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Health Management Information System Scale-Up Project in Ethiopia: A Five-Year Journey to Better Health Information Systems

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ADVANCING PARTNERS & COMMUNITIES

Advancing Partners & Communities (APC) is a cooperative agreement funded by the U.S. Agency for International Development under Agreement No. AID-OAA-A-12-00047, beginning October 1, 2012. APC is implemented by JSI Research & Training Institute, Inc., in collaboration with FHI 360. The project focuses on advancing and supporting community programs that seek to improve the overall health of communities and achieve other health-related impacts, especially in relationship to family planning. APC provides global leadership for community-based programming, executes and manages small- and medium-sized sub-awards, supports procurement reform by preparing awards for execution by USAID, and builds technical capacity of organizations to implement effective programs.

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JSI RESEARCH & TRAINING INSTITUTE, INC.

2733 Crystal Drive, 4th Floor

Arlington, VA 22202

Phone: 703-528-7474

Fax: 703-528-7480

Email: info@advancingpartners.org

Web: advancingpartners.org

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Acronyms

APC	Advancing Partners & Communities
CHIS	Community Health Information System
DHIS2	District Health Information Software 2
eCHIS	electronic Community Health Information System
eIDSR	electronic Integrated Disease Surveillance and Response
eMCS	electronic Medical Catalog System
eMRIS	electronic Multi-sectoral Response Information System
ERIS	Emergency and Referral Information System
FMOH	Federal Ministry of Health
HEW	Health Extension Worker
HIS	Health Information Systems
HMIS	Health Management Information System
ICT	Information and Communication Technology
JSI R&T	JSI Research & Training Institute, Inc.
RHB	Regional Health Bureau
RHIS	Routine Health Information System
SNNPR	Southern Nation Nationalities and Peoples Region
WorHO	Woreda Health Office
ZHD	Zonal Health Department





Background

Health information systems (HIS) is one of six building blocks defined by the World Health Organization as essential to health system strengthening. In Ethiopia, the Federal Ministry of Health (FMOH) is committed to advancing the country's health sector and has long recognized the need to improve HIS. Through the Health Sector Transformation Plan's (HSTP) Information Revolution agenda—with its three pillars of cultural transformation for data use, digitization, and governance—the FMOH introduced sweeping changes to the way information and communication technology (ICT) is used at all levels of the health system.

Since 2006, the FMOH has worked with development partners to improve its HIS, including its health management information system (HMIS), which constitutes the core system for collecting, analyzing, and disseminating health data and supporting monitoring and evaluation. Information from the HMIS provides continuous support for planning, management, and decision-making processes at each level of the health system—the FMOH, regional health bureaus (RHBs), zonal health departments (ZHDs), woreda health offices (WorHOs), and health facilities—which drives improvements in the country's health system.

In 2006, a United Nations Development Programme (UNDP)-funded countrywide HIS assessment, led by John Snow, Inc. as part of a technical working group, identified some major problems, including a significant data burden for health workers, poor data quality, limited information use, lack of human resources for HMIS, and lack of ICT support. The group developed five strategic initiatives to strengthen and continuously improve the health sector: capacity building; standardized and integrated data collection and reporting; linkage between information sources; information use and action-oriented performance monitoring; and appropriate technology. As a result, the HMIS was reformed and piloted in 2007. Various partners and projects have since supported Ethiopia's HIS development.

2006

HIS assessment funded by UNDP.

2007

HMIS reform and pilot funded by UNDP

2010-
2011

- HMIS reform and pilot funded by UNDP
- Development of Community Health Information System (CHIS) and Multi-sectoral Response Information System (MRIS)
- Roll-out of systems in Southern Nation Nationalities and Peoples Region (SNNPR)

2012

- Development and roll-out of electronic Medical Catalog System (eMCS)
- Offline woreda data entry
- CHIS scale-up initiated in Oromia

2013

Development and roll-out of electronic Integrated Disease Surveillance and Response (eIDSR) at woredas

2014

HMIS Scale-up Project continued under the USAID-funded APC project

2015-
2017

- Expansion and strengthening of systems to other regions
- eHMIS scaled up in SNNPR
- CHIS scaled up in all regions

2018-
2019

- Health Net implemented country-wide
- District Health Information Software 2 (DHIS2) implemented in all regions
- Electronic CHIS (eCHIS) developed and deployed in 4 regions
- RHIS eLearning application developed

HMIS SCALE-UP PROJECT

GOAL:

Technical assistance to promote a sustainable HMIS that produces high-quality data to be used at every management level of Ethiopia's health system.

OBJECTIVES:

- Build local capacity for HMIS ownership and leadership to promote its sustainability and use.
- Scale up paper-based HMIS at all health facilities in SNNPR and strengthen it in Oromia region.
- Scale up CHIS in all health posts in SNNPR and Oromia.
- Promote data quality assurance and information use at all levels of the health system.
- Enhance ICT use in health care delivery and expand internet connectivity for health facilities.

Project Overview

The Advancing Partners & Communities' (APC) HMIS Scale-Up Project, implemented by JSI Research & Training Institute, Inc. (JSI R&T) from 2014–2019, was a continuation of the MEASURE Evaluation project (2009–2014); both projects were funded by USAID. The HMIS Scale-Up Project supported the FMOH's ongoing commitment to improving health through the Health Sector Transformation Plan's Information Revolution agenda and was conducted in close collaboration with the FMOH, RHBs, ZHDs, WorHOs, and health facilities.

APC provided technical, financial, and logistical support for systems implementation, training, supportive supervision and mentoring, and data quality improvement and information use. The project developed and implemented data systems, built capacity within the health workforce to use and maintain data, and connected health facilities with networking equipment. These contributions increased the use of data for decision-making, which enables improvements in the health system.

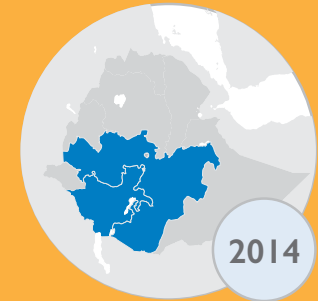
During the course of the project, APC's mandate expanded from support to two regions (Oromia and SNNPR) to all regions of the country and the FMOH. In addition to the HMIS, the country's routine health information system, APC supported the enhancement and scale-up of the CHIS; electronic Community Health Information System (eCHIS); electronic Multi-sectoral Response Information System (eMRIS); electronic Integrated Disease Surveillance and Response (eIDSR); electronic Medical Catalog System (eMCS); and the Emergency Referral Information System (ERIS) at the national level and in specific regions.

FUNDAMENTAL APPROACHES

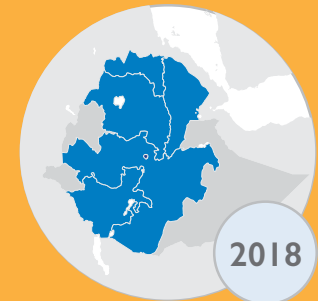
- Capacity building to ensure that managers, health care providers, and health extension worker (HEWs) have the skills to generate and use high-quality data.
- Promote and strengthen standardization, integration, simplification, and institutionalization principles for an effective and efficient HIS.
- Strengthen performance review teams for evidence-based decision-making.
- Enhance use of ICT.



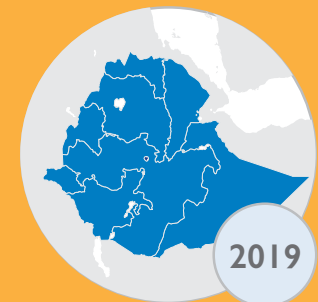
HMIS EXPANSION



2 Regions



6 Regions



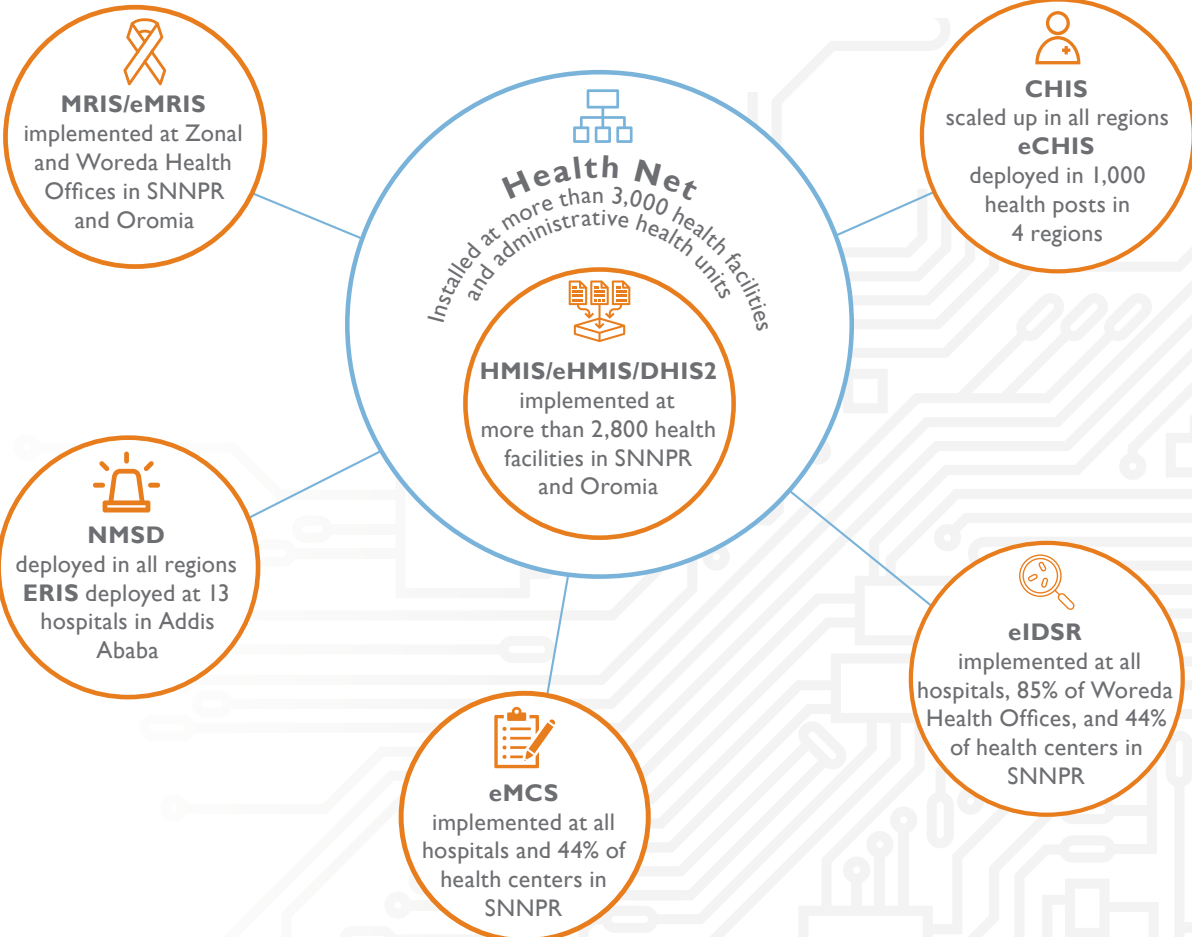
All Regions



Results Summary

BUILDING A SUSTAINABLE HEALTH INFORMATION SYSTEM

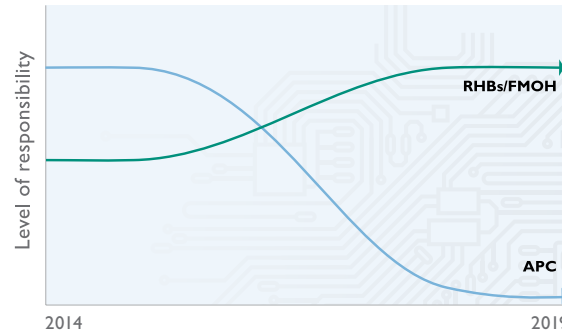
In close collaboration with federal and regional government and partners, APC supported strengthening HIS components.



CAPACITY BUILDING DESIGNED FOR SELF-RELIANCE

Project implementation was accompanied by extensive capacity building at all levels of the health system. A gradual shift in level of responsibility from APC to the RHBs ensured sustainability of project interventions.

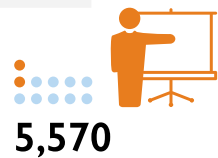
-  **TRAINING**
-  **MENTORING**
-  **HMIS DATA COLLECTION & REPORTING**
-  **IT DEVELOPMENT**
-  **DATA QUALITY ASSURANCE**
-  **USE OF HMIS DATA FOR DECISION MAKING**



APC TRAINED MORE THAN 66,000 HEALTH CARE PROVIDERS, MANAGERS, AND HEALTH EXTENSION WORKERS



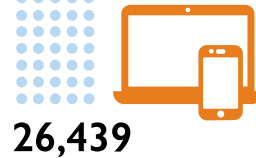
TRAINING OF TRAINERS



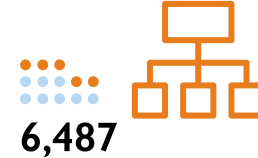
CHIS AND HMIS TRAINING



DHIS 2 TRAINING



TRAINING ON OTHER SYSTEMS



LEGEND: each dot = 500 people ● female ● male

PRINTED MANUALS & GUIDES



APC developed and distributed printed manuals and guidelines for HMIS, CHIS, information technology support, and information use to all trainees

KEY OUTCOMES

- Managers and health workers can now better manage health-related data at every level of health care delivery system, which improves patient care. Currently, all public institutions record and report according to standard procedures.
- With improved data quality, demand for data, and information use, informed decision-making has improved at all levels of the health system. The routine HMIS data flow is fully integrated and institutionalized to assure standardization and good data quality.
- Most health facilities now have network infrastructure and Internet connectivity, resulting in improved data exchange and access to databases and information systems for broad-based analysis, triangulation, and decision-making.

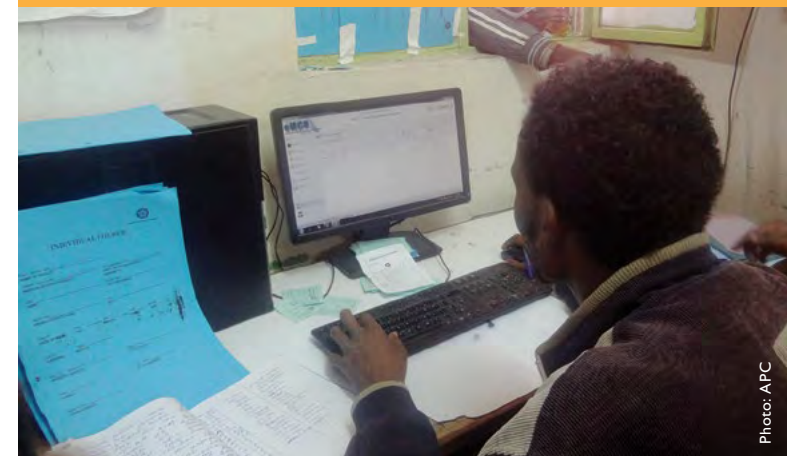


Photo: APC

KEY ACHIEVEMENTS

HMIS data management improved at all public hospitals and health centers, WorHOs, ZHDs, and RHBs in SNNPR and Oromia:

- All health facilities use standard FMOH tools for data recording and reporting.
- Significantly reduced fragmentation of reporting and burden of data.
- Increased availability of comprehensive routine data from all health facilities.
- Improved recording and maintenance of client records with proper indexing, file tracking, and file storage and retrieval systems at all health facilities.
- All zones have pools of trained experts who are able to provide training at every level.

SNNPR:

77 hospitals



715 health centers



15 ZHDs



158 WorHOs



4 special woredas

OROMIA:

91 hospitals

1,402 health centers

39 ZHDs/towns

317 WorHOs

Paper-based HMIS and CHIS

The paper-based HMIS and CHIS were introduced in 2007 and 2010, respectively, under the MEASURE Evaluation project to collect and manage routine health information. APC supported these two systems by building the capacity of managers, health workers, and HEWs in Oromia and SNNP Regions, registers, and other documents essential to operating the paper-based systems.

The CHIS is designed to help HEWs manage their work educating households and delivering an integrated package of promotive, preventive, and basic curative health services to families. HEWs manage and monitor clients through the CHIS tools, which include the family folder, cards, a field book, tallies, and reporting sheets. The project implemented CHIS at 10,000 (100%) agrarian health posts and at 650 (100%) pastoralist health posts in Oromia, as well as in 66 of 68 (97%) kebeles (wards) in SNNPR. The implementations were followed by onsite support at regional and national levels.

At FMOH and RHB request, the project provided basic and refresher trainings on core competencies of data quality and information use for health managers, HMIS focal persons, health information technicians, information technology officers, and health workers. The trainings improved performance and promoted sustainability and ownership of the systems. APC trained more than 33,000 (34% of whom were female) managers, health workers, and HEWs on paper-based HMIS and CHIS (see Table 1).

Table 1. Paper-based HMIS and CHIS Training

Training type	Number of participants		
	Female	Male	Total
Training-of-trainers on HMIS tools and Connected Woreda	1,120	4,450	5,570
HEWs and health care providers trained in pastoral and agrarian CHIS	11,731	16,439	28,170
Total	12,851	20,889	33,740

Digitization and Scale-up of E-Health Applications

eHMIS

The paper-based HMIS was supported by electronic applications designed and developed to meet the growing need for timely, complete, and accurate reporting across all levels of the health system. In 2011, the MEASURE Evaluation-managed HMIS Scale-up Project helped SNNPR implement a locally developed electronic HMIS (eHMIS), designed for the Ethiopian health system, with features in line with industry standards. All 19 zones, 158 WorHOs, and 23 of 65 (36%) hospitals had access to the eHMIS server located at the RHB.

APC continued to support SNNPR's eHMIS by strengthening data exchange among RHB, ZHD, WorHOs, hospitals, and health centers. eHMIS was expanded to 34 (53%) hospitals, and 320 of 640 (50%) health centers were connected to a regional server that enabled use of facility data for review, planning, and decision-making.

DHIS2

In January 2018, the FMOH decided to change the country's routine data collection platform to DHIS2 to accommodate evolving information needs. APC assisted the FMOH in major code-level customization and rollout of the application in all regions, provided hardware and software maintenance, and training for more than 26,000 people (see Table 2).

eCHIS

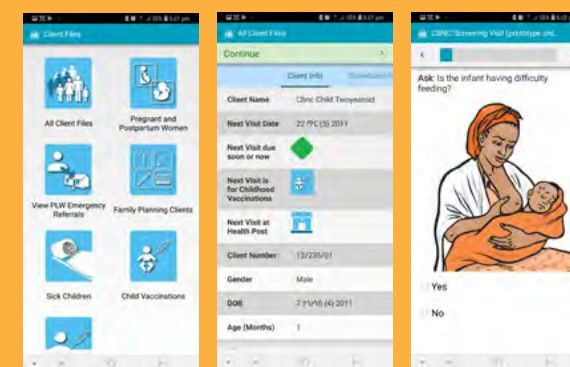
Since 2018, under the leadership of the FMOH, APC and other partners have been developing eCHIS, which allows HEWs to record and analyze family-centered services to inform local decisions. The project deployed eight full-time software developers and information technology professionals to develop the system, which includes a digital family folder module and reproductive, maternal, newborn, and child health cards. APC tested the system in four woredas in Oromia, Amhara, Tigray, and SNNP Regions before training and deploying it at 1,000 health posts. The project also worked with the FMOH to configure and maintain the back-end servers.

KEY ACHIEVEMENTS

- eHMIS implemented at 354 health facilities in SNNPR
- DHIS2 implemented in more than 2,800 health facilities in all regions
- eCHIS developed and implemented in 1,000 health posts in 4 regions



eCHIS



E-LEARNING FOR ROUTINE HEALTH INFORMATION SYSTEMS



To facilitate sustained learning, APC created an e-Learning curriculum on Routine Health Information Systems

(RHIS). This online curriculum provides didactic content and enables learners to train intermittently, repeatedly, and for durations that accommodate their schedules. The target audience for this training is persons engaged in or interested in performing tasks related to RHIS, including policymakers and managers; RHIS staff at national, intermediate, and facility levels; care providers and health technicians; as well as students in health sciences and practice. The curriculum was adapted from a workshop-based RHIS curriculum developed by MEASURE Evaluation with worldwide partners.

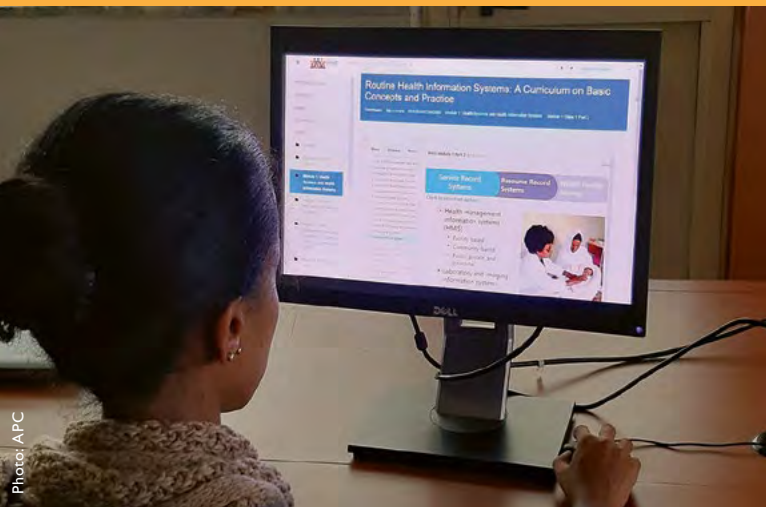


Photo: APC

OTHER ELECTRONIC SOLUTIONS

APC provided assistance to develop additional eHealth systems to meet the growing need for timely, complete, and accurate reporting. This included a disease surveillance system, a medical catalog, an HIV data collection tool, and an emergency and referral information system. These systems, below, improve the efficiency and effectiveness of health care delivery.

Electronic Integrated Disease Surveillance and Response: Application for responding to notifiable diseases communicated to public health emergency management units at each level. Currently, 134 (85%) WorHOs; 65 (100%) hospitals; and 320 (44%) health centers of SNNPR have functional electronic weekly disease reporting systems.

Electronic Medical Catalog System: Application for patient registration and appointment management; installed at 65 (100%) hospitals and 320 (44%) health centers of SNNPR.

Electronic Multi-sectoral Response Information System: Non-clinical HIV data collection tool developed by the World Food Program for the Federal HIV/AIDS Prevention and Control Office in 2017, and implemented by the HMIS Scale-Up Project at ZHDs and WorHOs in Oromia and SNNP Regions. eMRIS captures and analyzes information on HIV prevention for most at-risk populations and vulnerable groups; school-based HIV prevention; HIV mainstreaming; condom distribution; orphans and vulnerable children care and support; people living with HIV care and support, and community behavior change communications programs.

Emergency and Referral Information System: Developed in 2016 to improve emergency and referral services. ERIS was implemented in two phases: first in the National Medical Service Directory in all regions, then at 13 hospitals in Addis Ababa. APC trained health professionals from hospitals and RHBs to use the system, which consists of a National Service Directory, a bed management and referral system, an emergency service/management module, a decision support system, and a reporting module.

Table 2. Training on DHIS2 and Other Electronic Solutions

Training type	Number of participants		
	Female	Male	Total
DHIS2 training	7,352	19,087	26,439
Other electronic solutions software training	2,501	3,986	6,487
Total	9,853	23,073	32,926

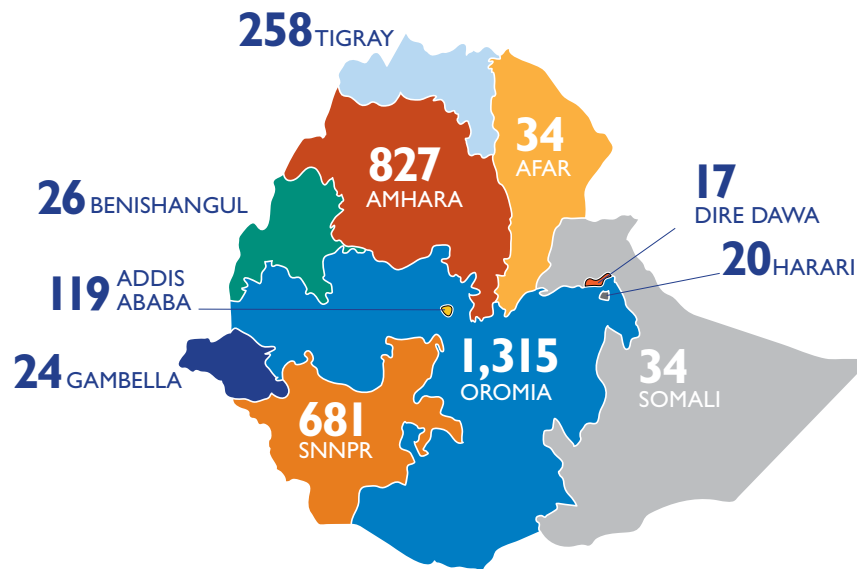
Health Net

To facilitate communication and increase the timeliness of data and feedback, the HSTP's Information Revolution agenda includes the Connected Woreda strategy, which calls for connecting the FMOH, RHBs, WorHOs, hospitals, and health centers for fast and secure data exchange.

To achieve this, APC provided technical assistance and logistics support for more than 3,000 health facilities and administrative health units in the country to implement Health Net, a virtual private network (VPN) service provided by Ethio Telecom. APC worked closely with FMOH and RHBs in the implementation process and monitored progress through help desk officers hired by the project.

APC provided local area networking equipment and trained small- and micro-business enterprises to install wired local area networks at each facility. In addition to networking supplies such as cables and toolkits, APC provided desktop computers, printers, servers, tablets, projectors, and other devices, as well as software and hardware maintenance. APC also supported Health Net orientations, trainings, expansion of local area networking within health facilities, and follow-up.

Health Net Expansion to Health Facilities and Administrative Health Units, 2019



ACCELERATING DATA EXCHANGE

HEALTH NET ACCELERATES:

- Monthly DHIS2 and weekly eIDSR reports.
- Access to woreda, regional, and federal HIS dashboards.
- Feedback on health service performance.
- Access to Master Facility Registry, logistics management information system, human resource information, etc., for analysis, triangulation, and decision-making.
- Exchange of patient care data (tele-radiology, laboratory, and other telemedicine reports).
- Virtual training and continuous education to build and strengthen staff capacity.



LOT QUALITY ASSURANCE SAMPLING



Data quality checks using LQAS is now 100% institutionalized at all 1,474 health centers and hospitals in Oromia and at 787 health centers and hospitals in SNNPR.

HEALTH FACILITY REPORTING

Average report completeness rate

SNNPR:

98%



for public health centers and hospitals

82.9%



for health posts

OROMIA:

99.5%



for public health centers and hospitals

98.2%



for health posts

Data Quality Assurance

Data quality assurance helps to ensure that managers and health workers have high-quality data to make informed decisions. APC, in partnership with the FMOH and RHBs, made significant improvements in data quality and information use at all levels of the health system. APC supported institutionalization of lot quality assurance sampling (LQAS) at health facilities; routine data quality assessment (RDQA) at RHBs, ZHDs, and WorHOs; and data quality assurance (data validation) systems in SNNPR and Oromia.

As a result of this support, availability and timeliness of service delivery reports have improved, although more work must be done to reach and sustain required levels. APC also participated in annual data quality assessments at the national level, as part of the RDQA team of the HMIS technical working group.

Administrative health units and health facilities are now better equipped to use their own data for decision-making. They use data to review monthly performance toward targets; for the annual woreda-based planning process, resource allocation, and progress monitoring; and to improve clinical practices.



Performance Improvement

APC, in collaboration with the FMOH/RHBs, employed multiple strategies to enable the health work force to collect and use paper-based and electronic data. Orientations, trainings, joint supportive supervision, mentorship, and feedback introduced and solidified skills and knowledge of health managers, health workers, and HEWs.

APC staff provided technical assistance to import monthly data; review indicators and check data consistency; clean, verify, and analyze data; prepare summary reports, and provide feedback to administrative health units and facilities.

Since 2014, 5,868 administrative units and facilities (ZHDs, WorHOs, hospitals, and health centers) have been jointly supervised by the HMIS Scale-Up Project and government staff for data quality checks and onsite training using a standard checklist.

PERFORMANCE REVIEW

Performance review is the continuous tracking of key performance indicators set by the FMOH, which allows HIS managers to monitor progress. Performance review teams (PRTs) were established at nearly every facility and administrative unit to institute results-based monitoring and ensure that evidence-based decisions are used to improve health sector performance in line with annual plans and targets. The overall objective of performance review meetings is to identify gaps and lessons, and to plan and implement corrective measures. Semiannual and annual review meetings supplement monthly and quarterly performance monitoring.

The project, working with RHBs, conducted PRISM assessments in 2016 in Oromia and SNNP Regions to identify areas for improvement in HMIS performance by examining technical, organizational, and behavioral factors. The HSTP midterm review, in which APC participated, showed increased use of data for decision-making at all levels.

PERFORMANCE MONITORING CHART

CORE INDICATOR	Quarter I	Quarter II	Quarter III	Quarter IV
1. Contraceptive Acceptance Rate	61.85	61.67	61.3	
2. ANC Coverage	16.13	16.17	16.16	
3. Proportion of Delivery Attended by HEW	4.7	4.7	4.3	
4. Pentavalent Coverage for 2 Yrs	18.28	18.16	18.20	
5. Measles Coverage for 2 Yrs	16.17	16.16	16.18	
6. New Malaria case per 1000 Population	-	-	-	
7. New Pneumonia case per 1000 For 25 years	-	-	-	
8. Tracer Drug availability	6.5	6.5	6.5	
9. TB case Detection rate	1.1	1	1	

Photo: APEgumsa Fayyaa Maannoo

FACILITIES WITH PERFORMANCE REVIEW TEAMS

SNNPR



100% of ZHDs and WorHOs



93% of health centers and hospitals

OROMIA



97% of ZHDs



94% of health centers and hospitals



95% of WorHOs



2016 PRISM ASSESSMENT

Increased demand for data and information use led to improved informed decision-making at all levels.

SNNPR:

- 100% of ZHDs and 70% of WorHOs made decisions based on HMIS review.
- On average, 88% of health centers and health posts and 95% of WorHOs were able to calculate indicators for their catchment areas.

OROMIA:

- 73% of health centers/hospitals; 86% of ZHDs; and 84% of WorHOs conducted monthly performance review using HMIS indicators.
- Performance review is fully institutionalized at all levels of health system.



Lessons

The HMIS Scale-Up Project provided massive technical support to build the capacity of health workers and managers to operationalize Ethiopia's HIS. Lessons from this process include the following:

- Alignment and harmonization of the project plan with FMOH and RHBs was a key to success of systems implementation.
- Joint supportive supervision and mentorship by project and government personnel motivated staff and facilitated knowledge exchange.
- Coordination among APC and partners helped to sustain, promote, and maintain HIS ownership at all levels.
- Frequent communication between Ethio Telecom and regional/zonal/woreda offices narrowed gaps in the VPN deployment.
- Health center and health post linkage was key to success of CHIS implementation.
- Electronic systems significantly reduced the data burden on health workers and facilitated informed decisions.

Conclusions and Recommendations

The HMIS Scale-up Project achieved its objectives. All health facilities and health posts in project-supported areas implemented HMIS/CHIS using the revised tools. The project's assistance resulted in training, mentorship, supportive supervision, logistical support, software development, and roll-out of paper-based and electronic systems.

Currently, the HMIS and its flow of routine health data is fully integrated and institutionalized to assure standardization, consistency, and high-quality data. The system minimizes data fragmentation and parallel reporting in administrative health units and public health facilities. Additionally, the improved data quality and information culture has promoted evidence-based decision-making. The program has gained support from political leadership in communities, woredas, zones, regions, and at the national level. It empowered health providers in their jobs, which improves health service coverage and quality of care.

The demand for high-quality data and its use by managers and health workers at all levels is increasing ownership of and accountability for the HMIS. However, the following challenges remain:

- Shortage and high turnover of trained professionals (HMIS focal persons and health information technologists).
- Infrastructure-related problems (power interruption, poor coverage, and weak internet connectivity).
- Persistent shortage of paper-based data recording tools.
- Skill gaps among newly graduated professionals on data-use core competencies (analysis, interpretation, synthesis, and presentation) because health data management is not incorporated in university or college training curricula.
- Parallel recording and reporting, especially at health posts.
- Delayed HMIS implementation at private facilities.



BEFORE



AFTER

Photos: APC



RECOMMENDATIONS FOR THE WAY FORWARD

Beyond the success of the project and the progress of the HIS, sustained efforts are required to achieve the objectives of the Information Revolution agenda. Looking forward, APC recommends:

- Continuing periodic systematic assessments of HIS performance (LQAS, RDQA, and PRISM assessments) at national and regional levels.
- Improving identification and dissemination of best practices.
- Strengthening mentorship at health facilities to ensure Connected Woreda strategy.
- Using Health Net to triangulate data sources.
- Improving governance structure and increasing accountability by expanding regional HIT departments to the zonal and woreda levels.
- Developing and sustaining strong leadership and commitment to HIS implementation to assure full ownership.
- Advocating for regulation that avoids silo systems and parallel recording and reporting.
- Strengthening collaboration among partners at all administrative levels (such as partner forums and technical working groups).
- Maintaining an adequate and sustainable supply of HMIS/CHIS tools and guidelines.
- Continue moving toward with digitization of all systems.

Further Reading

1. Advancing Partners & Communities. (February 2017). Making a difference: Health Extension Workers (HEWs) bring innovation to improve the Community Health Information System (CHIS) in Ethiopia. <https://www.advancingpartners.org/about-us/news/2017/03/apc-community-health-workers-symposium-kampala-uganda>.
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