

AFRICA CENTRES FOR DISEASE CONTROL AND PREVENTION (AFRICA CDC)

FRAMEWORK

FOR PUBLIC HEALTH WORKFORCE DEVELOPMENT, 2020-2025

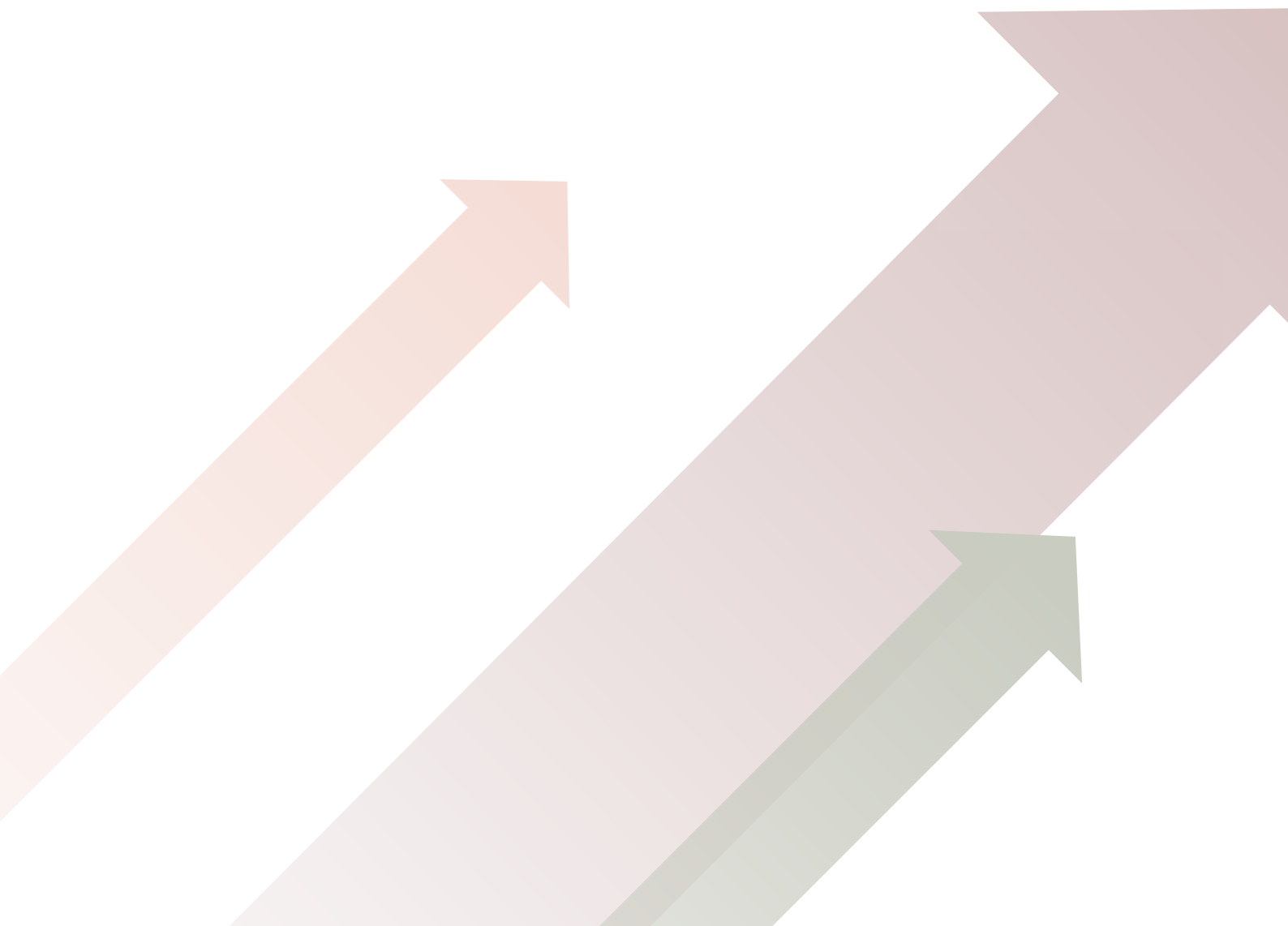




AFRICA CENTRES FOR DISEASE CONTROL AND PREVENTION (AFRICA CDC)

FRAMEWORK

FOR PUBLIC HEALTH WORKFORCE DEVELOPMENT, 2020-2025



CONTENTS

EXECUTIVE SUMMARY	6
1 BACKGROUND	7
2 FIELD EPIDEMIOLOGY	9
3 LABORATORY LEADERSHIP AND MEDICAL LABORATORY TRAINING	16
4 PUBLIC HEALTH INFORMATICS	20
5 OTHER AFRICA CDC WORKFORCE DEVELOPMENT ACTIVITIES	25
6 AFRICA CDC INSTITUTE FOR WORKFORCE DEVELOPMENT	26
APPENDIX	30

EXECUTIVE SUMMARY

The Africa Centres for Disease Control (Africa CDC) is specifically mandated to “support Member States in capacity building in public health through, medium and long-term field epidemiologic and laboratory training programmes” (Article 3, Africa CDC governing statute). To fulfill this mandate, Africa CDC convened a Task Force for Workforce Development in 2018. The Task Force included representatives from Member States, public health organizations, academia, and global health agencies and sought to define specific action steps for Africa CDC to develop personnel in three professional areas: field epidemiology; public health laboratory leadership; and public health informatics.

The Task Force prepared this Framework for Workforce Development to describe actions that Africa CDC, Member States, and partners will take to increase both the quantity and quality of African public health professionals, including:

- ▶ **Advocating at the highest government levels for epidemiology, laboratory, and informatics training programs as key components of health security**

- ▶ **Promoting accreditation of existing Field Epidemiology Training Programs**

- ▶ **Collaborating with African schools of public health to increase the number of Africans with graduate-level training**

- ▶ **Promoting development of new programs for laboratory leadership and public health informatics, including standard curricula**

- ▶ **Advocating for civil service career tracks for epidemiologists, laboratory leaders, and informaticians within government health agencies**

- ▶ **Developing an Africa CDC Institute for Workforce Development to provide online training and continuous tracking of professional development**

1 BACKGROUND

1. Africa CDC's Workforce Development Mission

In January 2017, the African Union (AU) officially launched the Africa Centres for Disease Control and Prevention (Africa CDC). As a new, specialized technical institution of the AU, Africa CDC works to strengthen Africa's public health institutions' capacities, capabilities, and partnerships to prevent, detect, and respond effectively and efficiently to disease threats and outbreaks based on science, policy, and data-driven interventions and programmes." Africa CDC's first 5-year strategic plan (2017 – 2021) describes how to achieve this mission across five strategic pillars: Surveillance and Disease Intelligence; Emergency Preparedness and Response; Information Systems; Laboratory Systems and Networks; and National Public Health Institutes (NPHIs) and Research. Within the strategic area of NPHIs and Research, Africa CDC intends to increase both the quantity and quality of African public health professionals.

Africa CDC's workforce development strategy aligns closely with its legal authority, the strategic vision of the AU, and the health and development priorities of the AU and Member States. First, Article 3 of the governing statute specifically tasks Africa CDC with "supporting Member States in capacity building in public health through, medium and long-term field epidemiologic and laboratory training programmes." Second, the AU is moving rapidly to integrate the continent, to allow people, goods, and services to move freely. Successful integration requires the building of institutions and infrastructure that can both promote development and mitigate risks, including, for example, the trans-national spread of disease. Ensuring Africa's health security, as well as compliance with the International Health Regulations (2005), depends on a skilled public health workforce working within national public health institutes and regional bodies. Third, Agenda 2063: the Africa We Want and the AU's Health Strategy, 2016–30 clearly identify human resources for health as essential to Africa achieving the Sustainable Development Goals and universal healthcare.^{1,2}

In November 2017, Africa CDC convened representatives from Member States (MS), public health organizations, academia, and global health agencies to identify priorities for workforce development. This Task Force for Workforce Development was asked to define specific action steps for Africa CDC to develop personnel in three professional areas: field epidemiology; public health laboratory leadership; and public health informatics. For each, the Task Force outlined ways Africa CDC can improve the quality of existing programs, increase the number of programs, and strengthen career opportunities.

1 Agenda 2063: The Africa We Want. Available at <https://au.int/en/agenda2063/overview>

2 Africa Health Strategy, 2016–2030. Available at https://au.int/sites/default/files/documents/24098-au_ahs_strategy_clean.pdf

2. Task Force

Africa CDC invited experts from various agencies and regions to join the Task Force. **[Appendix B]** It held teleconferences from Jan 2018 – Jan 2019, prepared draft reports, and solicited input before finalizing it.

Specific objectives for the Task Force included:

- ▶ Document existing training programs in Africa that contribute to public health workforce development
- ▶ Conceive a forward-looking workforce development vision, strategies, objectives, and actions for field epidemiology, the public health laboratory, and public health informatics that include:
 - Policies that Africa CDC and MS can adopt to promote public health workforce development
 - Strategies to enhance job placement, retention, and career development for public health professionals, including measuring workforce gaps and designing models for longitudinal career progression
 - Standards and accreditation processes for training programs
- ▶ Define requirements for a new Africa CDC Institute for Workforce Development, plus incorporate links to the Pan-African University and other African institutions of higher learning.



2 FIELD EPIDEMIOLOGY

1. History and Current State of African FETPs

Field epidemiology training programs (FETPs) develop competencies in public health that include outbreak investigation and surveillance, analyses, and interpretation of public health data. The FETP pedagogy uses periods of didactic instruction, followed by periods of learning-by-doing. Specific field investigations and projects are conducted under the supervision of senior field epidemiologists. The history, evolution, and success of the FETP, from its beginning in the United States in 1951 to expansion in Africa in 1993, has been previously documented.^{3,4}

FETPs in Africa are based, at the national level, in Ministries of Health, public health institutions, or universities with trainees embedded in infectious disease control programmes. In many countries, they receive instructional support from schools of public health. The 2014–15 West Africa Ebola epidemic highlighted gaps, impediments, and needs for improving public health prevention, detection, and response. Therefore, in collaboration with multiple international partners, many countries initiated a tiered approach to FETP pedagogy, differentiated by the level at which the trainee would work, training duration, and competencies sought. Three tiers were conceived and implemented: frontline (three months), intermediate (9 – 12 months), and advanced (two years).⁵

By 2017, 32 (58%) of 55 African countries had launched FETPs; 18 had advanced programs. In 2016, WHO initiated a Joint External Evaluation (JEE) process to measure MS capacity to comply with the International Health Regulations (2005), specifically a core element of having an “applied epidemiology training program in place, such as the FETP.”⁶ Based on the Global Health Security Agenda workforce package, the JEE assessed whether countries had at least one trained epidemiologist per 200,000 population and one trained veterinary-epidemiologist per 400,000 animal population. Expanding the number of trained epidemiologists, while expanding and enhancing training quality, remains critical to ensuring Africa’s health security. For the estimated 2.5 billion people living in Africa by 2050, the continent will need, at least, 12,500 trained human health epidemiologists.

3 Nsubuga P, Johnson K, Tetteh C, et al. Field Epidemiology and Laboratory Training Programs in sub-Saharan Africa from 2004 to 2010: need, the process and prospects. *The Pan African Medical Journal*. 2011;10:24. doi:10.11604/pamj.2011.10.24.1271

4 Jones DS, Dicker RC, Fontaine RE, et al. Building Global Epidemiology and Response Capacity with Field Epidemiology Training Programs. *Emerging Infectious Diseases*. 2017;23(13). doi:10.3201/eid2313.170509.

5 André A, Lopez A, Perkins S, et al. Frontline Field Epidemiology Training Programs as a Strategy to Improve Disease Surveillance and Response. *Emerging Infectious Diseases*. 2017;23(13). doi:10.3201/eid2313.170803.

6 World Health Organization. IHR (2005) Monitoring and Evaluation framework, Joint External Evaluation tool (JEE tool) Reporting Template. Geneva: The Organization; 2016.

2. Problem Assessment

Major challenges exist for FETPs in Africa, including:

- ▶ Lack of understanding about the role of field epidemiologists in the health system;
- ▶ Insufficient FETP trainees and programs at frontline, intermediate, and advanced levels;
- ▶ Need for continuous curricula upgrades and pedagogic improvements using modern tools and techniques for trainees and graduates;
- ▶ Insufficient professional opportunities for FETP graduates, including jobs with remuneration and authority commensurate to their training;
- ▶ Need to recruit, support, credential, and esteem mentors, while enhancing both their supervisory skills and experience;
- ▶ Need to expand the scope of training to include social sciences, emergency management, risk communication, injury epidemiology, occupational health and safety, health economics, non-communicable diseases, One Health (to include veterinarian-epidemiologists), health security, and health policy;
- ▶ Need to include public health informatics in all curricula;
- ▶ Lack of country ownership of FETP programmes and insufficient funding in post-JEE National Action Plans; and
- ▶ Difficulty maintaining programs amid violent conflicts and civil unrest.

3. Initiate New FETPs

Some African countries are small, and it would not be financially feasible to have their own advanced FETP. Africa CDC and its Regional Collaborating Centers (RCCs) will work with countries that do not have FETPs to explore country-specific or regional training paradigms that best suit their needs. The first step is to secure political commitments from Ministries of Health and Agriculture to host these programs. Africa CDC will meet with decision makers in Ministries of Health and Agriculture and Ministries of Finance to understand needs, gaps, and impediments. Africa CDC will partner with the Africa Field Epidemiology Network (AFENET), Eastern Mediterranean Public Health Network (EMPHNET), TEPHINET, International Association of National Public Health Institutes (IANPHI), European CDC, and leaders in existing programs on these missions given their experience in initiating programs in diverse settings. Even when Ministers of Health (and Agriculture) support these programs, they cannot succeed without dedicated commitments of heads of state, parliaments, and legislatures. Africa CDC will leverage its access to national permanent representatives to the AU to obtain this commitment. In addition to country-specific activities, Africa CDC will ensure that messaging about FETP defines these programs as critical determinants of security and economic growth; just as countries require a well-trained, sufficiently staffed and funded police and military, so too do they need field epidemiologists and well-trained surveillance officers. Such advocacy can occur at annual and mid-year summits of the AU linked to Africa CDC's mandated reports on progress toward IHR compliance.

FETPs cannot succeed, of course, without sustained and adequate funding to support activities, including: salaries for trainees, trainers, and supervisors; curricula development; fieldwork, including investigations; management, basic office infrastructure, supplies, and equipment; and other program activities. The cost-per-FETP Advanced trainee is approximately 50,000 USD per year. Africa CDC will pursue fund-raising approaches and work to identify external resources to initiate programs and country-budgeted funds to sustain them.

Further, Africa CDC will:

- ▶ Pursue political declarations at the regional and continent levels that include workforce training as a mandated expenditure to ensure IHR compliance;
- ▶ Mobilize key opinion leaders in specific regions to advocate with influential members of parliament and staff for FETPs;
- ▶ Promote inclusion of FETPs within National Public Health Institutes (NPHIs) as a core program full funded by the NPHI's statutory budget;
- ▶ Convene donor meetings at continent and regional levels to obtain commitments for program development where they do not now exist;
- ▶ Include FETP costs when meeting with donors who wish to fund public health programs;
- ▶ Collaborate with African schools of public health to provide scholarships for master's training in public health to early- or mid-career public health professionals.
- ▶ Showcase programs and individuals who have had a major impact to make epidemiology an desirable career.

4. Improve Existing FETPs

a. Accreditation

Accreditation aligns FETPs to best-practices and supports quality pedagogy because it:

- ▶ Encourages accountability and transparency;
- ▶ Identifies strengths and areas needing improvement;
- ▶ Demonstrates a visible commitment to improved quality;
- ▶ Helps to strengthen sustainability through demonstration of value added;
- ▶ Enables exchange of training/graduates across program/regions.

The processes and standards for FETP Accreditation are developed with input from TEPHINET's global network of FETPs and partners. To date, TEPHINET has accredited 13 programs, six in Africa (Cameroon, Kenya, Nigeria, South Africa, Tanzania, Zimbabwe). AFENET has hosted week-long accreditation workshops, mentored programs, and helped programs apply for accreditation.

Current impediments to FETP accreditation include:

- ▶ Language, in that applications and supporting documentation must be completed and summarized in English;
- ▶ Program structure, because TEPHINET's basic eligibility requirements exclude frontline, intermediate, and some advanced programs from applying;
- ▶ Technical capacity, because programs may have difficulty meeting minimum standards, even if they meet the basic eligibility requirements;
- ▶ Personnel capacity in that application for accreditation is complicated and time-consuming; programs must have the ability to dedicate staff to complete the readiness assessment and application, and to host site visits;
- ▶ Program stability, in that programs may be affected by factors external to FETP, including political considerations or changes in government leadership;
- ▶ Awareness because programs may not have an optimal level of engagement with TEPHINET or knowledge of the FETP accreditation process; and
- ▶ Resources because programs may not have the ability to travel to attend regional workshops to receive training.

These barriers can be overcome. Africa CDC will adopt a phased approach to support FETP accreditation by ensuring and prioritizing every RCC to have a minimum of one accredited FETP

in its region. Africa CDC will work with its RCC to develop a regional action plan for achieving the required field epidemiologic capacity. Each plan will include thoughtful, yet assertive milestones for progressively increasing the number of accredited FETPs within each jurisdictional NPHIs. This accountable framework will lead over time to a 100% target in each RCC. Africa CDC and its RCC will also:

- ▶ Position FETP as a program required to build NPHI capacity;
- ▶ Develop a common framework for action that is endorsed politically;
- ▶ Collaborate with AFENET, EMPHNET, TEPHINET, and IANPHI to map existing capacity and track progress toward the goals of each RCC to have by 2030:
 - At least one Frontline-trained surveillance officer in each health district
 - At least one graduate of an accredited Advanced FETP in each country
 - One front line FETP in each country
 - One Intermediate FETP in each country;
- ▶ Help Member States develop a career path and job descriptions for field epidemiologists;
- ▶ Offer scholarships for training five field epidemiologists per RCC, per year (i.e., 20 epidemiologists per year);
- ▶ Create a mentor network and identify at least one mentor per country, including:
 - Set up mentor training
 - Contract services for a minimum of two years
 - Establish a “nominal salary” conferred based on qualifications
 - Sponsor attendance at conferences
 - Profile, market, and esteem mentors;
- ▶ Include tracks for informatics, emergency management, social anthropology, injury epidemiology, occupational health and safety, health economics, non-communicable diseases, One Health (to include veterinarian-epidemiologists), health policy, and risk communication;
- ▶ Host joint annual conferences with focus group discussions to address priority issues in each RCC and have spatial planning approaches to deal with “hot spots”;
- ▶ Host summer and winter meetings that showcase work and encourage young scientist/ doctors/veterinarians in public health;
- ▶ Host scientific writing workshops that encourage FETPs to publish;
- ▶ Promote development of national field epidemiology networks within Member States.

b. Curricula Standardization

To ensure a competent, fit-for-purpose epidemiologic workforce that addresses public health challenges and needs within countries and across the continent, FETP graduates must be trained in common, core competencies. The competency topics must include public health surveillance design and monitoring, outbreak investigation, data analyses and interpretation, critical thinking, risk communication, and scientific communication.

Through the Institute for Workforce Development [discussed later in document], Africa CDC will convene FETP program directors, key partners, instructional designers, and others to develop a consensus on core and optional competencies for each FETP tier. This standardization process will be maintained and tracked electronically within the IWD learning management system (LMS), as will backend accounting of performance and courses taken. Adult learning specialists, instructional designers, subject-matter experts, and others will review the existing curricula learning objectives and model curricula to support these competencies. The IWD will uphold pedagogic standards at the highest level of best practices.

A model FETP curriculum includes both classroom instruction and field experience to give trainees opportunities to acquire knowledge and gain proficiency. Africa CDC's IWD will identify both existing materials and gaps in classroom learning (i.e., lectures, exercises, case studies) and field experience (i.e., guides, checklists) and work with AFENET, EMPHNET, TEPHINET, IANPHI, and partners to develop new materials and modalities for training (i.e., videoconferences; webinars; on-line learning) as needed to fill gaps. Finally, the Africa CDC IWD will promote, share, and serve as a repository for model curricula for African FETPs. Efforts will be aligned with TEPHINET's global strategy for modernizing the FETP curriculum, e.g., supplemental learning, tailored materials, new teaching methods and innovation, tracking and reporting of modifications to curricula.

c. Certification

TEPHINET accredits FETPs, but a comparable process for *certifying* (also known as credentialing) field epidemiologists does not exist. Developing a mechanism for FETP graduates to become certified would ensure that graduates have a common set of knowledge, skills, and competency for rapid response and crisis-response deployments, as well as more mundane day-to-day epidemiologic tasks. A database could be built and maintained within the backend of the LMS of the Africa CDC IWD. While knowledge can be assessed through examination (i.e., oral, written, or computer-based), certification of skills and competencies poses a more difficult challenge. Certifying processes would also need to be aligned with professional bodies within countries, which poses additional challenges since field epidemiologists are not widely recognized as a unique professional cadre. Given its complexity and competing priorities, Africa CDC will consider this issue in the future after a more complete assessment of advantages and disadvantages, challenges, costs, and mechanisms for implementing a certification process.

d. Career Opportunities for FETP Graduates

One critically important element of field and classroom training is to prepare graduates for career progression into jobs with more pay, security, responsibility, and advancement. The backend component of the Africa CDC IWD LMS will maintain a longitudinal record of academic performance for each individual person. This information will be available for employees to provide to prospective employers, as they advance in their career. Continuing education should translate in a career path that not only enhances the job satisfaction of each public health practitioner, but also provide evidence for salary increases and promotion. A formalized career ladder could include progression along a pathway (entry, intermediate, principal, and specialist epidemiologist) with outputs for each stage that align strengthening IHR core capacity. Africa CDC will work with existing programs on the continent to further refine this ladder and assess how it might be incorporated into civil service systems.

e. Targets for Competent Field Epidemiologists

Capacity can be defined as the number of people with specific competencies needed at each level or sub-national unit to perform specific functions. This includes the number of field epidemiologists trained in FETP-Advanced needed by each country overall (and with proper geographic distribution) as well as the number trained in FETP-Frontline. Africa CDC will develop targets and a strategy to reach these targets through engagement with key stakeholders (e.g., WHO/AFRO, WHO/EMRO, WHO/HQ Health Workforce Department and Health Emergencies Program, AFENET, EMPHNET, and U.S. CDC). The JEE Human Resources technical area requires MS to have a workforce strategy but does not include competency-aligned workforce targets beyond the general target of one trained field epidemiologist per 200,000 population. This target does not address geographic coverage or epidemiologic competencies needed at lower levels of the public health system and may be wholly insufficient given the vulnerability and risk on the continent. Africa CDC will establish an objective matrix for each RCC that will assess the current ratio and propose an appropriate increase per year to reach the target. Each RCC will have its own matrix and targets that are publicly available and reported annually to decision makers.

5. Action Steps

- ▶ Develop a common workforce development strategy for action that is endorsed politically;
- ▶ Work with countries that do not have FETPs to explore country-specific or regional training paradigms that best suit their needs;
- ▶ Secure political commitments from Ministries of Health and Agriculture to host FETPs;
- ▶ Meet with decision makers in Ministries of Health and Agriculture and Ministries of Finance to understand needs, gaps, and impediments;
- ▶ Identify key opinion leaders and decision makers and advocate for support;
- ▶ Frame FETP programs as critical determinants of security and economic growth;
- ▶ Advocate at annual and mid-year AU summits as part of Africa CDC updates about International Health Regulations compliance;
- ▶ Pursue fund-raising approaches and work to identify external resources to initiate programs and country-budgeted funds to sustain them;
- ▶ Pursue political declarations at the regional and continent levels that include workforce training as a mandated expenditure to ensure IHR compliance;
- ▶ Mobilize key opinion leaders in specific regions to advocate with influential members of parliament and staff for FETPs;
- ▶ Embed FETPs within National Public Health Institutes (NPHIs), and define FETPs as a core program of NPHIs that requires full funding, using NPHI's statutory budget;
- ▶ Convene donor meetings at continent and regional levels to obtain commitments for program development where they do not now exist;
- ▶ Include FETP costs when meeting with donors;
- ▶ Adopt a phased approach to support FETP accreditation by ensuring and prioritizing that every RCC have a minimum of one accredited FETP Advanced program;
- ▶ Establish thoughtful, yet assertive milestones for progressively increasing the number of accredited FETPs within each jurisdictional NPHIs;
- ▶ Position FETP as a program required to build NPHI capacity;
- ▶ Collaborate with AFENET, EMPHNET, TEPHINET, and IANPHI to map existing capacity and track progress toward the goals of each RCC to have by 2030;
- ▶ Help Member States develop a career path and job descriptions for field epidemiologists;
- ▶ Offer scholarships for master's in public health training to approximately 20 epidemiologists per year (four in each of the 5 regions);
- ▶ Create a mentor network and identify (at least) one mentor/country;
- ▶ Include tracks for social anthropology, emergency management, injury epidemiology, occupational health and safety, risk communication, health economics, non-communicable diseases, One Health (to include veterinarian-epidemiologists), health security, and health policy;
- ▶ Host joint annual conferences with focus group discussions to address priority issues in each RCC and have spatial planning approaches to deal with "hot pops and hot spots";
- ▶ Host summer and winter camps that showcase work and encourage young scientist/doctors/veterinarians in public health;
- ▶ Host scientific writing workshops that encourage FETPs to publish;
- ▶ Promote development of national field epidemiology networks within Member States;
- ▶ Convene FETP program directors, key partners, instructional designers, and others to develop a consensus on core and optional competencies for each FETP tier;
- ▶ Uphold pedagogic standards at the highest level of best practices; establish and maintain each course in the Africa CDC IWD;

- ▶ Identify both existing materials and gaps in classroom learning (i.e., lectures, exercises, case studies) and field experience (i.e., guides, checklists);
- ▶ Develop new materials and modalities for training (i.e., videoconferences; webinars; on-line learning) as needed;
- ▶ Develop, promote, share, and serve as a repository for model curricula for African FETPs;
- ▶ Convene workgroups to discuss the advantages and disadvantages, challenges, costs, and mechanisms of certifying epidemiologists;
- ▶ Maintain a longitudinal record of academic performance for each individual FETP graduate;
- ▶ Develop targets for the number of field epidemiologists to be trained in each country and a strategy to reach them.



3 LABORATORY LEADERSHIP AND MEDICAL LABORATORY TRAINING

1. History and Current Status of Public Health Laboratory Leadership and Medical Laboratory Training in Africa

a. Public Health Laboratory Leadership

Laboratory services are essential to disease prevention, health promotion, disease detection, and outbreak response. Leadership and management training of laboratory personnel can improve effectiveness and efficiency of clinical and public health laboratory systems and networks. Good leaders and managers plan, implement, and supervise laboratory systems and networks, and they continuously improve quality, reliability, and efficiency of laboratories and networks, establish key collaborations and partnerships, and advocate for resources to sustain and expand essential health services.

Typically, countries have requirements to attain certificates and diplomas in medical laboratory sciences under a ministry of education, but few training programs include laboratory leadership and management courses. Universities have medical microbiology and medical laboratory science degree programs, but leadership and management are not included. There are examples of discrete training programs developed in response to the need for leadership and management competency. For example, in Tanzania at the Muhimbili University of Allied Health Sciences a 4-week laboratory leadership training is provided. At Strathmore University in Nairobi, a comprehensive 4-month Health Laboratory Managers' Training Program that targets the laboratory managers and supervisors at all levels of the Kenya health system is in development. There are also non-government organization programs in Africa. The Association of Public Health Laboratories (APHL) offers the *Foundations of Laboratory Leadership and Management* program for mid- and senior level technical supervisors in collaboration with national ministries of health provided as a training-of-trainers to develop local capability; and a training program for emerging leaders that includes skill building workshops over 12–18 months with practical mentored teamwork between sessions. The Foundations of Laboratory Leadership and Management course has been integrated in the Nigeria educational system for medical laboratory technicians. APHL/George Washington University has offered an intensive onsite two-week program with follow up mentoring at national laboratories. It has graduated 145 senior laboratory directors and leaders from 21 countries. A consortium of international agencies – including U.S. CDC, APHL, WHO, FAO, OIE, and European CDC – have developed the “Global Laboratory Leadership Program.” This program will provide a combination of didactic, interactive, and mentored practical experiences in a 2-year schedule. It can be provided in collaboration with universities to grant a graduate-level degree or with the national laboratory systems and partners.

b. Medical Laboratory Training

Medical laboratory technician training programs advance the competency of individuals who perform testing for screening, diagnosis, surveillance, and outbreak response. A range of pre-service educational programs and in-service training is available, but often these are not adequate to address needs. Pre-service programs frequently lack up-to-date laboratory facilities and equipment sufficient to assure competency. Some, but not all, countries have strong public educational systems for medical laboratory technicians with graduates earning bachelor's and

master's degrees with a sufficient number of graduates to staff the national laboratory system. Many countries also have health professions councils that regulate and register individuals and programs. However, many countries lack resources to provide comprehensive medical laboratory education and training for sufficient numbers of individuals to meet the needs of their national laboratory systems. Public and private laboratories operate under varied levels of regulation, which is more often minimal and lacks rigorous quality assurance. In summary, the competencies are known but neither used nor obtained in many settings.

2. Problem Assessment

The list of gaps and weaknesses within laboratory systems is long and includes these major items:

- ▶ Lack of national laboratory policies to establish authorities of the national laboratory system;
- ▶ Lack of clear, funded objectives in a national laboratory strategic plan to improve quality and capacity of testing services;
- ▶ Lack of sufficient training and mentoring resources to develop the laboratory leadership workforce to lead national laboratory systems; and
- ▶ Lack of a career ladder and competitive compensation to attract and retain high performing laboratory professionals who exhibit exceptional leadership and technical competency.

Remarkable progress has been made in improving the quality of testing services using a number of excellent guidance documents, e.g., WHO/CLSI/CDC Laboratory Quality Management System Handbook, published 2011 (<https://www.who.int/ihr/publications/lqms/en/>), Laboratory Quality Stepwise Implementation Tool, published 2015 (<https://extranet.who.int/lqsi/content/homepage>) and the WHO/AFRO Stepwise Laboratory Quality Improvement Process Towards Accreditation in the African Region (SLIPTA), version 2 published in 2015 (<https://www.slmta.org/resource/training/teaching-guide/16-SLIPTA-checklist.pdf>). Nevertheless, there remains a scarcity of strategies, programs and activities that focus on leadership for laboratory systems. The IHR JEE tool and IHR do not define or require certification or credentialing requirements for laboratory directors; the JEE tool does ask for demonstrated capacity of mandatory licensing of all health laboratories conforming to a national quality standard, but this lacks definition of staff requirements especially for directors. WHO/AFRO's SLIPTA checklist does not define qualified professionals nor require certification and credentialing of managers. Additional challenges include:

- ▶ There are no pan-African minimum standards for medical laboratory professionals or position requirements for laboratory directors for reference use by national ministries and laboratory systems;
- ▶ Laboratory testing services requirements for licensure, certification and accreditation are not consistent among countries and for public and private laboratories;
- ▶ National laboratory policies and national laws do not consistently define requirements for laboratory directors (or for National IHR Focal Points) or for the varied specialties and levels of laboratory positions;
- ▶ Definition or authorization of national laboratory networks is lacking or inconsistent, if at all, in statutes and ministry policy; and
- ▶ National laboratory strategic plans usually do not address workforce requirements or funding commitments; occasionally budget estimates of the cost of services and training of staff are addressed but without an accompanying funding strategy.

There is large variation among countries in the training and experience of director and manager-level laboratory staff, and technician staff. Country data of workforce numbers and competencies needed are limited for planning educational and training resources. For many countries, there is no certification or registration system for medical laboratory technicians, managers, and directors and no national system of laboratory certification or accreditation requirement.

3. Initiate New Programs

Africa CDC can work with partners to develop and implement laboratory leadership programs. The program's focus is improving the knowledge and skills for laboratory professionals who manage public health laboratory systems and enabling these professionals to advocate and develop support for quality national laboratory systems. Africa CDC will work through its Regional Coordinating Centers (RCC) and with partners to develop region-specific approaches to advocate, develop, deliver, and evaluate training programs.

With its partners, Africa CDC will design and develop short (1–3 weeks) and long-term (1–2 years) programs to impart knowledge, skills, and competence in management and leadership of high-complexity health laboratories services. Learning objectives include:

- ▶ Describe essential components in leadership, management, and governance of high-complexity health laboratory services, including national public health laboratories;
- ▶ Plan a quality management system approach for public health laboratory service provision;
- ▶ Manage people and teams in public health laboratories;
- ▶ Monitor and evaluate the performance of high-complexity health laboratory services;
- ▶ Demonstrate entrepreneurial, budget, and financial skills in the management of public health laboratories;
- ▶ Describe, discuss, and use public health laboratory ethical codes of conduct in health services provision;
- ▶ Apply data management skills in utilizing laboratory data for decision making and interventions; and
- ▶ Describe a laboratory information system and how data generated from this system supports laboratory quality and effectiveness, aids in disease prevention and treatment and supports evaluation and development of public health policy.

4. Improve Quality of Existing Programs

To improve the quality of existing programs, Africa CDC advocates and mobilizes resources for new national and international investments in the laboratory professional health care system. Such investments strengthen the output of pre-service training institutes and promote work competency-based in-service training to ensure continual improvement in staff skills. National laboratory strategic planning strengthening with rigorous needs assessment improves the quality of existing programs. Africa CDC can also assist with supporting national regulatory and representative bodies to improve governance and enhance quality. Standardization and regulation of pre- and in-service trainings and accreditation of training institutes can enhance quality of existing programs.

5. Enabling Factors

Despite its critical importance, the laboratory profession lacks appropriate level of recognition in the health delivery system and government. There is attrition in the profession due to poor infrastructure, modest remuneration, and limited professional advancement; these factors are major factors that lead to significant turn over. Even with recent improvements, the profession has a long way to go to make its voice heard, especially in sub-Saharan Africa where there are many competing priorities. Laboratory personnel can have a stronger voice if representative bodies are better organized to represent the interests of laboratory professionals. Professional laboratory associations can give a voice to laboratory cadres and enhance their representation at national level.

As a continental organization, Africa CDC will create an enabling environment that includes guidance, oversight, advocacy, and partnership and activities to facilitate inclusive input of laboratory professionals in all aspects of health system strengthening. At a continental level,

Africa CDC will work with other organizations to support the interests of laboratory workers and advance the standards of the laboratory profession. Beside this, there could be a stronger voice for the laboratory personnel at a continent level by scaling-up research on the issues related the laboratory workers to inform public policy. Such research will be useful to understand the specific labor market situations and factors that influence the supply and demand.

Following the publication of a WHO/CDC/APHL *Guidelines for Development of National Laboratory Strategic Plans*⁷, significant progress has been made in development and implementation of national laboratory strategic plans approved by Ministries of Health. Although this document led to demonstrable improvements in many areas of laboratory systems, there was little associated change in the areas of human resources and training that resulted from this process. The wide acceptance of the efforts in development of national laboratory strategic plans and policies provides opportunity to revise and strengthen these documents in the area of workforce thus leading to political buy-in and financial support.

6. Action Steps

- ▶ Africa CDC and its RCCs will initiate meetings to improve national laboratory policies and strategic plans, specifically regarding workforce training and competencies for laboratory managers and career development for laboratory professionals;
- ▶ Africa CDC will incorporate into the NPHI Framework a policy for laboratory training and support the development of national laboratory leadership institutes that can be registered as NGOs and seek funding through public private partnerships;
- ▶ Africa CDC will promote national agencies and professional organizations to set consistent standards for accreditation and certification. RCCs will work with member laboratories of their region to secure or strengthen existing national legislative laws;
- ▶ Africa CDC will endorse the Global Laboratory Leadership Program competency framework and promote its use among NPHIs and national laboratories;
- ▶ Africa CDC RCCs will conduct planning meetings at least once per year to assess the leadership and medical laboratory technician education and training, and to develop regional specific educational collaborations to build on existing resources;
- ▶ Secure political commitments from Ministries of Health for laboratory leadership programs;
- ▶ Meet with decision makers in Ministries of Health and Ministries of Finance to explain the importance of workforce development of medical and public health laboratory staff and advocate for their support;
- ▶ Pursue fund-raising approaches and work to identify external resources to initiate training programs for laboratory leadership and country-budgeted funds to sustain them;
- ▶ Mobilize key opinion leaders in specific regions to advocate with influential members of parliament and staff for laboratory leadership programs;
- ▶ Help Member States develop a career path and job descriptions for public health laboratorians and managers.

7 https://www.aphl.org/programs/global_health/Documents/GH_2010Aug13_GuidanceNLStrategicPlans.pdf

4 PUBLIC HEALTH INFORMATICS

1. History and Current Status of Public Health Informatics (PHI) in Africa

Information and data are the lifeblood and currency of public health. In the current global Digital Revolution⁸, data are increasingly being enabled by Information and Communication Technologies (ICT) and becoming digitized. Public health informatics (PHI) is one of the core sciences of public health and underpins the digital age and eHealth.⁹ PHI is defined as “the systematic application of information and computer science and technology to public health practice, research, and learning”¹⁰ and promises tremendous opportunities for public health to: improve healthcare outcomes; reduce health care costs, duplication, and waste; empower individuals (patients) and communities to be informed consumers; decrease the time it takes from disease prevention to detection to response; improve the completeness, timeliness, and accuracy of (surveillance) data; and hasten translation of research findings to practice.

In the past two decades, considerable progress has been made to strengthen and standardize public health informatics and health information systems (HIS). In 2007, WHO proposed a framework describing health systems in terms of six core components or “building blocks. Health information systems was one of the building blocks.”¹¹ The subsequent WHO monitoring framework recognized that “sound and reliable information is the foundation of decision-making across all health system building blocks.” Through the Health Metrics Network, in 2008, WHO released a Framework and Standards for Country Health Information Systems.¹² It was the first attempt to propose HIS standards. In 1998, the African states adopted Integrated Disease Surveillance and Response (IDSR) as a framework for strengthening national public health surveillance and response systems and, in 2006, recommended that the IHR be implemented using the IDSR framework.. In more recent years, various publications have been released to standardize the use of ICT in strengthening HIS and disease surveillance.

Africa CDC will work to develop professionals with PHI competencies for this digital age who can create, manage, and lead informatics-savvy public health organizations. Informatics-savvy organizations generate, acquire, manage, effectively use, and securely exchange information to improve public health practice and population health outcome.¹³ Public health organizations at all levels should be informatics-savvy if they are to reap the opportunities and mitigate the challenges of the digital age. An informatics-savvy organization should create strategic directions for informatics to meet their data and information needs; leverage data standards; assure

8 The Fourth Industrial Revolution: what it means, how to respond. Foreign Affairs December 12, 2015. <https://www.foreignaffairs.com/articles/2015-12-12/fourth-industrial-revolution>

9 Fifty-eighth World Health Assembly Resolution 58.28, Geneva, 2005. <http://www.who.int/healthacademy/media/WHA58-28-en.pdf?ua=1>

10 Yasnoff WA, O’Carroll PW, Koo D, Linkins RW, Kilbourne EM. Public health informatics: improving and transforming public health in the information age. *J Public Health Management and Practice* 2000 Nov;6:67-75.

11 Everybody’s business : strengthening health systems to improve health outcomes : WHO’s framework for action. (https://www.who.int/healthsystems/strategy/everybodys_business.pdf)

12 WHO, 2012. Framework and standards for country health information systems / Health Metrics Network. (<https://apps.who.int/iris/handle/10665/43872>).

13 Brand B, LaVenture M, Lipshutz JA, Stephens WF, Baker EL. The Information Imperative for Public Health: A Call to Action to Become Informatics-Savvy. *J Public Health Management and Practice* 2018 Nov/Dec;24:586–589

confidentiality, security, and integrity of their data; effectively evaluate, improve, and manage information systems, applications, and IT operations; enable interoperability with other information systems; and train employees to create and maintain a culture of data quality and public health action. Becoming informatics-savvy involves having the capabilities to transform data into actionable information and knowledge for decision making and problem solving, leading to a robust public health systems and healthy communities. To achieve these effectively, informatics-savvy organizations must have three core capabilities: organization-wide informatics policy and governance; skilled workforce; and well-designed and effectively-used information systems. The skilled workforce is the centerpiece of these capabilities, because the people in the organization determine the policies, standards, and systems.

2. Problem Assessment

The rapid adoption of health information systems in low- and middle-income countries has elicited the need for local institutions to provide training at various levels, including diploma/certificate, bachelor, master, and PhD levels. Tertiary level training in health information systems in Africa has historically involved 2 years of training for a certificate and 3 years of training for a diploma in health records management. These certificate and diploma courses produced a cadre of staff that essentially provided 'library' services in health facilities. Their responsibilities were primarily filing and retrieving patient paper documents. In-service advanced diploma training was later introduced in several countries to enhance management, analytics and medical coding skills of the workforce.¹⁴ Recently, several universities have developed bachelors' degree curricula for broader courses, including computer science, health records, and information systems management. The number of trained professionals and training programs is not proportional to disease burden or the current and anticipated growth of ICT and its adoption in health commonly referred to as digital or electronic health (eHealth). Training programs have generally been of low quality, because of inadequate human capacity (teaching, supervisory, mentorship), weak and non-standardized curricula, and inadequate computer equipment, laboratories, teaching aids, software licenses, and internet connectivity. Trainers often fail to meet the core competencies required to adequately equip graduates with problem-solving skills to address public health problems. Only a handful of leading universities in Africa offer high quality health informatics training at the post-graduate level, resulting in an insufficient number of graduates. Lack of internship and mentorship opportunities in public health programs leads to missed opportunities for early exposure to real-world challenges. Various efforts through collaborations with western universities, public health institutions and development partners are starting to yield progress.

Government leadership and ownership is central to developing a strong PHI workforce. African countries could benefit from laws and policies that promote domestic investment in public health informatics and infrastructure.¹⁵ Job classifications in the civil service for PHI rarely exist. A sizeable number of PHI graduates end up in non-health careers due to unemployment and scarce apprenticeship opportunities in public health in many African countries. PHI graduates trained in Europe and North America are similarly unable to find attractive opportunities in Africa and end up not returning to their home continent. Programs that make practicing PHI attractive are necessary to attract both local and foreign graduates to pursue careers in public health.

14 Achampong J. New Bachelor's Degree Programme in Health Information Management in Ghana. *J Health Inform Manag* 2017, 1:2

15 Digital Health – A call to government leadership and cooperation between ICT and Health. (<https://www.broadbandcommission.org/Documents/publications/WorkingGroupHealthReport-2017.pdf>)

3. Initiate New Programs

A public health informatician is a “public health professional who works in either practice, research, or academia and whose primary work function is to use informatics to improve population health.” PHI competencies relate to the “public health worker’s observable or measurable performance, skill, or knowledge related to the systematic application of information and computer science and technology to public health.” Fifteen core PHI competencies align to the three informatics-savvy organization core capabilities.¹⁶ [Appendix C]

Africa CDC will partner with the Pan-African Health Informatics Association (HELINA) and other regional informatics entities to develop standardized, competency-based public health informatics training curricula that could be used across the continent. The virtual university model perfected by College of Surgeons of East, Central and Southern Africa (COSECSA) and Africa Field Epidemiology Network (AFENET) will be considered for replication to scale up PHI training in Africa. These examples have proven to effectively address the critical barriers to harmonize standards of tertiary education for professional specialties.¹⁷ PHI training should be provided as in-service short courses, as well as introduced in pre-service medical, public health, and allied health sciences schools. The success of the new PHI training depends on:

- ▶ Securing consensus to adopt standardized competency profiles and curriculum for PHI among academic institutions currently offering health informatics courses in Africa, ministries of health and professional associations and networks;
- ▶ Define minimum requirements that include faculty, infrastructure and field placements for an institution to train students in PHI. This will be done through a gradual accreditation process that encourages institutional growth;
- ▶ A cross-border, continental faculty that provide support as adjunct faculty to the accredited institutions. Providing lectures, supervising students, providing placement opportunities and mentorship;
- ▶ Cross-border, continental accreditation and licensure of PHI graduates. The details of institutional responsibility, shared or delegated mandates of national regulatory authorities will be defined by member states at the ‘founding’ workshop to establish Pan-African Health Informatics Network (PAHIN).

Africa CDC will promote a 3-tiered training plan based on the competencies to develop PHI capacity in Africa. This approach draws from and aligns with the FETP.

Tier	Program Level	Applied Training	Academic Training
1	Basic	2 weeks-6 months, introduction	Certificate
2	Intermediate	6–24 months, project-based	Diploma, Bachelors
3	Advanced	Fellowship, 24–48 months, 80% practicum	Masters, Ph.D., DrPH

Africa CDC will aspire to have every public health professional, including leadership and program personnel, receive basic informatics training. A subset of these should go on to complete a 6-month to 2-year mentored program to become PHI specialists or informaticians working in information-savvy organizations to advance the informatics infrastructure and capacity in public health organizations. Different pedagogic environments should be employed, including case-based, problem-based, field-based, and project-based experiential learning.

¹⁶ Competencies for public health informatics, 2009 (<https://www.cdc.gov/informaticscompetencies/pdfs/phi-competencies.pdf>)

¹⁷ Health Informatics in Developing Countries: Going beyond Pilot Practices to Sustainable Implementations: A Review of the Current Challenges. *Healthc Inform Res.* 2014 Jan;20(1):3–10. English. Published online Jan 31, 2014. <https://doi.org/10.4258/hir.2014.20.1.3>

During the Tier-2 and Tier-3 training, completion of an informatics project relevant to their workplace is required. Tier-3 is the 2-year Informatics Fellowship Program, similar to a traditional FETP training program with residents spending over 75% of their time in the field or MPH or PhD programs if in academia. Each tier builds competencies in PHI and motivates graduates to pursue full-time careers commensurate with their background and experience. As trainees complete their training, they have the foundation that allows them to proceed systematically to the next tier. Additionally, they serve as mentors for trainees in lower tiers.

4. Improve quality of existing programs

a. Accreditation

Currently, no accreditation exists for PHI training programs in Africa. Africa CDC will work with Ministries of Education, the Pan-African Health Informatics Association, and other relevant organizations to develop and maintain standards and a system for accreditation of PHI training programs. Accreditation supports competency-based PHI education, ensuring that program curricula content reflect recommended Africa CDC core competencies. Accreditation assures that core competencies are met by the program and program quality is accurately represented to students, faculty, and public health organizations. It also provides an effective and consistent quality monitoring process for continuous quality improvement of these programs.

b. Certification

Currently no certification exists for individual PHI graduates. Developing a mechanism for PHI graduates to become certified would ensure that graduates have a common set of knowledge, skills, and competencies. Similar to what is proposed for field epidemiologists, a database could be built and maintained by the Africa CDC IWD. While knowledge can be assessed through examination (i.e., oral, written, or computer-based), certification of skills and competencies poses a more difficult challenge. Certifying processes would also need to be aligned with professional bodies within countries, which poses additional challenges since PHIs are not widely recognized as a unique professional cadre. Given its complexity and competing priorities, Africa CDC will consider this issue in the future after a more complete assessment advantages and disadvantages, challenges, costs, and mechanisms for implementing a certification process. Consideration will include review of informatics accreditation organizations, processes, and standards in other regions, including North America.

5. Enabling factors

One way to increase PHI capacity is to share resources, best practices, software, and learning across countries with a focus on: (1) strengthening national eHealth strategies; (2) development, implementation, and use of appropriate ICT across the health system; and (3) building educational networks in health informatics.

Africa CDC has identified 11 networks in Africa working on PHI [Appendix D]. Also, various African countries participate in global networks such as the Routine Health Information Network (RHINO), the Global Evaluation and Monitoring Network for Health, and the International Medical Informatics Association.

Most of the networks in Africa focus on only one aspect of PHI, such as disease surveillance, eHealth, monitoring and evaluation. Many networks are also set up and/or managed by private public health agencies and not country-driven, posing a long-term problem of sustainability. Africa needs a comprehensive Health Informatics Network that addresses all objectives as laid out earlier. Experience from other networks such as the Asian eHealth Information Network

RHINO, RELACSIS in Latin America, and the Health Information System Program network have shown the following key success factors:

- ▶ Networks should be country owned and country led with a board representing each of the member countries
- ▶ Capacity building interventions, such as training, online courses, best practices workshops, etc. should have contextualized materials, catering to various African countries and audiences
- ▶ Participation of local universities ensures institutionalization and sustainability of capacity building

6. Career opportunities for graduates

Career and professional development pathways within organizational and civil service contexts must be established and expanded throughout Africa. Presently, many countries lack defined pathways for career and professional development in PHI. Important aspects of PHI career and professional development include: public service workforce policies, Ministry of Health workforce policies, continuing education for both the public and private sector workforce, financial and non-financial incentives for recruitment and retention, professional associations that represent members and facilitate networking and career growth, and PHI professional regulation to promote and ensure high standards of education and practice.

7. Action Steps

Africa CDC will work to develop professionals with PHI competencies for the digital age who can create, manage, and lead informatics-savvy public health organizations to improve population health outcomes. The following outlines the needed action steps:

1. Support African Union member states to develop eHealth and PHI policies, strategies, and legislation within an integrated health system model;
2. Support NPHIs to develop country-specific PHI Workforce Development Strategy that aligns with Africa CDC's strategy;
3. Foster strategic partnerships with continental and global partners including academia and private sector to develop a model standardized PHI curriculum based on the recommended competencies and train 20,000 PHI specialists through academia and applied training programs in 10 years – 1 per 100,000 population, accounting for population growth;
4. Develop accreditation standards for PHI training programs that align with the standardized curriculum and encourage PHI faculty development within African universities, especially schools of public health;
5. Convene workgroups to discuss the advantages and disadvantages, challenges, costs, and mechanisms of certifying PHI graduates as well as explore models used in other regions;
6. Deliver core PHI training courses through Africa CDC IWD;
7. Support integration of PHI training in FETP and lab training programs;
8. Convene ministries of Health and NPHIs to develop and adopt civil service PHI job classifications and position descriptions in line with International Standard Classification of Occupations;
9. Partner with and support HELINA to strengthen the science of PHI and institute PHI training program accreditation and professional licensing;
10. In partnership with WHO, RHINO, AeHIN, HELINA, ANDH, and other relevant stakeholders, conduct a “founding” workshop to establish a Pan African Health Informatics Network (PAHIN) to support advocacy, knowledge management and sharing, and community and resource mobilization.

5 OTHER AFRICA CDC WORKFORCE DEVELOPMENT ACTIVITIES

Africa CDC's strategic plan includes five pillars: surveillance disease intelligence; emergency preparedness and response; laboratory systems and networks; health information systems; and public health research and institutes. In addition to field epidemiology, laboratory leadership, and public health informatics, Africa CDC will also work to enhance the knowledge and skills of existing public health workers in specific topics that are essential to the strategic plan. As of publication, these topics include:

- a. Event-based surveillance: Africa CDC's Event-Based Surveillance Framework recommends that countries implement national hotlines, media scanning, and surveillance for events in communities and facilities;
- b. Mortality surveillance and civil registration systems: Africa CDC is developing a Framework for Mortality Surveillance that recommends that countries implement systems to estimate numbers and causes of death using statistical samples of the population;
- c. Rapid response for public health emergencies: As part of the African Volunteer Health Corps, Africa CDC is training teams of first responders in all regions of the continent, whose primary objectives are to assess an event, identify areas of support needed, and provide emergency assistance to those areas;
- d. Laboratory quality assurance: To build effective laboratory systems, Africa CDC is working with partners to promote training and implementation of laboratory quality assurance systems as part of step-wise approach to accreditation;
- e. Antimicrobial resistance: Africa CDC's Framework for Antimicrobial Resistance Control describes policies and strategies that Africa CDC and partners will employ, including training, to monitor, delay emergence, limit transmission, and mitigate harm from antimicrobial resistant organisms.



6

AFRICA CDC INSTITUTE FOR WORKFORCE DEVELOPMENT

1. Overview

The Africa Centers for Disease Control and Prevention (Africa CDC) supports African countries to improve the health of the people by reducing the disease burden – especially infectious diseases – through prevention and treatment, surveillance and response to emergencies (including outbreaks, man-made and natural disasters, and public health events of regional and international concern), and capacity-building.

Public health workforce development is an integral component of Africa CDC’s mission, as it will benefit Member States by increasing their ability and knowledge to prevent, detect, and respond to the spread of disease within their borders. To this end, Africa CDC and the Rollins School of Public Health (RSPH) are establishing the Africa CDC Institute for Workforce Development (IWD).

2. Approach

Africa CDC and RSPH will develop and deploy training primarily through the NPHI of AU Member States. In addition, IWD activities will align with and build off the work conducted by other key stakeholders within the AU, specifically the Pan-African University and specialized technical communities related to health, education, and technology.

The Africa CDC IWD intends to implement an all-in-one learning solution that includes a course catalog customized for the African CDC IWD, course registration system, payment gateway, and learning platform. The LMS catalog will be branded with the African CDC IWD’s name, logo, and domain. This LMS platform will also automatically issue certificates upon student course or program completion.

3. Year 1 Objectives

a. Develop Africa CDC Institute of Workforce Development Strategic Plan

RSPH will work closely with Africa CDC and its training collaborators to develop a strategic plan with short-term and long-term objectives.

b. Establish Training Information Management Infrastructure

RSPH will establish training information management infrastructure, consisting of policies, procedures, and tools to sufficiently manage training information, coordinate tasks amongst programs and personnel, and monitor and evaluate training.

c. Establish Digital, E-learning Training Environment

RSPH will utilize a learning management system to provide a digital, web-based platform for the administration, documentation, tracking, reporting and delivery of training for the IWD.

d. Conduct Priority Training Courses

RSPH will support Africa CDC in conducting short courses for public health professionals in public health surveillance (PHS), control of antimicrobial resistance, proposal writing, leadership, and

management. Training will take place at Africa CDC headquarters in Addis Ababa, at an RCC, via an online learning management system, or a combination of the three.

e. Post-training Activities

With the purpose of ensuring the success of the project and further develop in-house training capacity, RSPH will continue to support Africa CDC in the post-training phase as described in the activities below.

f. Promotion and Marketing

RSPH will support Africa CDC in marketing to stakeholders about IWD and its courses.

4. Training courses: learning objectives for initial courses

a. Transforming Public Health Surveillance

After completing this course, the student will be able to:

- ▶ Understand the principles and practice of public health surveillance (PHS)
- ▶ Become familiar with various PHS models
- ▶ Recognize the importance of the interdependence of PHS and public health action
- ▶ Understand how to evaluate PHS
- ▶ Become familiar with PHS in developed and underserved countries
- ▶ Become familiar with PHI and public health practice

b. Management and Leadership Training

After completing this course, the student will be able to:

- ▶ Apply skills and behaviors associated with effective leadership
- ▶ Develop strategies to delegate tasks and supervise team members
- ▶ Explain the importance and methods of using data for decision-making
- ▶ Practice the Model for Improvement and its Plan, Do, Study, Act (PDSA) cycle
- ▶ Describe the stages of project management

c. Antimicrobial Resistance

After completing this course, the student will be able to:

- ▶ Understand what AMR is and how it emerges and spreads
- ▶ Describe the impact of AMR on individuals, health systems, and society
- ▶ Describe recent international efforts to contain AMR
- ▶ Discuss the basic principles of antimicrobial and diagnostic stewardship in multidisciplinary teams
- ▶ Implement best practices for antimicrobial and diagnostic stewardship within an organization

d. Proposal Writing

After completing this course, the student will be able to:

- ▶ Apply the components of scientific research in proposal development
- ▶ Retrieve appropriate published data, information, and scientific evidence relevant to public health issues
- ▶ Discriminate between appropriate study designs

5. Training courses: Curricula for Future Courses

a. Epidemiology

- ▶ History of Epidemiology
- ▶ Descriptive and Scientific/Analytic Epidemiology
- ▶ Cross-sectional studies
- ▶ Ecologic studies
- ▶ Measures of Disease Frequency
- ▶ Measures of Association
- ▶ Random Error
- ▶ Research Ethics
- ▶ Intervention Studies (Experimental Studies, Clinical Trials)
- ▶ Cohort Studies
- ▶ Case-control studies
- ▶ Bias
- ▶ Confounding
- ▶ Effect Measure Modification
- ▶ Screening for Disease
- ▶ Causal Inference

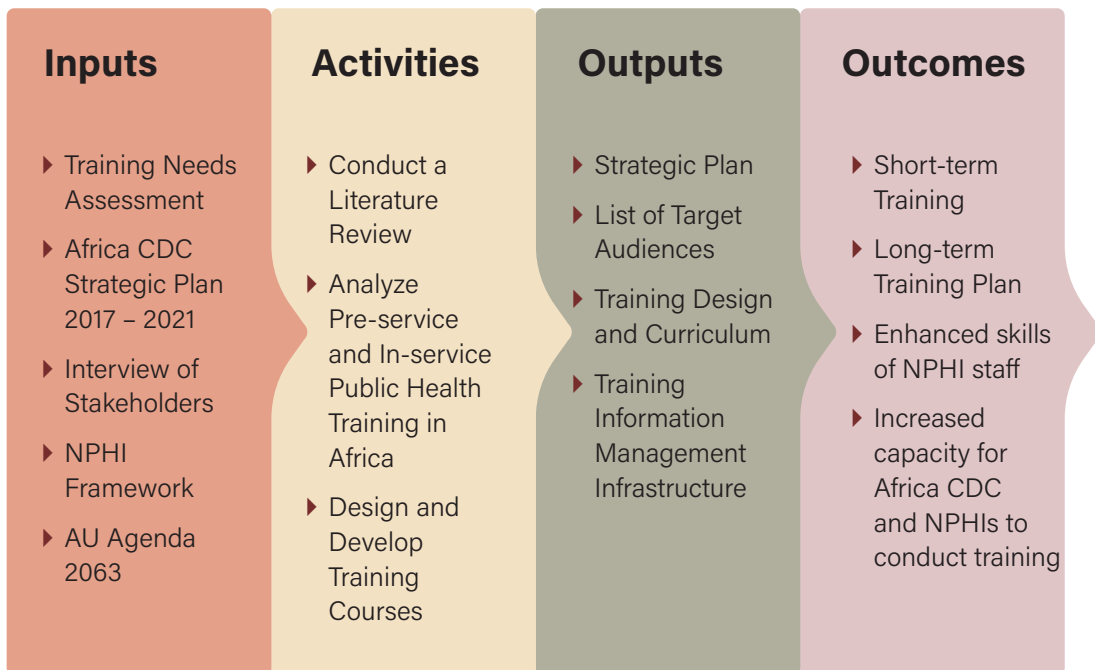
b. PHI

- ▶ Health Informatics
- ▶ Electronic Health Records, Data Standards, and Exchange
- ▶ Workflow Analysis and Process Redesign
- ▶ Usability and Human Factors
- ▶ System Design and Evaluation
- ▶ Effective Training

c. Laboratory Leadership Curricula and Learning Objectives

- ▶ Principles of Laboratory Management
- ▶ Organizational Structure
- ▶ Management Functions
- ▶ Problem-solving and Decision Making
- ▶ Human Resource Management
- ▶ Financial Management
- ▶ Laboratory Informatics and Electronic Laboratory Records

6. Africa CDC IWD Logic Model



APPENDIX

APPENDIX A. GLOSSARY

Acronym	Full spelling
AeHIN	Asia eHealth information network
AFENET	African Field Epidemiology Network
Africa CDC	Africa Centres for Disease Control and Prevention
ANDH	Africa Network for Digital Health
ASLM	African Society for Laboratory Medicine
AU	African Union
EMPHNET	Eastern Mediterranean Public Health Network
FETP	Field Epidemiology Training Program
FELTP	Field Epidemiology and Laboratory Training Program
HELINA	Health informatics in Africa
HIS	Health information systems
HMN	Health Metrics Network
ICT	Information and communications technology
IDSR	Integrated disease surveillance and response
IHR	International Health Regulations, 2005 revision
ISO	Informatics-savvy organizations
IWD	Institute for Workforce Development
JEE	Joint external evaluation
LMS	Learning management system
M&E	Monitoring and evaluation
NLSP	National laboratory strategy plan
NPHI	National public health institute
OIE	World Animal Health Organization
PAHIN	Pan African Health Informatics Network
PHI	Public health informatics
PHS	Public health surveillance
RCC	Regional collaborating center
RHINO	Routine health information network
RSPH	Rollins School of Public Health
TEPHINET	Training Programs in Public Health Interventions Network
TOT	Training of trainers
US CDC	United States Centers for Disease Control and Prevention
WHO	World Health Organization

APPENDIX B. TASK FORCE

Primary Coordination and Writing

1. Merawi Aragaw, Africa CDC
2. Jay K. Varma, Africa CDC

Contributors

- ▶ Simon Antara, African Field Epidemiology Network
- ▶ Mohammed Al Nsour, The Eastern Mediterranean Public Health Network
- ▶ Henry (Kip) Baggett, US Centers for Disease Control and Prevention
- ▶ Mohamed Chahed, Global Health Development
- ▶ Ali Elbireer, Africa Society for Laboratory Medicine
- ▶ Angele Hilmers, Training Programs in Epidemiology and Public Health Interventions Network
- ▶ Amha Kebede, Africa Society for Laboratory Medicine
- ▶ Theo Lippeveld, John Snow International
- ▶ Abderrahmane Maaroufi, Institut Pasteur – Morocco
- ▶ Natalie Mayet, South Africa National Institute of Communicable Diseases
- ▶ Scott McNabb, Emory University- Rollins Sch. of Public Health
- ▶ Marasi Mwencha, John Snow International
- ▶ Olivia Namusisi, African Field Epidemiology Network
- ▶ Chima Ohuabunwo, African Field Epidemiology Network
- ▶ Tom Oluoch, Health Informatics In Africa (HELINA)
- ▶ Martin Osumba, RTI International
- ▶ Leonard Peruski, US Centers for Disease Control and Prevention
- ▶ Ralph Timperi, Association of Public Health Laboratories
- ▶ Herman Tolentino, US Centers for Disease Control and Prevention
- ▶ Tadesse Wuhib, US Centers for Disease Control and Prevention

APPENDIX C. COMPETENCIES OF A PUBLIC HEALTH INFORMATICIAN

1. Supports development of strategic direction for public health informatics within the enterprise.
 - a. Leads public health informatics planning for a project, program, or organization
 - b. Recommends public health informatics strategic decisions for a project, program, or organization
 - c. Contributes to all strategic decisions for the project, program, or organization
 - d. Develops IT and information management policies for programs in accordance with organizational policies
2. Uses informatics standards
 - a. Communicates the origin and role of standards relevant to informatics projects and information systems within the organization
 - b. Uses informatics standards in all projects and systems, where relevant standards exist
 - c. Contributes to standards development efforts
 - d. Supports orderly migration to a standards-based framework
3. Manages IT operations related to project or program (for public health agencies with internal IT operations)
 - a. Manages project or program resources

- b. Manages user support for projects or programs
 - c. Manages risks to information systems and applications
 - d. Follows enterprise operational policies
4. Monitors IT operations managed by external organizations.
 - a. Provides information on IT operational needs of the public health organization
 - b. Provides information on the performance of the external IT management organization in supporting the operations of the public health organization
 - c. Ensures optimal management of IT operations by subcontracted entities, recognizing deviations from and/or need to amend contracts
 5. Communicates with cross-disciplinary leaders and team members.
 - a. Communicates effectively with technical and non-technical staff across organizational disciplines
 - b. Advocates within the agency for the value of informatics and IT as well as best practices to promote acceptance and adoption by organization staff
 - c. Negotiates within the department or programs to ensure maximal reuse of software resources and to promote cross-program benefits, including cost-efficiencies and interoperability
 6. Implements solutions that ensure confidentiality, security, and integrity while maximizing availability of information for public health personnel.
 - a. Protects personal health information
 - b. Complies with human subjects protection (appropriate use of institutional review boards), animal subjects protection when applicable, and the Public Health Code of Ethics
 - c. Monitors integrity of public health information systems
 7. Participates in development of knowledge management tools for the organization
 - a. Collaborates with other public health professionals to determine core knowledge required by groups within the organization
 - b. Assists in identifying solutions for information access
 - c. Assists in identifying or creating a knowledge repository
 8. Supports applied public health informatics research for new insights and innovative solutions to health problems.
 - a. Assists in maintaining infrastructure to support applied public health informatics research
 - b. Supports applied informatics research to determine how IT can change and improve public health practice
 - c. Supports development of new insights into potential uses of public health informatics for programs
 - d. Stays informed and contributes to local, national, and international public health informatics research agendas and participates in revising and setting these agendas
 - e. Collaborates with other informatics researchers in related areas
 - f. Disseminates findings and contributes to science
 - g. Attends national informatics meetings and other forums that support knowledge exchange and collaboration
 9. Conducts education and training in public health informatics.
 - a. Integrates knowledge about informatics into the organization
 - b. Advances the profession of public health informatics
 - c. Advances personal knowledge of public health informatics by staying current with the literature, attending conferences, and participating in continuing education activities
 - d. Supports efforts to harmonize public health informatics with other informatics domains (e.g., bioinformatics, human genomics, clinical informatics, consumer health informatics, nursing informatics, laboratory information systems, veterinary informatics, dental, pharmaceutical, or environmental)
 10. Ensures that knowledge, information, and data needs of project or program users and stakeholders are met.
 - a. Analyzes user and stakeholder information, knowledge, and data needs, and works with program staff and stakeholders to design information systems that meet user needs
 - b. Ensures that the project, program or organization applies appropriate tools and methods to transform data to information and knowledge for decision making and public health action

- c. Ensures effective and efficient data management activities (collection, storage, linkage, retrieval)
 - d. Ensure application of appropriate data analytics, visualization and dissemination/reporting principles, tools and methods
 - e. Promote use of data for decision making and public health action
11. Develops, supports, and promotes Public Health Informatic Networks for sharing of resources, lessons learned, and best practices with following objectives:
 - a. To strengthen National Health Information System
 - b. To develop, implement, and use appropriate Information and Communications Technology
 - c. To build educational networks in Health Informatics
 12. Supports information system development, procurement, and implementation that meet public health program needs.
 - a. Integrates public health system requirements into information systems development, procurement, and implementation
 - b. Ensures that acquisitions associated with projects meet their public health requirements
 - c. Manages information system projects supporting public health programs
 - d. Creates a clear project or operational framework
 - e. Minimizes impact on ongoing operations when changing or implementing information systems
 13. Evaluates information systems and applications.
 - a. Assists in developing an evaluation framework for public health information systems
 - b. Assists in developing an evaluation framework for the implementation process for information systems and applications
 - c. Evaluates the performance of health information systems according to established frameworks
 14. Contributes to development of public health information systems that are interoperable with other relevant information systems.
 - a. Identifies interoperability concerns
 - b. Determines whether interaction with other relevant information systems (e.g., clinical, environmental, or emergency response) is necessary for information systems being developed
 - c. Identifies available clinical data for potential use by public health programs
 - d. Implements and supports systems that electronically receive environmental data
 15. Supports use of informatics to integrate clinical health, environmental risk, and population health.
 - a. Supports use of informatics to promote disease prevention at the clinical, environmental, and personal health interfaces
 - b. Supports use of informatics to extend and make clinical care more effective in the community
 - c. Supports establishment of systems to improve public health through access to clinical care information

APPENDIX D. INVENTORY OF NETWORKS AND PROFESSIONAL SOCIETIES IN AFRICA

NAME	TYPE OF NETWORK	WEBSITE	DETAILS
eHealth Network for Africa (eHNA) AFRICAN NETWORK FOR DIGITAL HEALTH (ANDH)	Network Initiative	https://www.ehna.acfee.org/ Hosted and managed by African Centre for Health Excellence (ACFEE)	<p>The African Network for Digital Health (ANDH) is a peer assistance forum created by leading African eHealth experts to leverage ICTs to achieve better health outcomes. The goal of forming this network is to accelerate innovation to derive better quality and timely health information for improving service delivery and the management of health systems.</p> <p>Modeled on the success of the Asia eHealth Informatics Network (AeHIN), the ANDH is open to all Africans and electronic health (eHealth) professionals in Africa and is designed to empower individuals and institutions through sharing experiences and best practices.</p>
African eHealth Forum (AeF)	Forum	https://ehna.org/initiatives/MjlxNw==/organisation	<p>The African eHealth Forum (AeF) supports countries' health systems to expand and develop their eHealth's human capacity and leadership. These are core to eHealth's success. AeF activities help African countries to identify and develop methods and tools to find sustainable, successful eHealth solutions. It then helps procure them, implement them, sustain them and set up arrangements to afford them.</p>
African Health Observatory (AHO)	Web platform	aho.afro.who.int/ https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4109346/	<p>The African Health Observatory (AHO) serves four functions:</p> <ul style="list-style-type: none"> Storage and sharing of data and statistics for elaboration and download if needed Production and sharing of evidence through the analysis and synthesis of information Sustaining networks and communities, for better translation of evidence Supporting countries establish national or sub-national health observatories.
The African Alliance for Digital Health Networks	Network	http://digitalsquare.org/african-alliance/	<p>The African Alliance for Digital Health Networks (African Alliance) provides a platform to cultivate the human capacity needed to develop strong national digital health systems. Promoting country ownership of digital innovation and offering a hub for south-south learning, the African Alliance fosters the sustainability of investments made through Digital Square.</p>

NAME	TYPE OF NETWORK	WEBSITE	DETAILS
HealthE Africa Network	Network	http://healthenabled.org/wordpress/about-us/	<p>HealthE Africa is a peer assistance networking initiative undertaken by HealthEnabled in partnership with Knowledge for Health (K4Health).</p> <p>It plays three roles:</p> <p>Connector: We are a neutral, trusted facilitator among governments, top digital health experts, health implementers, and donors.</p> <p>Expert Advisor: We have significant experience and expertise in digital health to guide policy-making and the design and implementation of digital health solutions in low- and middle-income countries.</p> <p>Knowledge Hub: We share the latest information, advice, and technologies in digital health.</p>
East African Integrated Disease Surveillance Network (EAC)		https://www.eac.int/health/disease-prevention/east-african-integrated-disease-surveillance-network	The East African Integrated Disease Surveillance Network (EAIDSNet) is a regional collaborative initiative of the national ministries of the EAC Partner States responsible for human and animal health in collaboration with the national health research and academic institutions. The project is implemented with support from the Rockefeller Foundation.
HARMONIZATION FOR HEALTH IN AFRICA	Community of Practice for performance based financing	https://hhacops.org/	<p>HHA provides regional support to African governments for health system strengthening and to meet the Millennium Development Goals.</p> <p>The AfDB, JICA, NORAD, UNAIDS, UNFPA, UNICEF, WHO, USAID and the WB established a mechanism to support country-led efforts at health system strengthening leading to the accelerated attainment of health outcomes particularly the MDGs.</p> <p>The PBF CoP is a community of experts that communicate through an online forum and meet in person at events to share experiences, knowledge, and best practices with the goal of expanding the number of qualified PBF experts working in Africa and enabling regional capacity by documenting and assessing PBF experiences.</p>
Global Evaluation and Monitoring Network for Health (GEMNet-Health)	Network	https://www.measureevaluation.org/resources/networks/gemnet-health	<p>GEMNet member institutions are located in several countries throughout Asia, Africa, and North America.</p> <p>The purpose of GEMNet-Health is to foster organizational growth, collaboration, and peer-to-peer support for monitoring and evaluation of health programs globally through ongoing and future institutional linkages among members, beginning with a core of MEASURE Evaluation's current and former training partners.</p> <p>GEMNet-Health has members skilled in a wide array of evaluation-related technical areas, with capacity to conduct trainings, collaborate on research, and provide technical assistance. Several member institutions are also involved in capacity building and networking activities related to strengthening routine health information system.</p>

NAME	TYPE OF NETWORK	WEBSITE	DETAILS
East African Community (Digital REACH initiative)	Network	http://www.who.int/alliance-hpsr/evidenceinformed/reach/en/	An institutional mechanism, the Regional East African Community Health (REACH), has been created on the initiative of various stakeholders in Kenya, Tanzania and Uganda. These stakeholders include policy makers, researchers from universities and civil society who were interested in the idea of having a knowledge broker. REACH therefore bridges the gap between health research and policy and decision making. REACH is housed within the East African Community, Health Research Council in Arusha and supports a node in each country.
West Africa RHIS network		http://www.wahooas.org/index2.php?lang=fr	<p>WAHO is an agency which brings together health leadership from the fifteen member states of the Economic Community of West African States (ECOWAS). WAHO's goal is to improve health by harmonizing policies, pooling resources, and cooperating towards a collective and strategic fight against health problems in the ECOWAS region.</p> <p>The West Africa RHIS network is a newer initiative, which is currently being set up under the governance of the West African Health Organization (WAHO).</p> <p>The network's vision is that by 2025, all member countries will have a fully functional RHIS that produces data of adequate quality, which are effectively used for decision making at all levels of the health system.</p>
HELINA		http://www.helina-online.org/	Health Informatics in Africa is an association of Pan African Health Informatics.
Southern African Centre for Infectious Disease Surveillance (SACIDS) One Health	Network		The SACIDS, a One Health African initiative linking southern African academic and research institutions in smart partnership with centres of sciences excellence in industrialised countries as well as international research centres, strives to strengthen Africa's capacity to detect, identify and monitor infectious diseases of humans and animals, to better manage health and socio-economic risks posed by them, and to improve research capacity in investigation the biologic, socio-economic, ecologic, and anthropogenic factors responsible for emergence and re-emergence of infectious diseases.

APPENDIX D. INVENTORY OF NETWORKS AND PROFESSIONAL SOCIETIES GLOBALLY

NAME	TYPE OF NETWORK	WEBSITE	DETAILS
ROUTINE HEALTH INFORMATION NETWORK	Network / Listserv	http://www.rhinonet.org/	<p>RHINO focuses on improving the use of routine health information for decision making through sharing lessons learned and best practices. The network spun out of USAID's MEASURE Evaluation Project and aims to improve population's health in resource poor countries through the use of information produced by high quality, productive and sustainable routine health information systems (RHIS). Examples of its approaches include advocating for the use of routine health information in decision making, learning from and informing HIS professionals, managers, and users of health information systems of advancements in RHIS development, and improving access and availability of routine health information.</p> <p>RHINO engages members in regular forums, newsletters, and cataloging of resources. RHINO is the first global network for RHIS professionals and is currently working to develop regional RHINOs through partnerships with existing regional eHealth and HIS networks in Latin American, West Africa, and Asia.</p>
BID LEARNING NETWORK	Network	http://bidinitiative.org/bid-learning-network/	<p>The network is focused on helping participating countries use better data to improve their health systems at every level. Its stated goals are to:</p> <ul style="list-style-type: none"> ▪ Bring countries together to identify shared problems and solutions and connect with peers. ▪ Use this knowledge to design common information system products, practices, and data policies. ▪ Experiment with these designs in countries to determine their applicability. <p>Use this experience to inform national and global decision-making.</p>
Evaluate	Newsletter	https://measureevaluation.wordpress.com/	Monthly newsletter focusing on guidelines, tools and other resources from MEASURE Eval.
Health Information System Program	Network	http://www.hisp.org/	HISP (Health information Systems Program) is a global network of people, entities and organisations that design, implement and sustain Health Information Systems (DHIS2). As a network, HISP globally follows a participatory approach to support local management of health delivery and information flows, and was established by the Department of Informatics at the University of Oslo.
Global Digital Health Network (GDHN)	Network	https://www.mhealthworkinggroup.org/about	The Global Digital Health Network envisions a world where technical innovation supports improved health and contributes to better quality, accessibility and sustainability of health services and health outcomes, particularly for underserved populations in low resource environments.

NAME	TYPE OF NETWORK	WEBSITE	DETAILS
Core group		https://coregroup.org/	CORE is the only player in its field that convenes the practitioners and public health professionals in global community health to share knowledge, evidence, and best practices, and then translates these into the real world with a direct impact, creating new standards in clinical and public health as it advances dialogue at the country and global levels.
JOINT LEARNING NETWORK FOR UNIVERSAL HEALTH COVERAGE (JLN)			The JLN is a practitioner-to-practitioner learning network for countries to share knowledge and co-develop tools, guides, and resources to achieve universal health coverage (UHC) in low and middle-income countries. The network seeks to connect practitioners and policymakers across countries to bridge the gap between theory and the practical 'how-tos' of implementing UHC reforms. The network forms topic specific sub-initiatives based on members' interests and priorities, and available partner support. Current initiative sub-networks are focused on quality improvements, provider payment mechanisms, information technology, expanding coverage, and primary health care.
HEALTH INFORMATION FOR ALL (FORMERLY HIFA2015)			HIFA's vision is for a world where every person and health worker will have access to the health information they need to protect their own health and the health of those for whom they are responsible. HIFA's strategy promotes communication, understanding, and advocacy among everyone involved in the production, exchange, and use of health knowledge. The primary network consists of five online global forums under HIFA Global Forums, which are focused broadly on access to and use of health information.
Health Information & Publications Network (HIPNet)		https://www.hipnet.org/	The Health Information and Publications Network (HIPNet) is a mission-driven partnership established in 1989 that addresses a key public health need for access to technical health information and innovative information technologies that strengthen the performance and sustainability of health care programs, organizations, and services around the world.
ICTWorks	Newsletter	https://www.ictworks.org/	ICTworks™ is the premier community for international development professionals committed to utilizing new and emerging technologies to magnify the intent of communities to accelerate their social and economic development. ICTworks focuses on the use of information and communication technologies (ICT) and the implementation processes that can make them sustainable in rural and underserved communities across the developing world (ICT4D).
DHIS2 for INGOs	Network and webinars		Population Services International (PSI) and The University of Oslo (UiO), in partnership with the NonProfit Organizations Knowledge Initiative (NPOKI) and InsideNGO will host a two-day event DHIS2 for iNGOs – a Symposium. The purpose is to showcase an open-sourced M&E solution with the unique opportunity to provide input in how to enhance DHIS2 as an enterprise M&E management tool for iNGOs.

NAME	TYPE OF NETWORK	WEBSITE	DETAILS
Health Data collaborative	Various working groups focused on facility, community information system; digital health and interoperability and newsletter	https://www.healthdatacollaborative.org/	<p>As the name suggests, the Health Data Collaborative is an inclusive partnership of international agencies, governments, philanthropies, donors and academics, with the common aim of improving health data. Countries are at the core of what it does, supported by donors, academics, UN agencies and civil society organizations.</p> <p>The Health Data Collaborative is not a formal partnership. We operate with a light, nimble governance structure, based on a shared vision that by working together to strengthen country information systems, we can contribute meaningfully to better decision-making and better health.</p>
OpenHIE	Community of Practice	https://ohie.org/	<p>OpenHIE is a Global Mission-Driven Community of Practice. Dedicated to improve the health of the underserved through open and collaborative, development and support of country driven, large scale health information sharing architectures.</p> <ul style="list-style-type: none"> ▪ Enabling large scale health information interoperability ▪ Offering freely available standards-based approaches and reference technologies ▪ Supporting each other's needs through peer technical assistance communities
Digital principles or ICT4D Principles	Community	https://digitalprinciples.org/	<p>With the advent of accessible digital technology more than a decade ago, international development organizations began seeking new ways of including digital tools in their programming for improved outcomes. These efforts were initially quite successful; significant advancements occurred in various sectors such as health and agriculture, more communities around the globe were connected, and underserved populations were reached in a way that had not been possible before. However, some digitally-enabled programs failed – and quite often that failure was for reasons that were both predictable and preventable.</p>
NonProfit Organizations Knowledge Initiative (NPOKI)	Network and webinars	https://www.npoki.org/#	<p>NPOKI is a collaboration of international health organizations, funders, partners, and in-country nongovernmental organizations (NGOs). Our members are at the forefront of providing access to safe and affordable health services globally, including a focused response to the spread of HIV/ AIDS. Founded in 2005, NPOKI focuses on a variety of projects and communities of practice with an emphasis on performance management. We provide information management and support systems that can track the performance of large numbers of projects in a variety of countries against strategic goals, align financial investment with results, and allow NGOs to collect, analyze and share information across program, departmental, institutional and geographical boundaries.</p>

NAME	TYPE OF NETWORK	WEBSITE	DETAILS
NetHope		https://nethope.org/	<p>NetHope enables committed organizations to change the world through the power of technology. Bringing together global leaders in the nonprofit and technology sectors, we embrace big challenges through innovation and collaboration in a unique model that has proven to have powerful results for more than a decade.</p> <p>Nethope enables cross-sector collaboration between nonprofits and innovative companies to develop better programs, mitigate risks, and scale benefits for greater impact in the communities in which we work. Most of their activities occur in the emergency response area by getting iNGOs and IT companies to quickly respond to humanitarian emergencies.</p> <p>The collaborative model uses public & private partnerships to deliver information technology solutions to the developing world.</p>

Africa Centres for Disease Control and Prevention (Africa CDC)

African Union Commission
Roosevelt Street W21 K19,
Addis Ababa, Ethiopia

☎ +251 11 551 7700

✉ africacdc@africa-union.org

🌐 www.africacdc.org

📘 africacdc

🐦 @AfricaCDC