ETHIOPIA DUP | DATA USE PARTNERSHIP

ANNUAL REPORT

January 1, 2019 to June 30, 2020

ETHIOPIA DATA USE PARTNERSHIP (DUP)

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This report is intended to give an overview of activities supported by DUP at national level and in all regions of Ethiopia from January 1, 2019 to June 30, 2020.

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INTRODUCTION

The Ethiopia Data Use Partnership (DUP) project was awarded by the Bill & Melinda Gates Foundation (BMGF) to a consortium led by JSI Research & Training Institute, Inc. (JSI) in October 2016. The project covers the period from November 10, 2016 to October 30, 2021. In addition to BMGF, DUP is also funded by Doris Duke Charitable Foundation (DDCF) with a focus on strengthening implementation research on health information system.

In its third year, DUP has focused on cascading implementation of IR activities to the regions and facilities to make them models in information use and encouraging the sharing of lessons learned and best practices to facilitate scale-up. In addition to the broader support on IR at the MOH and regional levels, DUP also worked with selected learning woredas and hospitals in order to test HIS interventions, document lessons learned, and ensure facilities become models and scale-up successful interventions to the woredas and facilities beyond the learning sites.

This report gives an overview of DUP's key progress and major achievements in its third year of implementation (January 1, 2019 to June 30, 2020).

(I) CULTIVATING AN INFORMATION USE CULTURE

Health care providers, program managers, and policy-makers are required to make decisions that hold consequences for the health outcomes of individuals, communities, and countries. Ideally, these health professionals demand and use data to inform their decisions and actions. Towards this goal, DUP supported strategies that promote and facilitate increased demand for and use of data for evidence-based decision-making at all levels of the health system.

Support for the overall Connected Woreda (model IR woreda creation) at national and regional levels

As part of the broader system level support, DUP supported the effort towards creating model woredas that are enabled to implement tailored and need based interventions to become high performing in health information systems by using the Connected Woreda Strategy (CWS) as the guiding document. This has been implemented by promoting stakeholder participation, supporting the preparation of standardized tools, supporting the monitoring of changes due to interventions, facilitating learning exchange, developing a planning template for tailored interventions and promoting its use, and by supporting the development and implementation of tailored interventions.

Support for promoting information use in eight woredas to generate lessons for the national programs

During this reporting period, eight woredas across five regions of Afar, Tigray, Amhara, Oromia, and SNNP recived close support from DUP which benefited the eight woreda health offices, 41 health centers, and two primary hospitals found in these woredas.

The support provided to these woredas include;

A. Supported baseline data collection to ascertain the status of HIS. Based on the baseline data, gaps were identified and root cause analysis were carried out to understand the underly- ing causes of data use and data quality gaps.

B. Organized workshops and onsite mentorship to facilitate participa- tory tailored action plan development that led to preparation/refinement of a data de- mand and information use improvement in- tervention package for woreda health offices and health facilities.

C. Supported the implementation of tailored action plan in collaboration with regional health bureau (RHBs) by organizing mentoring and supportive supervision by focusing on; data quality assurance, data use, DHIS2, data analytics and visualization among others.

D. Procured and distributed equipment and materials to improve collection and use of information.

A detailed report about the learning woredas and learning hospitals is annexed with this report.

Support for promoting information use in 28 high caseload hospitals

During the current reporting period, DUP in collaboration with the MOH gave due attention to transforming information use culture in 28 high caseload hospitals.

To this end, DUP supported PPMED to customize the IR model woreda measurement tool to a hospital context by integrating a clinical data audit. The support provided also included identifying HIS performance gaps, developing tailored plans, conducting awareness creation workshops and training, and tracking the IR implementation status. Accordingly, 123 hospital staff were trained on the IR model woreda concept, data quality, and information use, coupled with DHIS2 data analysis features. Of 28 hospitals, 4.5% achieved model status and 77.3% reached candidate level.

Out of the 28 high caseload hospitals, five received intensive support from DUP in order to generate learnings from data use initiatives that will be used to improve information systems and information use at the hospital level. These five hospitals are being supported based on the tailored action plan they developed through a root cause analysis and tailored planning process that DUP facilitated. Follow-up assessments after the first round of interventions showed that out of the five learning hospitals, Zewditu Memorial Hospital achieved IR model status and three hospitals (Adigrat, Fenote Selam, and Adare Hospitals) have reached candidate level. Overall, the five hospitals showed a 10% increase in the IR score (71% to 81%) with their data use scoring increased by 27%. Zewditu Memorial Hospital is also creating a dynamic, evidence-based action-oriented performance monitoring team (PMT) linked to quality improvement efforts. DUP provided onsite technical support to the PMT and developed a monthly performance monitoring dashboard based on selected key performance indicators (KPIs). Except Nekemte specialized hospital, all learning hospitals showed improvement in data use.

Data use improvement in the five learning hospitals after first interventions

Name of Facility	Data Use comparison before & after	Data Use score (100)- Baseline	Data Use score (100) -1st intervention
Adare General Hospital	Data Use Improved	42.5%	70.0%
Adigrat Hospital	Data Use Improved	40.0%	87.5%
Finote Selam Primary Hospital	Data Use Improved	60.0%	62.5%
Zewditu Hospital	Data Use Improved	88.8%	92.5%
Nekamte Specialized	Data Use Not - Improved	75.0%	70.0%

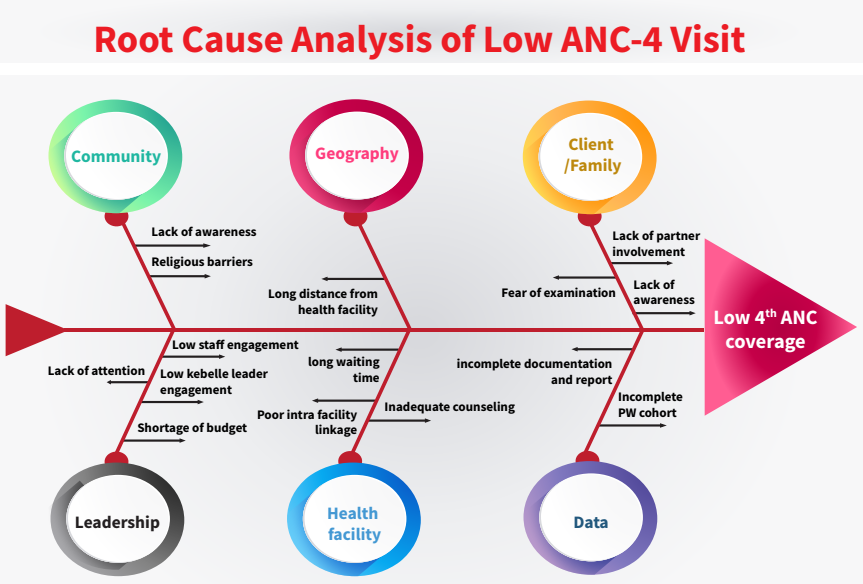
Support for Improving functionality of performance monitoring teams (PMTs) for data informed performance monitoring and decision-making

One of Ethiopia's approaches in creating an information culture is by enhancing PMTs at all levels. PMTs directly tackle issues in data inaccuracy and low performance and delayed accomplishments through an established process of problem identification, root cause analysis, intervention design, and implementation. For this reason, the project supported strengthening PMTs by exploring the possibility of merging the PMT and quality improvement team in health facilities, expanding the PMT to be formed at department level in addition to the higher level PMT, providing training, and conducting on-site mentorship for PMT members on HIS in selected health facilities for practical demonstration of conducting data informed PMT meetings.

In this regard, 211 PMT members recived training on the DHIS2 system, information use and data quality in Oromia, SNNP, and Dire Dawa. At the regional level, DUP supported analysis and visualization of key indicators for informed decision-making by the RHB leadership. An interactive monthly performance tracking dashboard for selected KPIs is among the innovative interventions introduced in a hospital by the project as part of enhancing PMT functionality. DUP is testing an excel based dashboard in Zewidtu Hospital and

will scale it to other learning hospitals. Because of this, positive changes are being observed in health service delivery due to functional PMTs as demonstrated in Hawelti health center in Tigray region. Case studies of Zewditu memorial hospital and Hawelti health center are attached as annex with this report.

Effects of a functional PMT on improving health service performance in Hawelti Health Center



Hawelti health center PMT's success in identifying problems, analyzing and prioritizing root causes, and implementing recommended changes helped to address a low ANC4 turnout and skilled delivery. Following implementation of problem solving interventions, the health center's PMT reviewed the health service data and found that ANC4 completion increased from 52% to 79% and the percentage of women who delivered at the facility grew from 67% to 88.5% within one year.

Support for promoting national and regional level data analysis and evidence generation

A common barrier to using data for decision-making is the limited capacity of data users to interpret data in the context of program improvement. Program managers and policy-makers, the data end users, are seldom involved in the data collection process, thus limiting their understanding of how data was collected and the questions it addresses. To overcome this, in collaboration with PPMED and HITD, the DUP team created data analysis and visualization dashboards that illustrate how these data are translated to information for decision-making on the DHIS2 platform. Along with these platforms, the team also provided training on the DHIS2 information use training package, developed for program managers, and DHIS2 analytics and visualization for program staff at national and regional levels.

Under the leadership of MOH, DUP supported/ participated in the development of data analytic platforms/ applications that are built on DHIS2. Some of these applications are; DHIS2 data analysis dashboard, scorecard, bottleneck analysis, action tracker, and immunization data analysis.

Accordingly, 43 MOH staff from different departments, including maternal and child health experts, were trained onsite on how they can access data from DHIS2, how to use the standard dashboards, and how they can do basic analysis and make insights out of the data, depending on their area of interest. As a result of the training, MOH program staff (particularly the MNCH Directorate) started using the DHIS2 data analytics platform during the onset of the COVID-19 pandemic to track, analyze, and present their pro-

gram data to ensure continuity of essential services in the midst of the pandemic.

Moreover, DUP as a member of national and regional data analytic taskforces, became involved in various essential health services uptake and reportable diseases trend/pattern analysis and evidence generation in the context of COVID-19 pandemic. As part of this effort, DUP conducted facility-based mortality trend analysis and respiratory disease morbidity and mortality trend analysis and shared the results with relevant bodies for follow-up. DUP regional teams also supported the preparation of an 11-month key service performance trend analysis and presented it to the RHB and ZHD management for action and shared feedback to lower levels. Similarly, at the national level, three detailed routine data analytic reports, highlighting key findings were produced and shared to all directorates by PPMED for further interpretation, root cause analysis, and use. These analyses showed a decline in essential service uptake at the beginning of the COVID-19 pandemic, based on close follow-up undertaken by MOH and RHBs, and an upward improvement is observed in the month of May, 2020. DUP supports the technical preparation of the report as part of the PPMED team and we have assigned a visualization and graphic designer to work with the team.

Over the past 18 months, staff hired through DUP has contributed to the preparation of more than 200 analysis reports based on routine data both at national, regional, or lower levels. These reports include monthly/quarterly performance analysis, data quality review, disease or program specific analysis, learning woreda level analysis, and others including ARM, mini E-DHS, five-year health sector performance trend analysis, etc.). The following table shows the distribution of the type of routine health data based reports produced over the course of the reporting period.

Reports and analytical documents supported at national and sub-national levels

TYPES OF ANALYSIS REPORTS PRODUCED	JANUARY - JUNE 2019	JULY 2019 - JUNE 2020	GRAND TOTAL
Monthly/quarterly performance analysis	30	74	104
Quarterly data quality review	13	29	42
Disease/program specific analysis	16	34	50
Learning woreda level analysis	1	9	10
Other analysis reports produced	6	28	34

Support for creating local pool of DHIS2 data use experts

With the aim of establishing a local DHIS2 data use training center, DUP supported the University of Gondar to hold the first academy level training from November 11 – 16, 2019. A total of 27 participants from MOH, RHBs, local universities, and partners completed the training and were certified accordingly. In addition, four people from the University of Gondar and MOH were supported to attend an academy level training in Kampala and they later served as trainers in the first local academy level training, which has created a great opportunity to provide similar academy level trainings locally. Those who are trained are expected to enhance the use of DHIS2 data for action at different levels.

In addition, DUP supported a training of trainers for 42 participants from MOH and RHBs on integrated data quality, data use, and DHIS2 training for program staff. The main objective of the training was to build the knowledge and skills of trainers on data quality, data use, and DHIS2 so that they will be able to cascade the training to program staff at lower levels and also to apply it in their day-to-day practice to bring health system improvement (quality, equity, coverage, etc.).

In addition, DUP supported training of trainers on integrated data quality, data use, and DHIS2 training for program people. The main objective of the training was to build knowledge and skills of trainers on data quality, data use, and DHIS so that they will be able to cascade the training to program staff at lower levels and also apply it in their day-to-day practice to bring

health system improvement (quality, equity, coverage, etc). A total of 42 staff from regional health bureaus, MOH program and PPMED participated in this training.

Support for enhancing collaboration among data use partners

DUP facilitated the establishment of a data use technical working group (TWG) and supported the convening of five data use TWG meetings in the reporting period. Participants, drawn from PPMED, Addis Ababa RHB, DUP, L10K, CDC, ICAP, USAID, University of Oslo, and WHO, participated in the TWG meetings. Through this forum, national and regional level data use interventions have been coordinated and harmonized. The TWG will provide thought leadership in data use and will also be used as a forum for sharing lessons, best practices, and challenges among stakeholders.

In addition, DUP has provided DHIS2 training for staff of the Institute for Health Care Improvement (IHI) as part of an ongoing collaboration effort to strengthen information use culture using different mechanisms.

Support for strengthening data use practices at MOH and RHB levels

During the current reporting period, further data use-strengthening support was provided to the MOH and RHBs in the following areas:

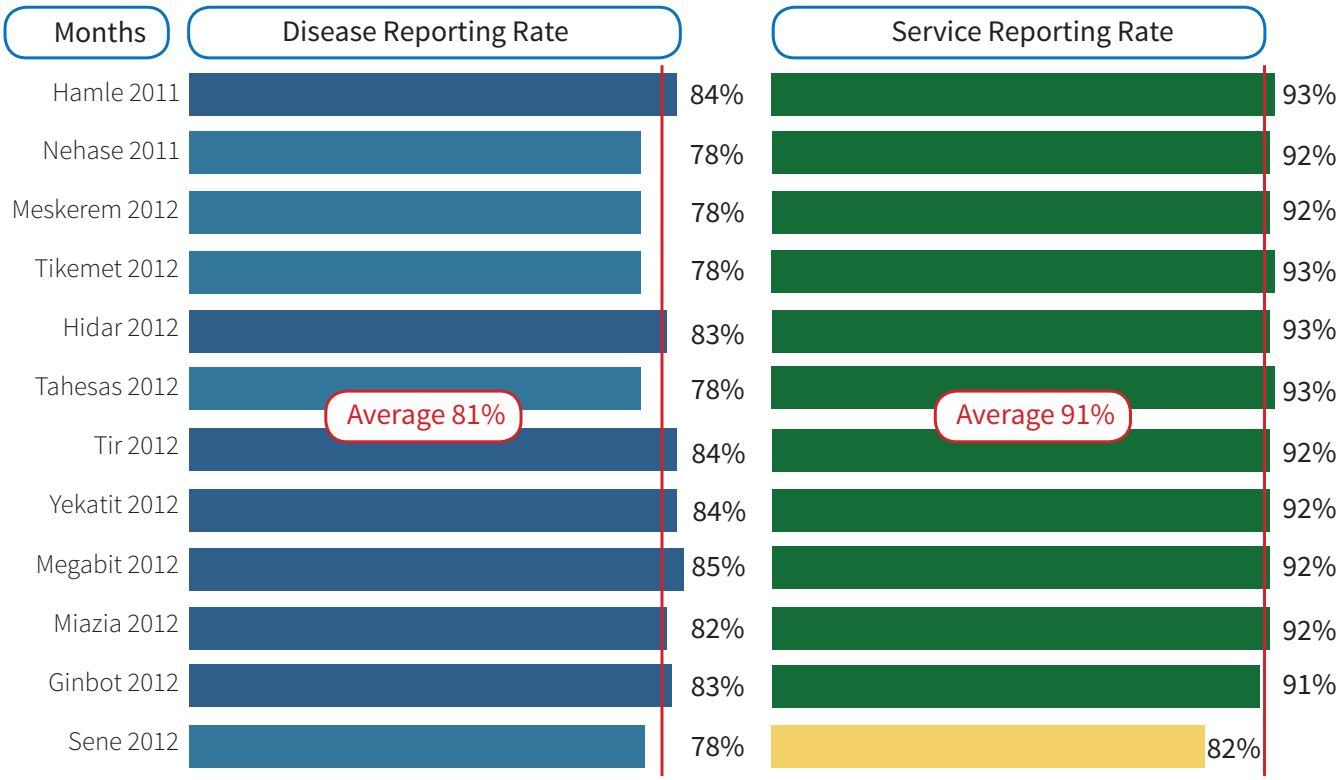
- Supported development and distribution of a data use poster and brochure to promote information culture to all health facilities in 18 woredas.
- Supported the MOH in reviewing and finalizing a draft mentorship guideline to be used to improve mentorship on HIS at all levels of the healthcare system.
- Provided technical and financial support for the national HIS review meeting, which was conducted in Hawassa from January 29–31, 2020.
- Provided technical support for the Annual Review Meeting, Woreda-based Planning, supportive supervision, and other data use platforms.
- Provided support to the MOH in the preparation of the next ten-years Health Sector Transformation Plan II (HSTP II) with the intention of catalyzing/facilitating evidence-based planning. The newly drafted HSTP II puts enhancing informed decision-making as a core component of the transformation agenda. DUP supported two rounds of workshops to finalize the write-up of HSTP II, which is in a near final state now. Input was also provided on refinement of the M&E framework, preparation of the indicator selection criteria, selection of the indicators, and write-up of the description of the six transformation agendas.
- DUP is supporting efforts in the development of the next HIS strategic plan.

Support for improving availability of HMIS data on time for informed decision making

DUP has embedded 22 fulltime staff in the 11 regions. In addition, more than 158 Information Technology (IT) graduates are assigned at zonal, woreda, and health facility levels. The main role of these staff is to provide the necessary capacity building and need-based support to make sure quality data is collected, reported and used for informed decision-making at all levels of the health care system. Over the past Ethiopian fiscal year, July 2019 to June 2020, significant improvement has been observed in completeness of service data and disease report. The average service report completeness has reached 91% and has achieved the HTSP target. Similarly, the disease reporting rate has improved over time (average of 81%), but still far from the HSTP target. Timely availability of routine health data needs improvement.

Service delivery report completeness at national level has reached 91% and has achieved the HTSP target. An encouraging trend is also observed in the disease reporting rate that is 81% nationally. Despite these achievements, still low percentage (53%) of reports are submitted on time.

DISEASE AND SERVICE MONTHLY REPORTING RATE



Support for data quality assurance

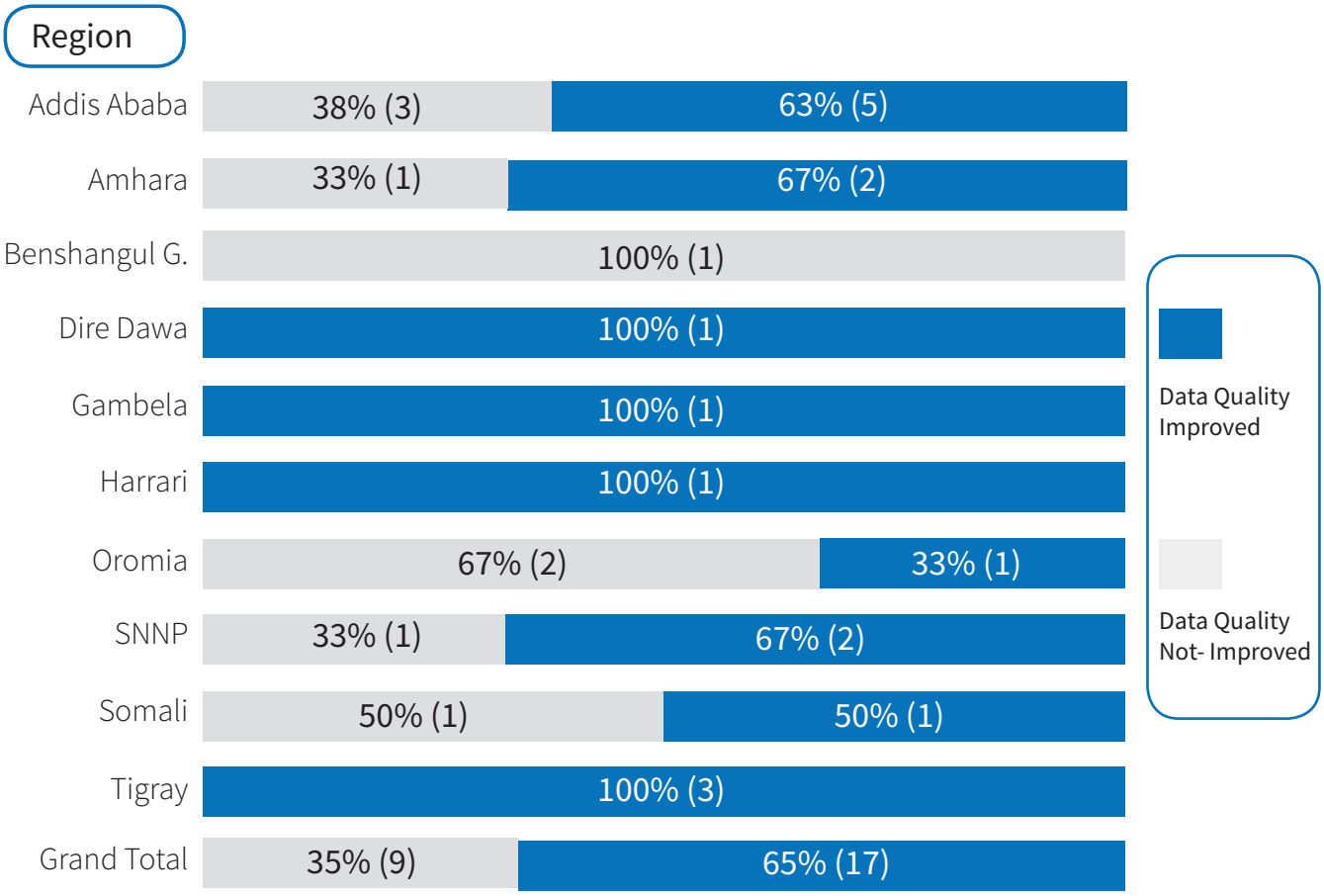
Improving the quality of data at the source of data generation and compilation is paramount for evidence-based decision-making. DUP regional staff, in collaboration with RHBs, have conducted site level visits to support health information technicians (HITs) and health workers to give due attention to data collection and timely reporting. The project also supported and participated in routine data quality assessments (RDQAs) in Oromia, Harari, and Amhara.

Moreover, DUP regional teams supported a desk review of performance over the past ten-months with regard to data quality, and findings were presented at responsible government bodies at different levels. Following the presentation, in-depth discussions were held to identify root causes of problems and a tailored action has been implemented to improve data quality. Feedback was also provided to the lower levels for continuous data quality improvements based on data generated from DHIS2.

For example, a review of the six-month performance data (October 2019 – April 2020) identified an outlier on reported malaria mortality figure. This has led to further investigation, drilling down to the specific health facilities, identifying the root causes and taking corrective action, including providing guidance to improve future malaria data recording and reporting practices.

DUP supported training of 123 participants from 28 high caseload hospitals in addition to providing routine need based support to address observed data quality gaps. We conducted a follow-up assessment in 22 of the hospitals to monitor improvements in data quality. Accordingly, 17 of the 22 hospitals showed significant improvement as presented in the following graph.

LEARNING HOSPITAL DATA QUALITY IMPROVEMENT



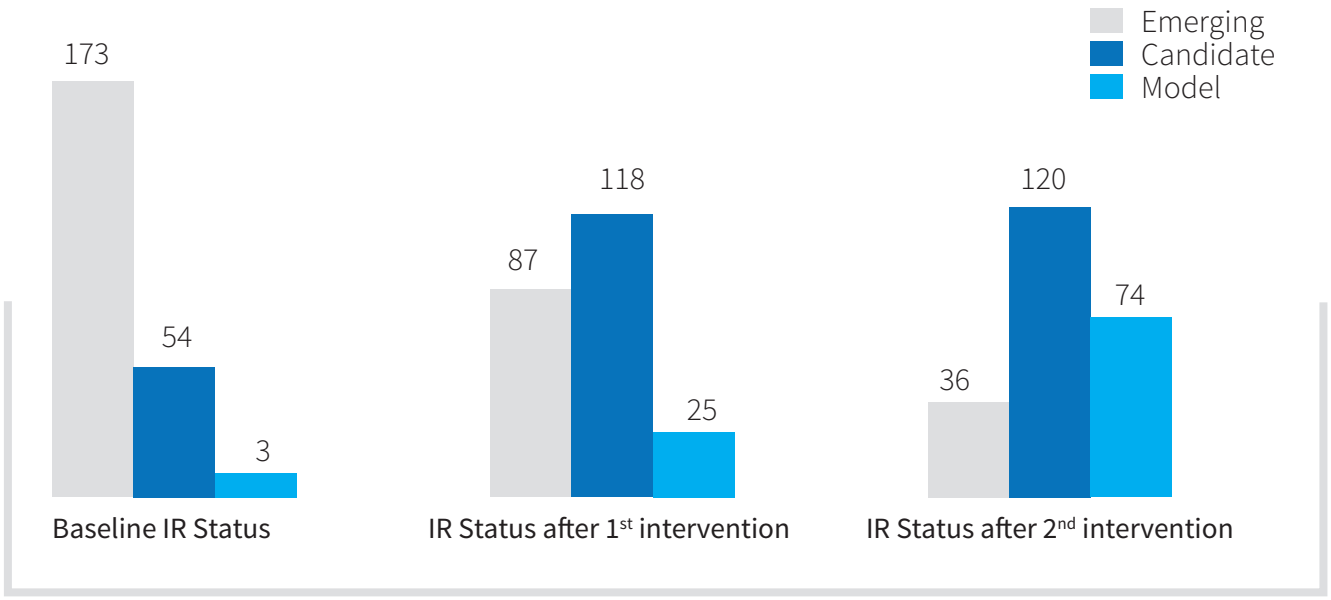
Support for coordination of capacity building and mentorship program

During the reporting period, DUP has implemented strategic capacity enhancement activities that created local capacity, focusing on building skills in data analysis, interpretation, and use among data users for service delivery, planning, and policy-making within the health system and local universities. The capacity enhancement efforts focused on providing training, developing and standardizing pre-service and in-service training manuals, revising HITs curriculum, mentoring and offering supportive supervision.

One of the human resource capacity building strategies adopted by the MOH is establishing a system to engage local universities to support capacity building and mentorship at the lower level of the health system. DUP, aligning with the Capacity Building and Mentorship Program (CBMP) implementation modality, which formed in partnership with six local universities (Addis Ababa University, Haramaya University, Hawassa University, Jimma University, Mekelle University, and University of Gondar). The universities are providing technical assistance to support the RHBs and 36 woredas in creating model health facilities. Additionally, ten of the 36 woredas received grants from DUP/DDCF to create demonstration woredas by implementing a fully functional HIS through improvements in data quality and use of health information for decision-making at the administrative unit and health service levels.

The universities conducted baseline, 1st intervention and 2nd intervention assessments in 230 sites (198 health facilities, and 32 woreda health offices) using the connected woreda measurement tool. By the end of the year, out of 198 supported health facilities, 108 (55%) were categorized as candidate and 63 (32%) achieved 'model' status. Similarly, out of a total of 32 assessed woredas/sub-cities, 12 (38%) achieved 'candidate' status and 11 (34%) woreda health offices managed to reach 'model' level status

Information Revolution status by Connected Woreda tracker, woredas and health facilities supported by local universities



Support for standardization and harmonization of health information system preservice training modules

The collaboration between DUP, MOH, and local universities also made possible the standardization and harmonization of the national health informatics training curriculum, including mainstreaming data quality and information use in the pre-service training. A joint team composed of MOH, University of Gondar, and other universities developed eight standardized pre-service training modules for major health informatics courses. This effort ensures graduates are equipped with the knowledge and skills that correspond to the demand in the health sector. It also responds to the gap of trained HIS professionals in the country. In addition, DUP in collaboration with DHA, supported the preparation of health information technicians (HIT) occupational standards which define the occupational requirements and expected outcomes related to HIT's work.

To facilitate the provision of quality training for HITs, DUP used DDCF's funding to procure furniture (150 tables and 300 chairs), desktop computers (290), LCD projectors (10), and local area network supplies to establish ten computer labs across the country. Each computer lab is set-up to accommodate 28 to 30 students at a time and is equipped with the necessary Wi-Fi connectivity. The labs will help to improve the quality and number of trainees as the country plans to upgrade more than 2,000 diploma-level HITs to a bachelor's degree in health informatics so they can provide better service.

Support for in-service training on HIS topics to FMOH, RHB, ZHD and health facility staff

During the last 12 months (July 2019 to June 2020), 70 sessions of skill-based training on DHIS2, data quality, NCoD, data analysis, visualization, and information use for MOH and RHB program staff, M&E and plan experts, WorHO, HITs and health workers in health facilities were conducted centrally and across the regions. The 70 sessions capacitated more than 3059 health workers at all levels of the health system. The training sessions were organized by following the key principles of DUP's embedment approach by which need is identified in consultations with MOH and RHBs and trainings are organized jointly.

Summary of HIS strengthening capacity building trainings, workshops, review forums organized during the current reporting period

Training areas/subjects	Number of participants: (July 2019 - June 2020)								
	MOH	RHB	ZHD/ sub- city	WrHO	Health Facility	Agencies	Universities	Partners	Total
Integrated DHIS2, data quality, data analytics and data use	60	154	85	239	99		7	12	656
Data informed collaborative leadership		30							30
IR/ connected woreda/ tailored interventions development		43		29	47			12	131
Community Health Information System		19	14	13	0				46
Implementation research	4	11					12	4	31
National classification of diseases (NCoD)					255				255
DHIS2 customization and upgrading to version 2.3	65	356	263	143	352	11	16	22	1228
eCHIS	7	303		68	63			3	444
eHealth interoperability	5						9	3	17
Master facility registry (MFR)	5	27						2	34
IT troubleshooting and maintenance		17							17
IT interns training on the various HIS applications and tools								170	170
Grand Total	146	960	362	492	816	11	44	228	3059

(II) DIGITIZATION OF PRIORITY HIS

Support for strengthening of the implementation of DHIS2

DUP continued the support on the further development (version updating), training, and deployment of DHIS2 V2.30 in the third fiscal year. In this regard, DUP coordinated and supported the DHIS2 V2.30 upgrade process, including upgrading of user manuals and training materials, providing training of trainers and rollout trainings, and performing post-deployment tasks.

DHIS2 application development training was provided to 30 participants from MOH, RHBs, DUP, and other partners. DUP supported the MOH in the incorporation and development of features, apps, and data sets that are integrated with DHIS2. The following improvements were made on the new version of DHIS2:

- Incorporating additional features like "TOP-n" diseases, custom data set reports, public health emergency management (PHEM) data entry and data export apps, scorecards, LQAS apps, league tables and bottleneck analysis (BNA), maps, interactive data set assignment features, smart display, and metadata browser.
- Including additional data elements, category combinations, and data sets, including PHEM, UNISE/Multi sectoral Nutrition.
- Addressing persistent bugs in the previous version (v2.27).

In order to support deployment of DHIS2 V2.30 to the sites, national and regional trainings were provided for about 180 experts from the MOH, regions, and partners in three rounds between August 16 and 29, 2019. The training included a refresher of the DHIS2 modules, becoming familiar with additional modules and features, refining of facilities, developing a regional v2.30 upgrade strategy, and demonstrations. DUP supported the revision of DHIS2 v2.30 manuals and shared the new versions with all regions. Training slides were also prepared and shared for regional-level trainings. In order to promote on-the-job training, DUP hosted a DHIS2 training instance on the Amazon Cloud, and DHIS2 frequently asked questions (FAQs) are being captured and imported to ORTS (HelpDesk System).

Currently DHIS2 V2.3 is deployed to 97% of public health facilities via offline mode and to 78% via online mode. In addition, DHIS2 server uptime reached to 100%

DUP also supported the MOH in the deployment of DHIS2 on Amazon Cloud so that users can directly access the system for data entry and analysis (via https://dhis.moh.gov.et/). The production instance, including the database and the applications, were deployed on the Cloud and as a result, the availability of DHIS2 is significantly enhanced for data entry and analysis. This has significantly solved the local server and other resource-related challenges the system had been suffering from in the past. DUP has been working with the MOH and University of Oslo to come up with an optimal solution that can ensure backend stabilization and better performance.

Furthermore, DUP supported the configuration of the DHIS2 server performance-monitoring tool at the MOH for routine monitoring of the system's performance to take immediate actions. According to the server performance monitoring system, currently the uptime of the server (instance) is 100% and the uptime of DHIS2 application running in the server is 99.7%.

Support for the development and Implementation of electronic community health information system (eCHIS)

During the third year, DUP continued its support to the MOH in order to improve functionality and scale-up of eCHIS.

DUP supported the MOH in the development of the nutrition and iCCM modules, including translation of the application into three local languages (Amharic, Afaan Oromo, and Tigrigna). Furthermore, DUP supported the MOH in the addition of disease modules in the eCHIS. To this end, scoping of the eCHIS disease modules for TB and Malaria was done in selected sites from the Amhara and Tigray regions. The scoping result was reviewed and approved by Disease Prevention and Control Directorate (DPC), PPMED, and HITD. In order to work on the prototype application for malaria and TB, focal persons were assigned from DPC to work along with the technical team. DUP also supported development of workflows based on the scoping result and guidelines for TB program in eCHIS. The same is done for the malaria program including integration of malaria elimination in eCHIS.

Consequently, eCHIS is currently being implemented in 1,442 health posts in the Oromia, SNNP, Amhara, and Tigray regions. Around 324 health extension workers (HEWs) are actively using the eCHIS apps as indicated in the below Table.

eCHIS implementation status in the 1442 health posts by region

Regions	# of implementing Health Post	Active Users*	Non-active Users**	Total users as of May 2020
Amhara	284	121	52	226
Oromia	552	114	40	154
SNPPR	440	87	5	92
Tigray	166	2	3	5
Grand Total	1442	324	100	477

*Active users: Those users who have submitted at least 270 forms per month. **non-active users: Those users who have submitted less than 270 forms per month.

HEWs are expected to complete household and members' information using eCHIS before going to the service delivery modules. As indicated in the table, a total of 562,822 households are registered to date on eCHIS.

eCHIS household registration status in the 1442 health posts as of June, 2020

Year	Regions				
	Amhara	Oromia	SNNP	Tigray	Total
2018	-	246	-	-	246
2019	37,328	199,481	186,333	7,653	430,795
2020	87,111	34,525	9,798	347	131,781
Total	124,439	234,252	196,131	8,000	562,822

DUP also supported the completion of a biometrics module integration with eCHIS (Simprints finger print module integration into eCHIS). To this end, DUP supported training on the integrated eCHIS-biometrics application to eight experts (five from SNNP and three from Oromia RHBs). During the two-day training, feedback was collected on translation and system usability. Furthermore, DUP supported the provision of end-user training on eCHIS-biometrics integrated application in two pilot woredas.

In addition, integration of eCHIS with Tableau has been implemented to facilitate data visualization. Accordingly, major data quality issues were identified using the visualization tool and feedback was provided to the respective regions and HEWs.

DUP is collaborating with an organization called, Weema International, to support eCHIS implementation in two woredas of SNNP in Kembata Tembaro Zone.

Performance improvement of the eCHIS mobile application was completed during the current reporting period. DUP supported the completion of 70 percent of the testing of mobile report indicators. The team performed an iteration on test results in order to improve mobile reports. DUP supported the completion of quality assurance and imported translations to the system.

Support eHealth architecture (eHA) and interoperability

The eHA continuously evolves to reflect the current status of the HIS national landscape and is adjusted to reflect emerging national and international needs. In doing so, several activities have been undertaken by DUP to support the MOH. These activities range and include the development of software solutions, preparation of an interoperability and messaging standards document, development of training/course materials to conduct knowledge transfer training to MOH and partner staff.

DUP, in collaboration with Mekelle University (MU), supported finalization of an eHA roadmap document that outlines a long -term sequential and prioritized activities to drive the maturity of eHA. The roadmap document serves as a communication of past, current, and future statuses of the eHA.

DUP also supported the preparation of interoperability and messaging standard documents for eHA. This document adheres to eHA principles and gives detailed explanations on how the interoperation can be supported by different messaging standards among those different eHA components. The document implemented the following three health information exchange guiding principles and also aligned with the eHA principles:

1. Adopting global eHealth interoperability trends.
2. Empowering consumers in using the systems and accessing information.
3. Efficient utilization of the existing infrastructure and methodological approaches to address existing eHealth interoperability challenges.

As part of its support to strengthen local capacity on eHA and interoperability that aims to create a critical mass of experts, DUP supported the development of an online Digital Health Academy Platform in collaboration with Mekelle University. The platform hosts different courses on general digital health and in particular, health information exchange and interoperability. The platform is made available with course materials developed and loaded on the DUP's server for testing purposes. Courses, including Introduction to Health Information Exchange, eHealth Architecture and Health Data Standards, Interoperability Layer, Registries and Workflows, and Digital Health Leadership, have been created on the platform. Course materials are ready and some activities such as quizzes and assignments are also created on the platform. The platform will assist eLearning or blended learning (face-to-face and online) on eHA and interoperability based on the materials developed.

Another important accomplishment related to eHA is the development of the Digital Health Projects Inventory System. It is a web-based system that allows registration of digital health projects and makes documentation of the enterprise architecture/applications searchable with appropriate attributes. Beyond registration of the projects, the system also clearly shows its alignment with Ethiopia's eHA and the status of the projects with comprehensive attributes. The inventory system can be used as a clearing house for the standards followed in a certain application and clearly shows the technology with which a project is developed, its focus area, and geographic coverage to mention a few. It is also used to improve coordination of work as it makes it easy to investigate similar work.

The Ethiopian eHA provides an architectural solution to enable data exchange between different HIS components, including point of services (PoS), shared services, and HMIS. In this regard, DUP supported the development of two software solutions to realize practical health data exchanges. The first solution, developed in collaboration with MU, was the eCHIS/DHIS2 health data exchange. To enable interoperability, a requirement gathering and analysis workshop was conducted. Based on the requirement document, a mediator service was developed as a component of an eHA interoperability layer that utilized capabilities of eHA shared services, i.e. terminology management service (TMS) and facility registry (FR) to validate data element mapping between the systems. The integration of eCHIS and DHIS2 adheres to the eHA principles and utilized open-source tools in the eHA ecosystem. DUP achieved a promising successful data integration between the systems and intends to increase the scale of implementation to incorporate other data sources.

The second solution addressed the health data exchange between the Master Facility Register (MFR) and DHIS2 systems. The MFR/DHIS2 integration was deployed on a test environment and a User Acceptance Test (UAT) was successfully done by performing 14 identified test cases. Technical documentation has been prepared and an updated version of the developed source code was stored in a MOH source code repository. Capacity building and knowledge transfer workshop was held in MU from January 1-5, 2020 on how to support the developed interoperability solution to 19 participants from HITD and six CBMP universities. Participants were introduced to MFR/DHIS2 data exchange use cases, conducted code walkthroughs of the developed script testing the use case, and discussed how to integrate the concept of FHIR in the MFR/DHIS2 integration.

Support for master facility registry (MFR)

DUP continued supporting MOH on further enhancements and data curation of the MFR. The facility list in the MFR had been upgraded in light of the current changes in the latest version of DHIS2. The DUP digitization team coordinated with JSI's AIDSFree team (including conducting formal meetings) to ensure the upgrade and the facility coding scheme. Moreover, curation (mainly editing) of the signature domain of the MFR was done in different regions under the leadership of the health facilities' regulatory body and with support of the PPMED and HITD as agreed in the governance document of the MFR.

DUP documented the current challenges with the MFR implementation, including both software and governance-related challenges. Moreover, DUP conducted a quick landscape analysis of the recently available MFR solutions. The intention of this analysis was to see the possibility and feasibility of replacing the current ResourceMap-based MFR of the MOH with a better, flexible and FHIR-compliant solution. On a related note, DUP installed the Global Open Facility Reconciliation (GOFR) Core system, supported by In-

traHealth International, on DUP's Cloud infrastructure and explored the features and functionalities of the system. Testing was performed on system integration between the new MFR tool (GOFR) with HAPI FHIR server and the FHIR standard data exchange between the two systems performed well. DUP plans to further support the fine-tuning of the MFR, supporting its use and systems integration.

Support for the national health data dictionary (NHDD or terminology service)

DUP supported a detailed analysis and quality check of the mapping of the 2,054 National Codes of Diseases (NCoD) to the ICD-10. By doing so, duplication and mismatched codes were corrected in order to support the proper use of the disease codes by clinical practitioners. As part of the efforts to simplify the terminologies for diseases and conditions for clinical practitioners, DUP supported the finalization of the ICD10 - SNOMED mapping of the NCoD. This effort will help clinical practitioners easily capture the right diseases and conditions from the overwhelming list. DUP also supported the review of the NCoD disease descriptions based on the newly released ICD-11. The new release of ICD includes the detailed descriptions of the majority of the diseases, which the previous version lacked.

The first version of the upgraded NHDD Mobile Pocket (the NHDD Mobile App) was finalized and is currently ready for use in health facilities. Among other things, this release is expected to significantly improve the data quality in disease reporting, as the system has enhanced the way diseases can be searched, captured, and put in favorites lists. Moreover, a full description of a disease is inculcated in the dictionary for a significant number of diagnoses. DUP closely worked with the DHA project in enhancing the NHDD Pocket. The enhanced version of NHDD Pocket was tested at the MOH level and made ready for use. It is also availed on the Google Apps Store for downloading, installing, and for offline use.

DUP in collaboration with the MOH and DHA made significant progress regarding the preparation of a list of pharmaceutical items that includes drugs, vaccines, supply and medical equipment, as well as the HMIS data elements and health cards to make them part of the NHDD. These priority lists and other domains are planned to be included in the NHDD to see a growing number of standard domains in the Terminology Service that paves the way for the realization of a bigger enterprise architecture.

Support for national data warehouse

DUP continued supporting MOH's commitment to realize a national data warehouse that can provide the capacity to integrate and store health data from multiple sources and enable planners, program managers, policy makers, and public health practitioners to have a comprehensive perspective on the public health domain. Understanding that the establishment of a national data warehouse is a huge and resource-intensive investment, the MOH opted to handle this initiative in a more agile manner and based it on priority use-cases to facilitate learning and reduce involved risks. Accordingly, the RMNCH domain came out as a priority use case with a huge multi-sectoral data demand, and remarkable progress has been made in realizing this massive initiative.

As part of this effort, DUP facilitated and supported the RMNCH data warehouse ("Data Mart") requirement refinement workshop that was carried out with the participation of 21 experts from MCH, HITD, and PPMED directorates of the MOH. The detailed MCH functional and non-functional requirements were gathered, reviewed, and discussed during the forum. DUP hired a senior consultant to lead the write-up of the functional and non-functional requirements of the RMNCH data warehouse.

DUP also supported the preparation and review of a detailed scope of work (SoW) for the national data warehouse technical design, implementation, and deployment (based on the selected use case). The objective of this SoW is to produce a detailed data warehouse technical design documentation and to implement it with the engagement of a competitive consulting firm. The SoW is now ready for announcement in order to identify potential vendors.

Support for establishment of a national digital health innovation and learning center (DHILC)

By collaborating with the MOH, DUP completed the establishment of a national digital health innovation center at St. Peter's Hospital and it is now functional following the official launching in the presence of the Minister of Health, Minister of Science and Innovation and BMGF's representative. To achieve this,

DUP equipped and furnished the center in many aspects, including renovation work and installation of network, electricity, and ICT equipment (that includes servers and computers). Two staff were hired and deployed at the center to support its functionality. Development of the Human Resource Information System is happening at center currently and the eCHIS development team will transition to work for the center momentarily.

In November, the center was visited by the former Minister of Health, Dr. Amir Aman, and the visit had facilitated the IT equipment receiving an expedited clearance from customs. In addition, during the OpenHIE Conference, representatives from USAID Washington and WHO Geneva visited the center and provided encouraging feedback. Recently, representatives from the Ethiopia House of Federation visited the center.

Support ICT infrastructures

DUP provided support to HITD's HIS Infrastructure's case team in order to monitor HealthNet/VPN functionality at woreda and health facility levels. Moreover, DUP deployed more than 158 IT interns at zonal and woreda levels in order to improve and support functionality of ICT infrastructure, including HealthNet and hardware maintenance, and to support the use of DHIS2, eCHIS, and other systems.

As indicated in the Table below, HealthNet has been implemented in 78% of the targeted sites (3,605 sites).

Health-Net/VPN implementation status by region

Region	Planned	Implemented				Difference
		ADSL	Got via 3G	Tailor	Grand Total	
Addis Abeba	125	121		2	123	2
Afar	105	33	31		64	41
Amhara	1013	255	572	3	830	183
Benish Gumuz	41	12	15		27	14
Dire Dawa	19	12	5		17	2
Gambella	47	19	8		27	20
Hareri	23	14	6		20	3
Oromia	1808	723	701	11	1435	373
SNNP	924	309	413	2	724	200
Somali	210	37	45		82	128
Tigray	289	101	148	7	256	33
Grand Total	4604	1636	1944	25	3605	999

Support G-Suite email and other related functions to all staff of MOH, agencies, and RHBs

DUP continued supporting the MOH on expanding G-suit email services to users. Based on a negotiated discounted price, the subscription for G-suit email was changed to an annual based contract with Google Africa. DUP transferred G-suite email accounts to Google Africa, which came with a free license for six months for a two-year service agreement.

DUP provided G-Suite email accounts management support to the MOH, in particular creation, administration, and user management support. Currently, 1,599 accounts have been created for the MOH, HIV Prevention and Control Office(HAPCO), and RHBs (SNNP, Amhara, Oromia). DUP further supported the creation of the user group email accounts for the COVID-19 task force which includes external partners in the group email. Moreover, DUP provided regular remote support to MOH, RHBs, and partners on G-suit email use.

DUP supported the preparation of the G-suite email protocol for MOH. The protocol was prepared in Amharic to increase readability with all concerned staff and shared with HITD. DUP also shared guidelines on working from home via G-suite to all MOH staff and have continuously supported/trained staff remotely to help them explore and use different features of G-Suite. Currently DUP has continued its remarkable

remote support on G-suite for MOH and RHBs, given the ever increasing COVID-19-driven demands from all corners.

(III) GOVERNANCE OF THE HEALTH INFORMATION SYSTEM

DUP supported further refinement of the national HIS governance framework based on inputs from a small team formed to revise the updated HIS governance framework.

DUP also supported the finalization of the HIS Steering Committee TOR, which was reviewed and endorsed by the virtual Steering Committee meeting held in June 2020. The Steering Committee meeting was chaired by Her Excellency Dr. Lia and passed important decisions, such as changing the frequency of the Steering Committee meeting from every six months to quarterly.

Another milestone achieved during the reporting period is the development of a national data access and data sharing directive. DUP supported the preparation of this directive, which was further refined based on comments from the HIS National Advisory Group, MOH's legal directorate, and the data use technical working group. The directive is now ready for a discussion and guidance from the MOH Executive Committee (EC).

The other important function of the national HIS governance is to establish and run the national level TWGs' meetings on a regular basis. Two TWGs, namely data use and HIS governance, were formed based on the guidance of NAG. To this end, DUP provided support to conduct data use TWG meetings monthly and one round of HIS governance TWG meeting.

DUP has been supporting regions to revitalize and initiate regional level HIS governance and coordination platforms. DUP supported the MOH in the development and sharing of generic HIS governance and coordination TOR to the regions so that they could customize it to their situation. The platforms are either a standalone or integrated with overall regional partners' forums, depending on the regional realities. Regions, such as Amhara, Dire Dawa, Somali, and Gambella, have established standalone HIS coordination platforms and are conducting meetings with HIS stakeholders on a regular basis. On the other hand, in Oromia and Benishangul Gumuz, the HIS coordination platforms are integrated with the overall partner coordination platform at a regional level. Coordination of HIS investments in SNNP, Afar, Harari, Tigray, Addis Ababa regions is happening in coordination with a broader health coordination forum.

DUP has been supporting the finalization of the HIS strategic plan. A small team of staff, drawn from PPMED and DUP, has been formed to finalize the write-up of the draft HIS strategic plan. Accordingly, the outline and timeline has been aligned with HSTP II and write-up of most sections of the document, including situational analysis, stakeholder analysis, assumptions, risks and risk mitigation, refinement of indicators, and description of strategic direction is almost completed. Currently, the zero draft document is prepared and input is being gathered from PPMED staff. Integration of the digitization aspect of the HIS Strategic Plan and finalization is awaiting the Digitization Strategy, which is being prepared separately by HITD and DUP is supporting this effort.

(IV) HEALTH INFORMATION SYSTEM RESEARCH, LEARNING, DOCUMENTATION, AND DISSEMINATION OF PRACTICE

DUP supports generation, sharing, storing, and application of knowledge pertaining to the IR. During year three, the project enhanced the capacity of the health sector on implementation research, knowledge management, data analysis, and report writing. Similarly, the project strengthened an internal knowledge management system and program learning and communication efforts.

DUP developed a monitoring, evaluation, learning, and adaptation plan and results framework, aimed at clearly articulating the change the project plans to achieve over its span, and ensuring the availability of data to support the project's narrative of change. The results framework (RF) identified the project's over-arching and intermediate outcomes and outputs. The updated RF is attached with this report.

Support implementation research

Through funding from DDCF, the DUP envisions creating a culture of implementation research to strengthen Ethiopia's HIS for increased and better health outcomes. To achieve this vision, a one-week training workshop was organized to build local implementation research capacity. More than 30 participants

from six local universities, all RHBs, MOH, and selected woredas successfully completed the training. It helped them to deepen their understanding of the barriers faced when programs are implemented in a real world context and how to develop, test, and scale-up evidence-based solutions to optimize HIS.

Following the IR capacity building workshop, collaborative research teams were established and they have defined their research areas. The research topics covered include: testing a data use incentive package, strengthening PMTs for better data quality and information use, strengthening data quality assurance mechanisms, the role of effective mentorship and supportive supervision for improved HIS performance, and strengthening HIS governance (leadership commitment and engagement) for better results. Currently, most research teams have finalized their research proposals, obtained IRB approval and are ready to collect preliminary data that will be used to design the interventions (the model to be evaluated).

Support impact evaluation: a study to determine the impact of HIS interventions on health services

In addition to ongoing and embedded implementation research, DUP designed protocols to conduct a robust and rigorous evaluation to explore the pathway that leads from increased utilization of quality data to improved services delivery and better maternal, newborn, and child health outcomes. Therefore, the designed impact evaluation aims to determine the impact of HIS interventions on improving the use of health information for decision-making and on improving maternal and child health service outcomes. To date, ethical clearance has been secured and data collection tools are prepared in three languages. This study will be conducted in the eight learning woredas and the 11 DDCF supported demonstration woredas. The study is a quasi-experimental design with a pre/post-test and comparison group. A linked facility and population-based survey will be conducted in both the intervention and comparison woredas.

Support documentation and sharing of lessons

DUP supported preparation and distribution of data use posters and brochures that were prepared in four languages (English, Amharic, Afan Oromo, and Tigrigna) to 18 woredas, eight primary hospitals, 90 health centers and 381 health posts. Support was extended to the MOH to produce the IR newsletter, updating the wider public on the status of the IR initiatives. The project also produced and shared five success stories, narrating observed changes due to the ongoing implementation of IR initiatives.

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