity and Infrastructure Scores by Region**

Region	Average HIS capacity and infrastructure Score (Out of 30)		Average score improvement	Average percentage improvement
	Baseline	Post-intervention		
Addis Ababa	17.43	22.24	4.81	28%
Gambella	14.53	17.8	3.27	22%
Benishangul G.	13.75	16.09	2.34	17%
SNNPR	10.64	15.99	5.35	50%
Sidama	12.77	18.30	5.52	43%
Diredawa	13.3	21.3	8.00	60%
Harari	12.6	21.7	9.10	72%
Oromia	10.92	17.55	6.63	61%
Amhara	13.74	21.16	7.42	54%
Somali	6.88	12.23	5.35	78%
National	<b>11.4</b>	<b>17.26</b>	<b>5.88</b>	<b>52%</b>

The most common factors contributing to the score improvements that appear in Table 4 include:



- DHIS2 coverage in health facilities improved
- Shelves and card room arrangements in medical recording units improved
- Dedicated office space for HMIS was prepared and organized
- The number of health facilities with dedicated HMIS focal persons increased
- Improved availability of recording and reporting tools
- The availability of computers, printers, and other accessories at woredas and health facilities to support the use of digital health tools increased
- Agrarian woredas that implemented eCHIS
- Supply chain systems (such as mBrana and Dagu) rolled out in select health facilities
- Health facilities were supported to improve the functionality of HealthNet

“The post-intervention assessment reveals a 52 percent average national improvement.”

## 2.2.2. Data Quality Improvement



The average data quality score at baseline was 17.9 out of 30, higher than the average baseline score for HIS capacity and infrastructure. After nine months of data quality improvement interventions, the average score rose to 21.81 out of 30, a 22 percent improvement from baseline. Addis Ababa demonstrated the largest improvement in data quality, followed by the Dire

Dawa, Benishangul Gumuz, Gambella, and Oromia regions. The remaining regions scored below the national average, with the Harari region scoring below its baseline. Overall, the post-intervention data quality score of all regions except Gambella and Somali is above 20 out of 30, an encouraging result compared to baseline scores (Table 5).

**Table 5. Average Data Quality Scores at Baseline and 9 Months Post-Intervention by Region**

Region	Average Data Quality Score (out of 30)		Average score improvement	Average percentage improvement
	Baseline	Post-intervention		
Addis Ababa	13.95	25.48	11.52	83%
Gambella	13.13	17.00	3.87	29%
Benishangul G.	19.00	24.45	5.45	29%
SNNPR	17.55	20.86	3.32	19%
Sidama	20.25	24.98	4.73	23%
Diredawa	16.00	21.00	5.00	31%
Harari	20.60	20.00	-0.60	-3%
Oromia	18.32	22.44	4.12	22%
Amhara	23.88	26.54	2.66	11%
Somali	13.49	16.39	2.90	21%
National average	17.9	21.81	3.88	22%

The most common factors contributing to the score improvements that appear in Table 5 include:



### IMPROVEMENTS

- Health facilities regularly conducted and documented Lot Quality Assurance Sampling (LQAS)
- Woreda health offices routinely provided performance and data quality feedback to health facilities
- Woredas regularly conducted RDQAs with minimal technical support from DHA
- Data quality (e.g., reporting rates, data timeliness and accuracy) at the health facility level improved as evidenced by the RDQA result



**After nine months of data quality improvement interventions, the average score rose to 21.81 out of 30, a 22 percent improvement from baseline.**







## 2.2.3 Information Use

The average baseline score for information use was quite low (14.9 out of 40) when DHA began information use improvement interventions. As a result of mentorship and other capacity-building initiatives, the average score improved by 25 percent to 18.85 out of 40, which is still significantly lower than the expected score (Table 6). Some regions demonstrated significant improvement from their

baseline (i.e., Dire Dawa, Harari, Addis Ababa, and SNNPR). The lowest improvement was shown in the Amhara region, despite registering the highest information use post-intervention score (24.56) compared to the other regions.

**Table 6. Average Information Use Scores at Baseline and 9 Months Post-Intervention by Region**

Region	Average Information Use Score (out of 40)		Average score improvement	Average percentage improvement
	Baseline	Post-intervention		
Addis Ababa	12.60	24.17	11.57	92%
Gambella	13.53	16.60	3.07	23%
Benishangul G.	12.75	15.45	2.70	21%
SNNPR	14.16	19.05	4.88	34%
Sidama	20.16	23.96	3.80	19%
Diredawa	9.6	26.7	17.08	178%
Harari	9.9	24.6	14.70	148%
Oromia	16.55	19.79	3.24	20%
Amhara	23	24.56	2.03	9%
Somali	6.7	8.82	2.09	31%
National Average	14.9	18.66	3.77	25%

**The most common factors contributing to the score improvements that appear in Table 6 include:**



### IMPROVEMENTS

- Woreda and facility Performance Monitoring Teams were revitalized and strengthened
- Health workers' capacities in some data use competencies improved
- The use of data increased during woreda and facility-level supervision and review meetings
- Data management practices (e.g., data recording and reporting) improved
- Data analysis and visualization practices improved

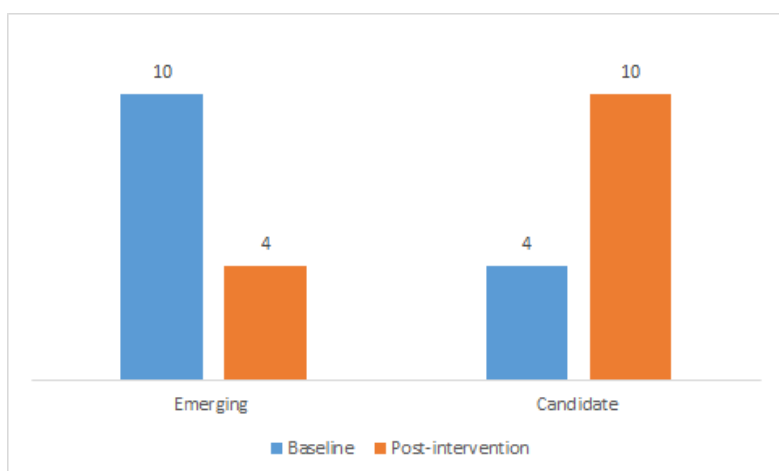
**“ The average baseline score for information use was quite low (14.9 out of 40) when DHA began information use improvement interventions. As a result of mentorship and other capacity-building initiatives, the average score improved by 25 percent to 18.85 out of 40. ”**

## II.2.3. Sub-objective 2.3: Supporting Creation of Eighteen IR Model Hospitals

DHA has supported 23 hospitals across the regions to improve data quality and information use for decision-making. Of the 23 hospitals included in IR implementation, 14 were assessed at baseline and nine months post-intervention. There were 10 emerging

and four candidate hospitals at baseline. Following intervention, while six of the 10 emerging hospitals improved their score and became candidates, the four candidate hospitals did not experience a significant change in score.

**Figure 23. Average IR Model Hospital Grading at Baseline and 9 Months Post-Intervention**



**The IR hospital assessment results displayed in Table 7 reveal a 45 percent average improvement between baseline and post-intervention.**”

The Addis Ababa, Amhara, Oromia, and SNNP regions had post-intervention scores higher than the national average. Overall, the hospitals showed encouraging progress, with some having the potential to achieve model status if the current support continues.

The hospitals in the Sidama and Benishangul Gumuz regions and in Addis Ababa demonstrated improvement above the national average. The lowest improvement score occurred in Gambella.

**Table 7: Average IR Score of DHA-Supported IR Hospitals by Region**

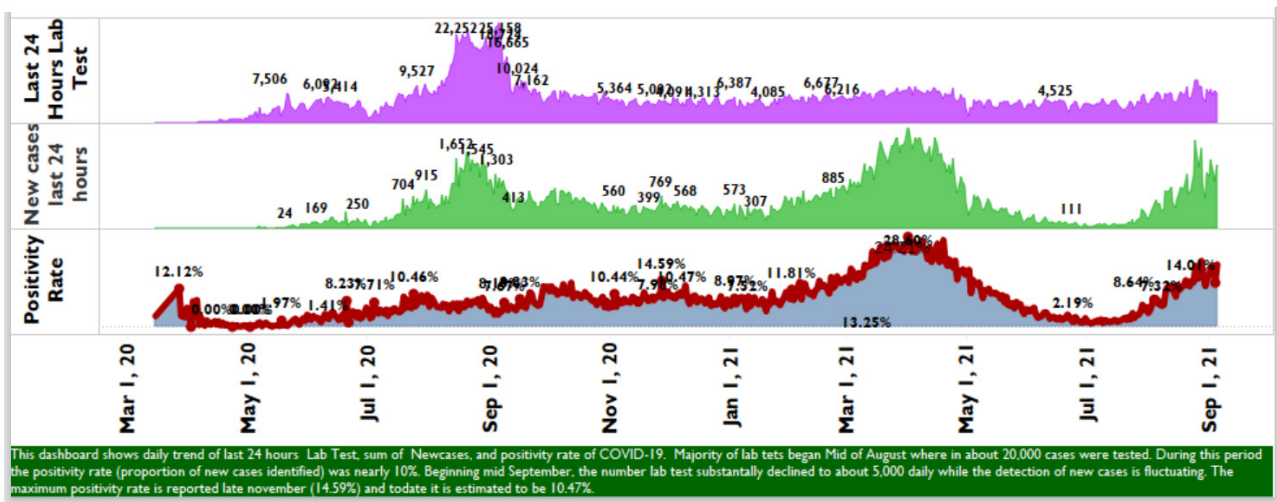
Region	# of hospitals supported	Average IR Score		Average score improvement	Average percentage improvement
		Baseline	Post-intervention		
Addis Ababa	2	52.5	75.375	22.875	44%
Gambella	1	74	76	2	3%
Benishangul G.	1	32	56	24	75%
SNNPR	2	55.375	70.5	15.13	27%
Sidama	1	37.25	70	32.75	88%
Oromia	3	53.13	72.67	19.54	37%
Amhara	2	65.63	74	8.375	13%
Somali	2	36.25	50	13.75	38%
National average	14	51.46	67.34	15.67	45%

## II.2.4. Sub-objective 2.4: Data Analytics Platforms and Capacity

During this reporting year, DHA created several new dashboards and shared them with stakeholders, including the 32 weekly dashboards disseminated between April 2 and September 6, 2021. Below are descriptions of the most significant new dashboards.

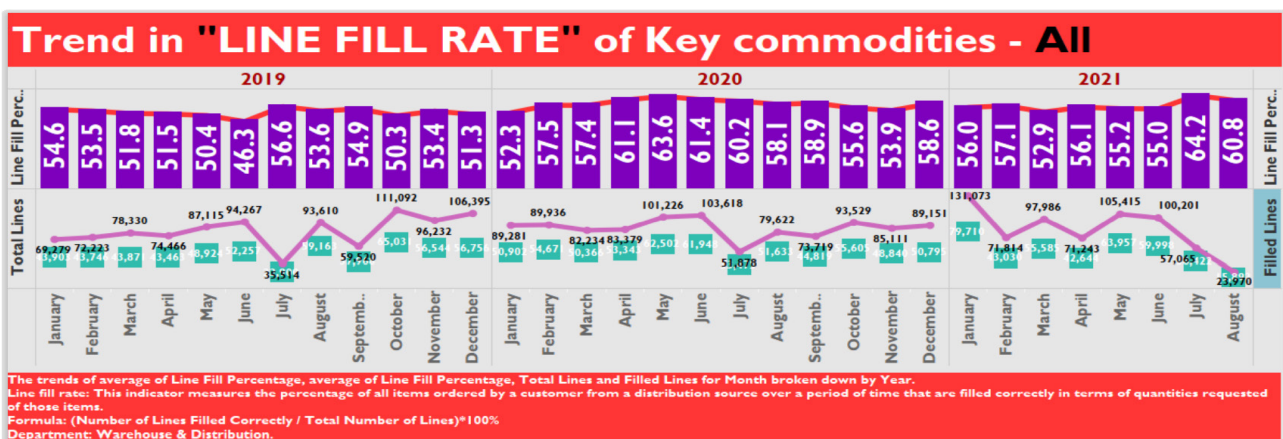
**COVID-19:** This dashboard uses data from the World Health Organization (WHO), the EPHI, Travelers, and Addis Ababa City Administration. It contains insights based on such factors as analyses of trends, geospatial distribution of key indicators, and disaggregation of socioeconomic and demographic variables (Figure 24).

Figure 24. Sample Dashboard: Trends in National COVID-19 Positivity Rates (March 1, 2020 to September 5, 2021)



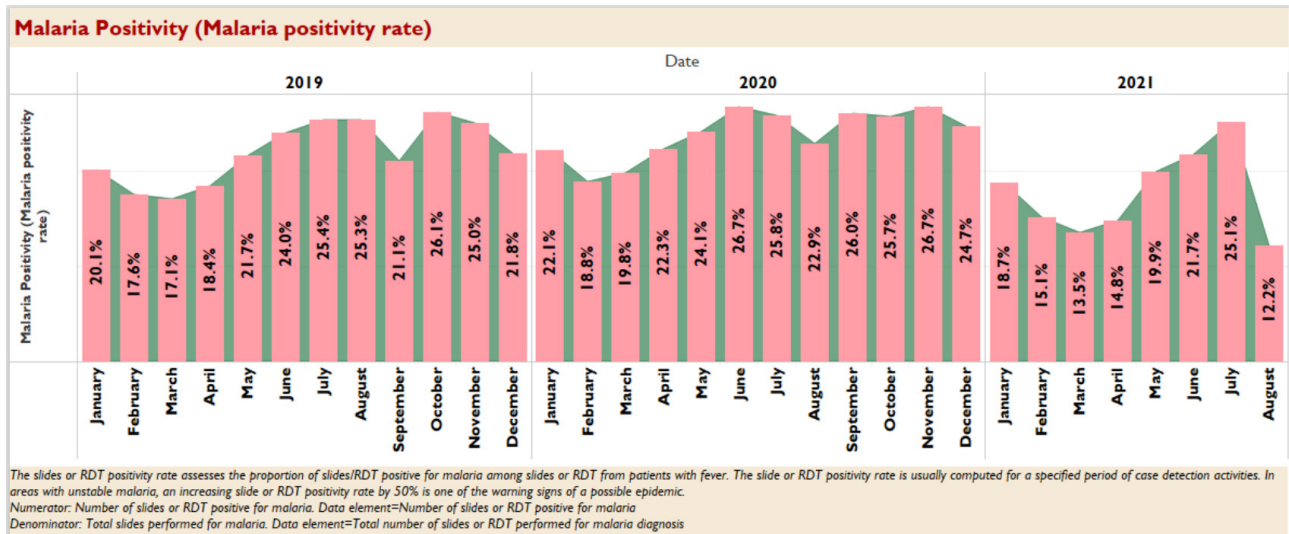
**Health commodities and logistics management:** In this dashboard, three key indicators (line fill rate, product availability, and stock according to plan of key commodities) are summarized by month and location (Figure 25).

Figure 25. Sample Dashboard: Trends in Line Fill Rates (January 2019 to August 2021)



**Health Management Information System:** 21 indicators are regularly populated and analyzed from the HMIS to monitor service uptake for select health services. The dashboards (Figure 26) contain information about clinical indicators, maternal and child health issues, and diseases (TB and malaria).

Figure 26. Sample Dashboard: Trends in Malaria Positivity Rates (January 2019 to August 2021)



These dashboards are being disseminated through diverse channels, including a Telegram group with 261 stakeholders, a WhatsApp group, email

communications, and monthly presentations to USAID Implementing Partners and health office staff.

## II.3. Objective 3: Capacity-Building and Governance

### II.3.1. Sub-objective 3.1: HIS Governance Support

#### Digital Health Blueprint

In keeping with the Digital Ethiopia Strategy, the MOH has identified digital transformation and its governance as one of the key priorities for the health sector in the coming five years. DHA, along with other partners and its subgrantee Mekelle University, has supported the MOH in the development of the national DHBp, which is designed to bring quality, affordability, equity, and technology-enabled health service delivery by 2030 (Figure 27).

“  
**The DHBp is meant to provide guidance and insight for the implementation of emerging technologies, new priorities, and opportunities for digital health solutions in an evolutionary and sustainable manner aligned with our health system transformation agenda.**  
 ”

*Dr. Lia Tadesse, Minister, MOH*

Figure 27. DHBp Team Discussion at the MOH



The blueprint was created to guide the MOH, RHBs, agencies, donors, implementing partners, private sectors, and academia in the implementation of digital health in the coming ten years. It encompasses the overarching vision of digital health choices, building blocks, enablers, and opportunities to bring about a positive impact on health outcomes. The blueprint

is a comprehensive, authoritative guiding document designed to govern the alignment of fragmented initiatives and disjointed investments. The DHBp was launched during the first National Digital Health Conference and Exhibition held September 14-15, 2021.

### **National Standard for the Electronic Health Record (EHR) System**

Over the past few years, the MOH has been exploring EMR platforms developed and implemented by private, public, and other health service delivery institutions. It was observed that most of the EMR systems automate only some aspects of health services and most cannot be used to exchange patient data with other e-health systems. Additionally, the systems do not address the growing need for individual-level data for better patient care and follow-up. Finally, the data collected in such systems lack uniformity as there is typically no requirement at the national level to enforce EMR system compliance.

In response to these gaps, DHA supported the MOH in the development of the national EHR standard. The standard defines the core functions and modules as well as the minimum dataset of an EHR system that includes key modules like interoperability,

security, ownership, and system implementation requirements. The EHR standard is believed to support all service delivery outlets to produce the desired outcomes. The standard encompasses eight core EHR functional areas, 90 functionalities, and 15 modules (subsystems). During development of the EHR standard, capabilities that support safe, efficient, effective, and patient-centered medical practices were assigned the highest priority.

The EHR standard has been officially endorsed and was launched at the first National Digital Health Conference and Exhibition. A team established by the MOH is evaluating the EMR platforms deployed throughout the country using a checklist developed in accordance with the EHR standard (Figure 28).

**Figure 28. The EMR Platform Evaluation Team**



**The EHR standard has been officially endorsed and was launched at the first National Digital Health Conference and Exhibition.**





## ECHIS SOP and Implementation Manual

During this reporting year, DHA supported the MOH in developing an eCHIS implementation manual (Figure 29). The manual aims to streamline eCHIS implementation by clearly designating stakeholders' roles and responsibilities. The implementation manual creates a common framework that guides routine eCHIS implementation. It proposes the

establishment of a governing body to oversee and monitor eCHIS implementation, maintain sustainable financing, strengthen ICT infrastructure, promote intersectoral and multisectoral collaboration, strengthen monitoring and evaluation, and promote accountability, responsibility, and transparency in eCHIS implementation.

**Figure 29: Discussion of the eCHIS Implementation Manual**



## Standard Operating Procedures for Digital Health Systems

i-License

i-Register

Vitas

- **i-license:** The SOP applies to the seven branches of the EFDA involved in managing the i-license app and data. It describes the procedures for data management and ensuring that all data are collected, verified, and analyzed appropriately. DHA has shared the draft SOP with staff at the EFDA.
- **i-register:** The i-register SOP applies to all health service delivery points in the country, including hospitals, health centers, and health posts. It also applies to the EFDA's Medicine Registration and Customer Service Departments and enables EFDA authorities and applicants to carry out market authorization request and approval processes online.
- **VITAS:** This LMIS SOP guides the management of upstream and downstream supply chains, including Vitas, Dagu, Fanos, and mBrana. It helps the EPSA to minimize variation and promote quality through consistent implementation of procedures for VITAS and related systems. The SOP also directs staff in carrying out routine operations with the aim of achieving efficiency, quality, and uniformity while reducing miscommunication and lack of compliance with industry standards and regulations. Moreover, the SOP helps to monitor pharmaceuticals from procurement to distribution as well as their movement and storage in an agency and in regional hub warehouses.

### II.3.2. Sub-objective 3.2: Support Ministry of Health Innovation Lab

To ensure sustainable digital health development and implementation, DHA collaborated with the MOH to finalize several innovation and governance documents that are expected to contribute to

realizing the goals of the national Digital Health Innovation Lab. DHA supported the development of the following documents:



**DHA SUPPORTED**

- **Creative Strategy for the Innovation Lab:** This document will help to transform the Innovation Lab culture and make the lab an incubation center for implementing sustainable digital health solutions.
- **MOH Innovation Lab Administrative Guideline:** This document provides guidance for the Innovation Lab System Administrator, including the ethical and acceptable use of administrative access rights in managing and monitoring the lab's activities.
- **Innovation Lab Documentation and Archiving Policy:** This is a systematic guide that covers issues such as the challenges and benefits of gathering, preparing, and formatting documents; documentation procedures; file naming and organization; and metadata standards.
- **Innovation Lab ICT Policy:** This policy defines the working modalities of the health care workers, system developers, and administrators of the Innovation Lab. It also guides the HITD team in the proper and strategic use of ICT equipment with the goal of addressing the current and future needs of the lab.

### II.3.3. Sub-objective 3.3: Building Capacity of Health Science Colleges

DHA implements a comprehensive capacity-building strategy for sustainable digital health implementation in Ethiopia by improving the quality and relevance of the pre-service training of health information technicians (HITs), improving staff capacity at various levels of the health system through in-service training, creating organizational capacity at local universities for sustaining selected digital health platforms, and leveraging trained youth to provide grassroots level digital health implementation support. These interventions are interconnected and are expected to contribute to building in-country digital health capacity that leads to self-reliance and sustainability.

During this reporting year, DHA supported the review and revision of the HIT curriculum and the development of the HIT assessment tool, which included engaging experts from the MOH, the federal Technical and Vocational Education and Training (TVET) agency, universities, colleges, and implementing partners. The revised curriculum, which covers all sub-systems and tools (e.g., DHIS2, Dagu 2.0, eCHIS, EMR, and mBrana), has been

approved. The health science colleges (HSCs) use the revised curriculum to enroll and train new Level IV HIT students. The HIT assessment tool, which will be used to certify HITs, was reviewed by a panel of assessors from TVET and the MOH.

DHA provided TOTs on HIS core competencies to 24 instructors from a range of HSCs. Following the TOT, 309 graduating HIT students from the Arbaminch, Menelik II, Harar, and Hosanna HSCs were trained prior to their deployment (Figure 30).



**DHA supported the review and revision of the HIT curriculum and the development of the HIT assessment tool**



**Figure 30. HIS Core Competency Training for Graduating HIT Students from Menelik II HSC, September 2021**



DHA supported the MOH, TVET and HSCs in the development of a blended learning approach (a combined face-to-face and online learning experience) for pre-service and in-service training programs. During AY2, DHA, in collaboration with TVET, the MOH, and other stakeholders, completed the development and hosting of eLearning modules for DHIS2, Dagu 2, HMIS core concepts, and eCHIS.

To promote the adoption of online learning, DHA has developed and shared an eLearning strategic

plan for HSCs and select universities. DHA has also customized a Moodle learning management system (LMS), which is deployed in select HSCs to facilitate the deployment and tracking of online pre-service and in-service training courses with no geographic limits.

Since April 2021, 34 instructors from nine HSCs and five DHA staff have participated in a blended learning master TOT on DHIS2 and Dagu 2 (Figure 31).

**Figure 31. Blended Learning TOT Participants, August 2021**



**DHA supported the MOH, TVET and HSCs in the development of a blended learning approach.**





“ Since April 2021, 34 instructors from nine HSCs and five DHA staff have participated in a blended learning master TOT on DHIS2 and Dagu 2. ”

As of September 30, 2021, 208 learners had been enrolled in DHIS2 eLearning modules and 164 in Dagu 2 modules (Figure 32). The development of offline versions of the modules has been completed and the modules distributed to HSC instructors and DHA field officers for use in locations where connectivity is a challenge.

**Figure 32: LMS Dashboard with a DHIS2 elearning Activity Completion Report**

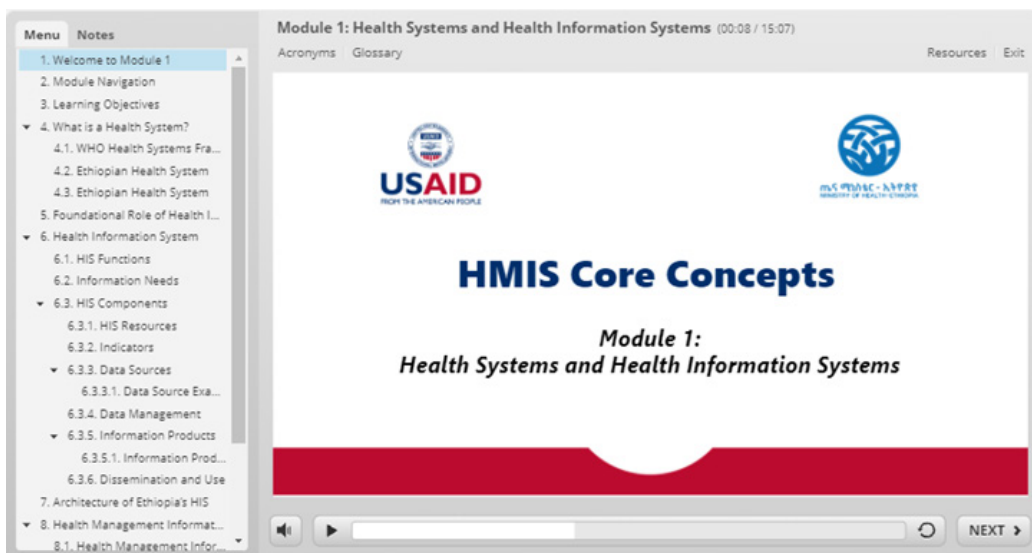
First name / Last name	Fundamental Concepts	Navigation and Key Concepts	Data Entry	Reports	Data Validation and Data ...	Pivot Tables	Creating Charts	Creating Maps	Using the Scorecard ...	Dashboards	Managing DHIS2 Offline	DHIS2 Final Exam
John Doe	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Jane Smith	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Michael Johnson	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Emily White	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
David Brown	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Sarah Green	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Robert Black	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Laura Grey	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
James Blue	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Michelle Yellow	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Christopher Purple	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Amanda Pink	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Kevin Orange	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Stephanie Light Blue	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Brandon Dark Blue	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

### II.3.4. Sub-objective 3.4: Building the Technical Capacity of the MOH for E-Health Programs

DHA, in collaboration with relevant HIS stakeholders, has developed the HIS core concepts module, which aims to provide health workers with the knowledge and skills necessary to implement the national HIS. The design, content, storyboard, and courseware development for the module has been finalized and uploaded to the LMS for testing (Figure 33). When

testing is complete, the module will be used for in-service health worker training, including at DHA-supported woredas, and as a blended approach to pre-service training at the HSCs. The module will also be used by professional associations for continuous professional development.

**Figure 33: HIS Core Concepts Module Interface, September 2021**



DHA conducted a five-day workshop with nine accredited HSCs to create a plan for developing DHIS2 and Dagu 2 eLearning modules for the in-service HIS training of HITs. After the modules were created, Harar and Menilik II HSCs, in collaboration with DHA, used the DHIS2 eLearning module to

train 33 HITs and the Dagu 2 modules for training 85 HITs (Figure 34). The HITs came primarily from DHA-supported woredas across the country. In addition, 24 HITs from Addis Ababa received face-to-face technical training on HIS.

**Figure 34: DHIS 2 and Dagu 2 eLearning Training of Harer and Minilik HSC HITs**



ECHIS, a primary information system being scaled up in the country, was identified as a priority area for eLearning module development. DHA has finalized the storyboard, content, and courseware development of the eCHIS module and uploaded it to the LMS for testing. The module discusses the programmatic goals of eCHIS, explains how eCHIS software is used in the Ethiopian health system, and describes the step-by-step use of three apps that compose the suite of eCHIS software. It also describes how HEWs use the app to record and report client health information and provides detailed information on reporting and resolving common eCHIS IT issues.

During this reporting year, DHA also supported the MOH in the review of Dagu 2.0 face-to-face training materials, including the facilitator guide, trainee manual, and PowerPoint slides for the Dagu TOT and basic training. The training manual, which was then revised in accordance with the MOH's In-Service Training (IST) standard, is being used by the MOH and DHA as official training materials.

Also during AY2, a range of capacity-building trainings was provided to HITs working in DHA-supported woredas. This included trainings on Dagu 2 TOT and cascading trainings on eCHIS, DHIS2, integrated data quality, and information use.

In addition, as a result of promotion during trainings and workshops during this reporting year, the number of users of the electronic Integrated Pharmaceutical Logistics System (eIPLS), which describes supply chain operations at the facility level, increased by 79 percent (from 432 to 772 users).

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**“ DHA has finalized the storyboard, content, and courseware development of the eCHIS module and uploaded it to the LMS for testing. ”**

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### II.3.5. Sub-objective 3.5: Work with the Ministry and other Stakeholders to Support the CBMP Universities as Centers of Excellence for HIS Sub-Systems

DHA supports Jimma University's vision of becoming an eCHIS Center of Excellence (CoE). During this reporting year, DHA provided material support for the university to establish a fully functional eCHIS lab to be used for development and training purposes. The university also selected the Tirafeta woreda, which has 26 kebeles, as an eCHIS implementation

learning woreda and conducted a baseline assessment in the woreda. Included in the assessment were the woreda Health Office (WoHO), a hospital, five health centers, and 25 health posts. Findings from the baseline assessment were presented to the woreda's health office and health facilities (Figure 35).

**Figure 35: Discussion of Baseline Assessment Preliminary Findings during a Workshop at Jimma University**



Jimma University, in collaboration with DHA, delivered a TOT to build the eCHIS implementation capacity of 22 university instructors. A five-day eCHIS training was then provided to 65 end users, including 51 HEWs, five midwives, five focal persons, and four HITs from the PHCU. The university leveraged 60 tablets and 50 power banks from the Oromia RHB to support eCHIS implementation in the learning woreda. Jimma University is now providing intensive mentorship to HEWs on eCHIS, with a special focus on improving HEWs' use of the system. DHA also provided high-level eCHIS technical training to nine Jimma University instructors and innovation team members.

Similarly, the Mekelle University grant, which focused on building the university's capacity to become a CoE on eHA and interoperability, was going smoothly until activities were disrupted by the ongoing conflict in Tigray region. The university supported the development of the Ethiopian DHBp; established

an eHA and Interoperability Academy (OpenHIE Academy) at the university; created electronic courses on architecture, standards, interoperability, and mediators; and supported the MOH to conduct the HIS interoperability maturity assessment to inform development of the eHA roadmap. The Mekelle University team has also facilitated a face-to-face training on interoperability and customizing data exchange mediators for 20 MOH developers, implementing partners, and local universities.

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**“ DHA provided material support for the university to establish a fully functional eCHIS lab to be used for development and training purposes. ”**

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## III. Cross Cutting Issues

### 3.1. Gender

During this reporting year, DHA has strived to address gender issues and participate in activities that promote gender mainstreaming in digital health in Ethiopia. Activities has included participating in platforms that foster discussion of gender parity, such as an Online Tech Salon discussion on How to Walk the Talk of Female Representation in Information and Communications Technologies for Development (ICT4D) and a Global Digital Health Forum 2020 panel discussion on the topic of Gender Mainstreaming in Digital Health: Process, Output, and Outcome. In both sessions, DHA team members discussed gender issues in digital health in the Ethiopian context. Both sessions included the sharing of valuable insights, which will be incorporated in DHA's Gender Strategy.

DHA leveraged the Women's Month theme of "Choose to Challenge" on March 8 to promote and encourage female participation in the health-tech industry. Activities included a social media campaign highlighting the experiences of DHA's female staff, including youth grantees. Short videos and photos were shared on the social media platforms of John Snow, Inc. and USAID with an emphasis on

encouraging messages to inspire the next generation of women in the tech industry. Additionally, during the Digital Health Hackathon, the participation of women was highly encouraged, beginning with the selection process.

Fifty-four percent of the YEs awarded to date are women-led. The YEs support health institutions across Ethiopia (with the exception of the Tigray region).

During this reporting year,

**“DHA has worked to identify a firm to develop a detailed gender strategy and a time-bound action plan to enable DHA to support gender mainstreaming in alignment with the Ethiopian IR roadmap.”**

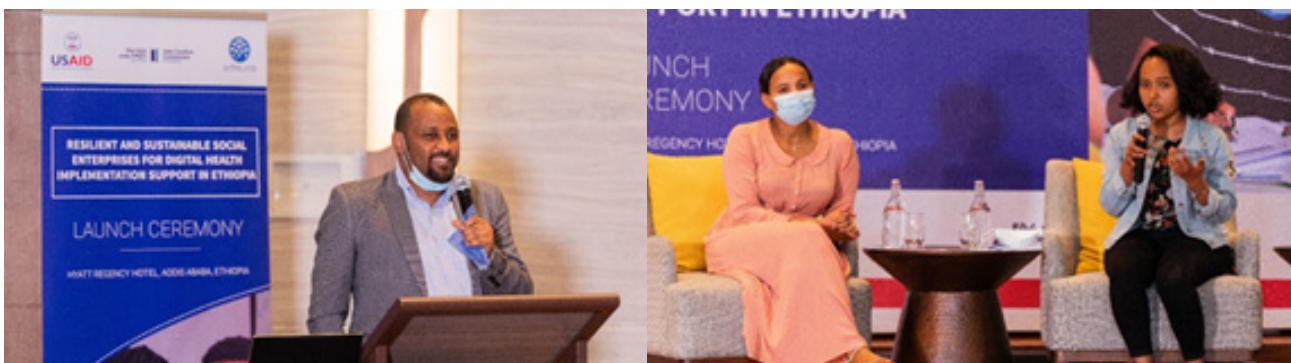
An agency has been selected and in the coming year, DHA will have a more comprehensive and action-focused approach to mainstreaming gender in the HIS. The Activity hopes to bring to light existing barriers and empower women's participation across the health-tech industry.

### 3.2. Youth Grant

During AY2, DHA provided technical and financial support to establish 15 YEs composed of 155 recent university graduates. The YEs are established in the following regions: Amhara (4 YEs), Oromia (5 YEs), SNNP (1 YE), Sidama (1 YE), Tigray (2 YEs),

and Somalia (1 YE) as well as in Addis Ababa City Administration (1 YE). The long-term goal for the YEs is to mature and eventually provide fee-based services to health facilities, thereby contributing to the entrepreneurs' self-reliance.

**Figure 36. Left: DHA Chief of Party Dr. Loko Addresses Entrepreneur and Business Management Training Participants. Right: Female Youth Enterprise Leaders Present at the YE Launching Session**



**Figure 37. Entrepreneurship and Business Management Training for YEs**



DHA worked closely with the federal Job Creation Commission (JCC) this reporting year to leverage resources and build the YEs' technical capacity to become successful businesses. DHA, JCC, and the

Entrepreneurship Development Center (EDC) have also provided capacity development support. As a result, the YEs have delivered support on a range of HIS issues in AY2 (Table 8).

**Table 8: Supports Provided by YEs on HIS Issues during AY2**

Activities/Supports	No. of facilities	Region
HealthNet functionality support	216	Addis Ababa, Amhara, Oromia, SNNPR, Sidama and Somali
DHIS2 support	284	Addis Ababa, Amhara, Oromia, SNNPR, Sidama and Somali
Dagu v.1 and 2 support	140	Addis Ababa, Amhara, Oromia, SNNPR, Sidama
eCHIS activities	126	Amhara, Oromia, SNNPR, Sidama
Hardware and software maintenance	333	Addis Ababa, Amhara, Oromia, SNNPR, Sidama and Somali
Other (offline support and backup services)	84	Oromia, Somali Amhara, Oromia, SNNPR, Sidama
Installed LAN	17	

### 3.3. Strategic Information (SI)

During this reporting year, DHA revised the Activity's Learning, Monitoring, and Evaluation (LME) plan. Thirty indicators are used to track the progress of the Activity; four are standard indicators and six measure the Activity's sustainability potential.

During the second quarter of AY2, DHA digitized its Monitoring and Evaluation (M&E) system. The system enables electronic data capturing, transfer, and visualization. Relevant DHA staff were trained to use the system for reporting and performance tracking, which improved their access to dashboards to track performance.

DHA dashboards have been developed for activity monitoring. The project monitors the progress of the Activity plan every two weeks. This process facilitates course corrections and the frequent communication of results to senior management. A summary of major DHA activities was communicated to USAID on a weekly basis.

The quality of data collected for DHA's indicators is assessed regularly. A summary of DHA's performance is displayed on a dashboard for use by Activity staff. At the end of every quarter, the Activity holds performance review meetings to track achievements against targets. The review meetings have served to identify challenges and share experiences and lessons learned among staff. Similar review meetings are conducted in all Activity areas every quarter to review area-specific performance. A guideline was prepared and shared to standardize performance review meetings at the Area level. During the second quarter of this reporting year, DHA facilitated a meeting to assess the status of the major assumptions made in the development of the Activity's theory of change. Quarterly and annual Activity reports were prepared and submitted to USAID.

To promote learning, DHA developed a proposal to study the acceptability and usability of eCHIS. Ethical clearance was secured from the EPHI and the study is being undertaken in collaboration with the MOH and Jimma University. Results of the study will be ready for use at the end of the first quarter of the AY3. DHA also identified gender consultants to formulate a gender strategy to guide gender mainstreaming in the HIS space in Ethiopia.

To encourage DHA staff to share and access knowledge, the Activity has hosted a monthly knowledge-sharing platform called DHA Warka. Each month, a brief presentation is made on a topic of interest followed by a question and answer period.

To increase visibility and promote learning beyond DHA, the project produced several knowledge management and communication products and disseminated them to different audience segments. This included quarterly newsletters, success stories, a brochure, a booklet on the Information Revolution, thematic roll-up banners, and DHA's annual report. The Activity supported the MOH to organize the first ever two-day National Digital Health Conference. Over 300 participants drawn from RHBs, universities, the MOH, and partners participated in-person and virtually. To help staff to retrieve information and documents to support their work, the Activity developed an organized knowledge repository for staff to store, share, and access DHA resources in one common location.

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**“ DHA developed a proposal to study the acceptability and usability of eCHIS. Ethical clearance was secured from the EPHI and the study is being undertaken in collaboration with the MOH and Jimma University. ”**

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## IV. Challenges and Solutions

Despite the many successes achieved during this reporting year, there were also many challenges worth mentioning. The COVID-19 pandemic and the political situation in the country were major obstacles in AY2. Both challenges restricted the movement of DHA staff to provide support to health institutions. Especially in the first quarter of the year, due to the COVID-19 pandemic, DHA staff faced challenges to support the implementation of face to face training, workshops and review meetings as planned. To avert this challenge, DHA quickly adopted virtual platforms to be used for review meetings and workshops. For example, the plan alignment and annual performance review with regions and regular staff meetings with the field implementation teams were conducted virtually with remarkable success. Similarly, in the last three quarters of the year, accessing some DHA-supported institutions was difficult due to the ongoing conflict primarily in the northern part of the country. DHA quickly developed a recovery plan and adopted digital tools for collecting emergency indicators and continued to support the critical stock transactions remotely. DHA continued to be flexible, adaptable, and responsive to the dynamics of the local contexts elsewhere in the country as well.

Additional challenges that DHA encountered during the year can be broadly categorized as technical, technological, behavioral, or supply-related. Technical challenges included inefficient use of HIS resources (e.g., registers, tally sheets, logbooks), skill and knowledge gaps in particular areas (e.g., HMIS and CHIS utilization, tablet configuration, fixing application bugs), and non-existent or non-functional PMTs. Technology challenges included insufficient IT equipment (e.g., computers, printers, uninterruptible power supplies, and other IT devices), frequent power fluctuations, and unreliable or inexistent internet connections. Major behavioral challenges included lack of motivation to use HIS systems for routine work (e.g., EMR) and the unavailability of health workers during site visits. Supply-related challenges included delays in HIS equipment deliveries, unavailable HIT professionals, and the shortage of HMIS/CHIS tools and space for card rooms. For each modifiable challenge, the DHA team devised and implemented solutions tailored to the nature and scale of the challenge.

## V. Key Lessons

In addition to the aforementioned successes and challenges, this Activity year also presented unique learning opportunities. To mitigate the effects of the COVID-19 pandemic, DHA has provided virtual support for some aspects of the Activity's interventions. In this regard, the online learning products developed by DHA not only built staff capacity but also helped to minimize travel, crowds, training costs, and service interruptions.

Similarly, the electronic RRF and eRIS applications and dashboards like Dagu and Fanos not only saved time but also reduced unnecessary travel and contacts that could have fueled the pandemic in the country. The use of IVR in AY2 to exchange information during political and social unrest in the country is another example of DHA's contextualized adaptations.

DHA interventions designed to fill gaps informed by evidence have also proven successful. For instance, connected woreda interventions have produced remarkable results by enhancing health institutions' HIS capabilities. DHA tailored its OJT, mentorship, and supportive supervision strategies to meet local needs and realities, which contributed to health service continuity and system functioning and utilization. Through ongoing monitoring of user feedback, the Activity has implemented many system enhancements and optimizations to continue to meet user requirements and promote system maturity.

Ensuring the sustainability of DHA's interventions without government buy-in and the collaboration of partners is difficult. To this end, DHA has aligned and implemented its plan in close collaboration with the MOH and other HIS partners, which has helped to prevent duplication of effort, safeguarded meager resources, and strengthened government ownership of interventions. DHA's engagement with universities, HSCs, and YEs is producing positive results that is contributing to ensuring the sustainability of the project's interventions.



## VI. Progress in Ensuring the Sustainability of DHA's Interventions

DHA has been implementing its interventions with the end in mind: sustainability. Accordingly, the Activity identified six indicators (C5, C7, C8, C26, S2, and S3 in Table 10) to track the sustainability potential of its interventions beyond the life of the Activity.

Through training the human resource, DHA aimed to ensure the availability of sustained technical capacity within the health system. In this regard, the Activity has so far trained 15,357 individuals, which is a little more than 100 percent of its lifetime target. To ensure uninterrupted supply of trained human resources to compensate for attrition and/or possible facility and service expansion, the Activity has been building the capacity of higher learning institutions (universities and health science colleges) during the first two years. Accordingly, the capacity of 11 higher learning institutions has been built, which is more than 100 percent of our target. To meet the dynamic HIS training needs of the health system, many TOTs have been given to government staff to create a pool of trainers. Besides, to reduce the need for already meager resources to train staff and also avoid unnecessary time spent away from work places, DHA has supported health science colleges to initiate virtual and blended training programs. This has created a potential to standardize the quality of training and reach a large number of trainees.

Without youth and women involvement and leadership, it is difficult to ensure sustainability. Cognizant of this, DHA has supported the establishment of 15 youth enterprises meeting more than 100 percent of its target and has continued to invest to ensure their viability beyond DHA. Around 60 percent of these youth enterprises are women led. The youth enterprises not only provide readily available continuous local HIS support to health institutions, but also they create job opportunities for new graduates.

To ensure digital tools developed with DHA's support are adaptable, usable, economically feasible and supported by global and local community of practices, DHA has been working to use open source digital global goods. During the year, the Activity has used 7 digital global goods in the development of 8 different systems, meeting 100 percent of the target. Besides, DHA has been trying to make sure systems developed with its support are interoperable with other systems. This helps to improve health workers efficiency, data security and better communication of client data among different systems. Four different systems that comply with the FHIR standard were developed during the year which is 100 percent achievement of the target set for the year.

Country ownership is key for the sustainability of DHA's interventions. In this regard, the Activity has proactively collaborated with MOH, agencies, RHBs and Universities in the identification of problems, selection of tools, customization and tailoring of implementation modalities. It has also played an active role in the establishment of the MOH's digital application inventory which is an archiving system for all digital tools developed in the sector with the necessary documentation.

In an effort to foster a favorable policy environment for the implementation of the HIS, DHA has been working with the MOH and other stakeholders in developing policies, strategies and SOPs. These governance documents help health workers practice HIS within the legal framework, create accountability and standardize services. DHA has helped the development and endorsement of 3 different policy documents during the year, achieving 60 percent of its targets.

Overall, DHA has achieved or exceeded the targets for most of the sustainability indicators. The Activity will continue to strengthen its support to create a strong foundation for the sustainability of its interventions in the remaining Activity year.

## VIII. Table 10: Activity Performance Indicator Tracking Table

Indicator #	Indicator	Base-line	EOA Target	AYII Target	AY II Achieved	% Achieved	Achieved to date	AYII % Achievement to data	Remark
C5	Number of persons trained	0	15,000	7,965	9,742	122%	15,357	100.2%	Additional training given as part of DHA's Covid response
S1 - (YOUTH-1)	Number of youth trained in social or leadership skills through USG-assisted programs	0	240	60	140	233%	140	58.30%	Additional fund was mobilized from JCC to train more people ( beyond core team )
C6.	Percentage of women in leadership positions within DHA	NA	35%	35%	32.35%	92%	32%	92%	
C7	Number of youth grants established	0	50	14	15	107%	15	30%	The two YEs are in Tigray region
C8.	Percentage of women-led youth grants	0	40%	40%	60%	150%	60%	150%	Gender advisor was hired this year.
C9	Cumulative Percentage (Cumulative frequency) of eHA components digitized n (%)	0	18(100%)	9(50%)	10 (111%)	111%	10(55.6%)	55.6%	
S2 - (STIR 15))	Number of digital global goods used by USAID-funded activities	0	12	4	6	150%	7	58.3%	Customization of additional digital global goods was made in response to field implementation needs
C10	Percentage of eCHIS modules developed	NA	100%	100%	100%	100%	72.2%	72.2%	
C11	Cumulative number of health posts (HP) where eCHIS is implemented	0	5,100	1,275	1,202	94.3%	1202	24%	
C12	Number of health extension workers actively using eCHIS	0	1,913	1,913	2,046	107%	2,046	107%	
C13	Percentage of HRIS modules developed	0	100%	100%	100%	100%	100%	100%	
C14	Number of institutions where HRIS is implemented	NA	50	20	3	15%	3	15%	Change in MOH's Development plan
C15	Percentage of health workforce recorded on HRIS	Na	100%	60%	87.91%	147%	87.91%	87.91%	DHA provided focused support to the 3 institutions the HRIS was deployed
C16	Cumulative number of health facilities DAGU 2.0 is deployed	0	1,526	626	551	88%	551	36%	
C17	Percent of DAGU 2.0 sites that produced program RRF from the system	0	100%	20%	30%	149%	30%	30%	The offline sync capability resulted in better performance

C18	Percentage of woredas using mBrana	Na	100%	20%	77.78%	389%	77.78%	77.78%	Additional funding provided by USAID for the COVID work.
C19	Number of woredas using LLIN tracking tool to record distribution out of the targeted woredas	38	TBD	108	101	94%	186	NA	
C20	Number of systems developed as per FHIR standard	NA	6	4	4 (100%)	100%	4	66.7%	
S3- CBLD	Percent of USG-assisted organizations with improved performance	0	60%	15%	58%	387%	96.5%	96.5%	Most of the health institutions included were remote and started at a low base score.
C22	Percentage of health facilities submitting service delivery reports on time using DHIS2	38.80%	95%	90%	62.48%	69.42%	62.48%	65.76%	Areas particularly in north Ethiopia were affected by the conflict resulting in communication blackout
i	Hospital	34%	95%	90%	52.64	58.49%	52.64%	55.41%	
ii	Health Center	40%	95%	90%	62.03	68.92%	62.03%	65.29%	
iii	Health Post	39%	95%	90%	63.36%	70.04%	63.36%	66.69%	
C23	Percentage of health facilities submitting complete service delivery reports on DHIS2	85%	95%	90%	81.08%	90.5%	81.08%	85.7%	Areas particularly in north Ethiopia were affected by the conflict resulting in communication blackout
i	Hospital	81%	95%	90%	70.02%	79%	70.02%	75%	
ii	Health Center	95%	95%	90%	86.51%	97%	86.51%	92%	
iii	Health Post	84%	95%	90%	80.20%	89%	80.20%	85%	

C24	Percentage of hospitals with complete disease registration reports on DHIS2	93%	95%	93%	84%	90%	84%	88%	
C25	Percentage of woredas for which the RDQA result is within acceptable range	60%	100%	70%	70%	100%	70%	70%	
C26	Number of newly developed and endorsed standards, strategies, policies on HIS governance (e.g., strategies, policies, etc.)	0	20	5	3	60%	3	60%	Delayed endorsement after the documents are produced
S4 - ES.2.1	Number of host country higher education institutions receiving capacity development support with USG assistance	0	30	8	11	138%	11	36.67%	After completion of the curriculum, it was important we reach as many institutions as possible. for uniform utilization by HSCs



## Sample Success Stories

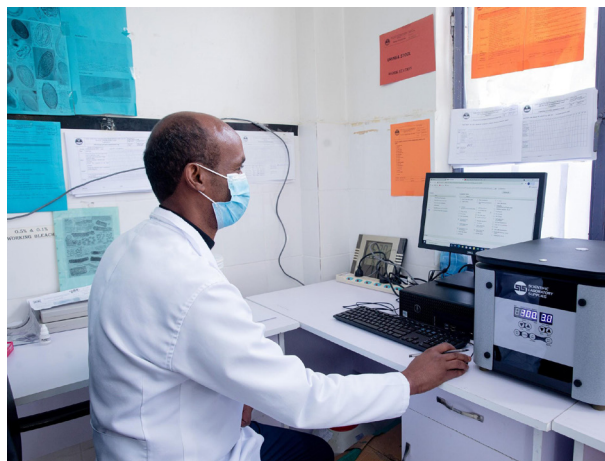
### Adopting the Electronic Medical Record (EMR) System: The Case of Ferensay Health Center

“As one of the three pilot sites selected for the EMR implementation, we felt a responsibility to make it a success,” explains Ms. Mekdes Kassa, Director of the Ferensay Health Center. Most public health facilities in Ethiopia manage their patient caseload using paper-based recording, resulting in errors, delays, and reduced service quality. The EMR, a computerized system, captures, stores, and shares patient information, which facilitates the delivery of high-quality health services. The health center has been implementing the EMR for the past five months.



When USAID’s Digital Health Activity first began EMR implementation, the previous management of the Ferensay Health Center had laid the groundwork by securing the essential infrastructure—installation of a local area network, cables, computers, and printers.

When Ms. Mekdes took over six months ago, she recalls, “When we started, our focus was on the staff.” She goes on to explain that the health center’s management made sure that staff received sufficient training to boost their skills along with their confidence in and sense of ownership of the EMR system. At times, when a shortage of equipment occurred, Ms. Mekdes, the Medical Director Ato Birhanu Tadesse, and others have offered their laptops to be used during staff training.



Thus far, the EMR has been implemented for services in the card room, all outpatient departments, the laboratory, cashier, and the delivery, antenatal care, family planning, and Expanded Program on Immunization units. Mr. Ibrahim Kabato, a health officer in the delivery room, explains: “We communicate with other departments, such as the laboratory unit, much faster now and, as a result, our patients receive faster care.”



To build staff morale, the health center’s management team conducts weekly review meetings, daily supervisory follow-ups, and fun, engaging competitions among departments. With strong leadership commitment and staff solidarity, the health center has just to implement EMR in the pharmacy unit to become fully digital.

## **Improving delivery time in the Pharmaceutical Supply Chain: The effect of Electronic Report and Requisition Form**

The availability of medicine is vital in the provision of health care. Well-functioning supply chain forms the backbone of the healthcare system. The Ethiopian Pharmaceuticals Supply Agency (EPSA) is working towards ensuring that a well-functioning supply chain system exists in Ethiopia. One major component of that is proper inventory management.

To streamline processes within the pharmaceutical supply chain system, DHA introduced an electronic Report and Requisition Form (RRF). The electronic RRF is an online system used by health facilities to report on their drug consumption and other medical supplies and to request for resupply from EPSA. The online RRF, which is integrated into Dagu 2.0 software: an inventory management software, is simplifying the logistics supply by significantly reducing the time taken to get resupply from EPSA.

The RRF is used to order essential items for everyday use by health facilities, so faster delivery of the RRF means faster and accurate delivery of these medicines. Previously, health facilities had to hand deliver the manual RRFs, overlong distances, to EPSA hubs. The delay in delivery of the RRF created a delay in the resupply of the much needed medicine compromising healthcare workers ability to provide timely and quality care. Oliyad Habte, Store Manager at Meda Welabu University Goba Referral Hospital says

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**“ Before the electronic RRF, we had to share the form as a screenshot or have it physically delivered. This created major delays which crippled us from delivering proper care services. ”**

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Now, the RRF has enabled health facilities to process their orders remotely through a website cutting RRF delivery time from an average of 7 days to hours.

Oliyad said,

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**“ The online RRF has simplified our job by speeding up the reporting time and minimizing data errors. We hope to see the utilization of the system grow ”**

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# DIGITAL HEALTH ACTIVITY (DHA)

## **ANNUAL REPORT**

ACTIVITY YEAR II (OCTOBER 1, 2020-SEPTEMBER 30, 2021)