Multisite Evaluation of Field Epidemiology Training Programs

Findings and Recommendations

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Table of Contents

Executive Summary

Field Epidemiology Training Programs (FETPs)

Field Epidemiology Training Programs are two-year training in service programs that aim to enhance the epidemiologic capacity of the public health workforce in the host country or region. FETPs provide participants with hands-on experience in responding to disease outbreaks, natural disasters, and other public health priorities including disease surveillance. The U.S. Centers for Disease Control and Prevention (CDC) and partner organizations assist Ministries of Health (MOHs) and other public health authorities to establish FETPs to improve and strengthen the host country's public health systems and infrastructure. The critical long-term outcomes of these programs are to improve public health functioning in the following ways:

- Public health events are detected, investigated, and responded to quickly and effectively;
- A robust surveillance system is established and used effectively;
- Human capacity is developed in applied epidemiology and allied areas; and,
- Public health decisions are driven by scientific data.

Multisite Evaluation of Field Epidemiology Training Programs (FETPs)

CDC designed and implemented this evaluation in partnership with the Training Programs in Epidemiology and Public Health Interventions Network (TEPHINET) and participating countries. This is the first evaluation in more than a decade to examine implementation and proximal (i.e., short-term) outcomes across multiple FETPs supported by CDC. The purposes of the evaluation were to (1) document selected components of program design and implementation across all participating sites; (2) determine progress toward the intended outcomes of the program; and (3) demonstrate accountability for use of resources and results. From June 2012 to February 2013, CDC and TEPHINET completed data collection in collaboration with 10 FETPs: national programs in China, Ethiopia, Kenya, Nigeria, Pakistan, South Africa, Vietnam, and regional programs in Central America, Central Asia, and South Caucasus. This report provides detailed information on design of the evaluation, participation of stakeholders throughout the evaluation, data collection and analysis, key findings, use of data to inform ongoing planning and evaluation activities, and recommendations for action to improve FETPs.

Summary of Findings

Variation in Program Design and Implementation

This evaluation identified important diversity in implementation of the programs. Many FETPs are described as modeled upon the U.S. CDC Epidemic Intelligence Service (EIS) Program. However, only one of 10 programs were national in scope, with full-time participation of fellows, non-degree granting, and located within the national public health agency, which are attributes of the EIS Program.

A fundamental component of the program is the relationship to the MOH or other government public health institutions. For the 10 programs included in this evaluation, the programs located in or with more investment by the MOH demonstrated more use of the program by the MOH and more opportunity to present epidemiologic data or findings to decision makers in the host country. These findings would suggest the ownership of an FETP and the primary location and affiliation of its fellows within the relevant epidemiology unit of the MOH is among the important structural or institutional attributes of successful FETPs. Alternatively, some programs are affiliated with a university in the host country and offer a degree upon completion of the program. While this approach is not an aspect of the EIS Program, some host countries choose this design to meet participants' career advancement needs. Five of the 10 sites included here were affiliated with a university and provided a Master's-level degree upon completion of the program. Data collected for this evaluation indicate that the benefits and challenges of dual affiliation (i.e., affiliation

of the program with both the MOH and a university at the same time) should be carefully examined; dual affiliation adds complexity, cost, and sometimes competing priorities to implementation of these programs.

Stakeholders often assume and describe participation in FETPs as full-time. However, 5 of 10 programs participating in this evaluation had part-time participation by fellows (i.e., participants maintained their employment while participating in the program). These programs tended to have difficulty assuring timely completion of program requirements. Nonetheless, the prevalence of programs with part-time participation suggests the need for discussion of realistic expectations for outcomes of these programs as well as guidance and materials specific to this approach.

Competency-based Training

FETPs are competency-based training programs that emphasize learning by doing and mentorship. However, the amount of time dedicated to work in the field varied considerably due to sites with part-time participation. In addition, weeks in the classroom varied widely from 9 to 28 weeks. Despite the similarity in requirements for completion of the program, the mentored or supervised work in the field, and the nature or type of work completed, varied substantially across the 10 programs. A lack of opportunity or insufficient time dedicated to mentored or supervised work in the field (e.g., completion of outbreak investigations or surveillance activities) have direct implications for achievement of the desired competencies associated with FETPs.

A fundamental element of an FETP is the role of the mentor as participants collect, analyze, and interpret epidemiologic data. The expectation is that the activities of fellows are mentored and supervised by a highly-skilled epidemiologist with appropriate levels of experience in field work. This evaluation is the first analysis of the characteristics and operations of the Resident Advisor (RA). All 10 sites included CDC-supported RAs that were trained in either the EIS Program or another FETP. All of the RAs provided technical guidance to the fellows, but the type and intensity of this support varied across sites. In addition, many of the fellows were not directly supervised by the RA or graduates of an FETP for much of their work in the field.

Sustainability

This evaluation examined several indicators that provide information on elements of program sustainability. Investment or support for the program by the host country includes material and financial resources, as well as how the MOH and other institutions engaged or used the fellows to complete public health work. Countries that demonstrated the highest ownership of the program provided a wide range of these supports and relied on the FETP for important public health work. The evaluation revealed that the countries that provided more resources for the FETP also used the program more for public health work. These aspects of planning and implementation of the program are important markers of the host country's engagement in the program and will surely be expected to influence sustainability of these activities over time. However, the mandate of regional programs seemed to limit the engagement and support by individual national governments. Should donor or external resources diminish to support these programs, the absence of engagement and support from national governments could have important implications for the sustainability of regional activities.

Progress toward Proximal Outcomes

In general, the programs demonstrated success in achieving the intended proximal (i.e., short-term) outcomes: the majority of graduates worked in applied epidemiology positions within their countries' public health systems; participants completed hands-on work with the host country's surveillance systems; FETPs were engaged in response to outbreaks of priority diseases in all 10 sites; and most of the programs demonstrated that the work of their fellows reached decision makers within the MOH. In addition, many of the sites identified specific actions or activities (e.g., development of guidelines or policies) that were the direct result of the work of fellows.

Recommendations for Action to Improve FETPs

It is essential to document and understand those components of design and implementation of FETPs that are critical to achievement of the intended outcomes. In evaluating these programs, we identified that many FETPs do not operate the way they are commonly described. CDC, TEPHINET, and the organizations that host FETPs must clearly articulate the core components of the program, how the program is to be implemented, and assure these processes are linked to the intended outcomes logically (i.e., based on the best available evidence and practice wisdom relevant to FETPs). Specific recommendations for action to meet this aim include the following:

- FETPs are intended to be competency-based programs. TEPHINET and CDC have articulated a number of expected competencies. However, each program needs to assure the desired competencies in that program are articulated explicitly for participants and partners. Program completion requirements must be matched to these competencies and all programs should track the completion and quality of these requirements for all participants.
- All participants should be provided appropriate opportunities for work in the field (i.e., number of opportunities, type of work, and duration) and receive qualified supervision and mentorship during this work.

Given the prevalence of programs with part-time participation of fellows, CDC, TEPHINET, and representatives of the organizations that host these programs should determine if expectations for the outcomes of these programs should be adjusted (i.e., are different from those of programs with full-time participation of fellows). Additionally, the materials and tools typically used in implementation of FETPs were created with the assumption of full-time participation of fellows; the appropriateness of these items should be assessed.

Given the importance of participation in FETPs (national and regional) by MOHs and other authorities, CDC, TEPHINET, or the host organization should continue to collect data on some of the indicators used in this evaluation to document this participation. The evaluation revealed substantial variation in the work of RAs across sites (both the types of activities or tasks and the time allotted to these items); CDC and partner organizations must develop concise expectations for performance in these positions. In particular, more work is needed to assure that RAs and the host organization provide the highest quality mentorship and supervision to fellows now and in the future.

CDC should improve information sharing with the programs it supports to assure better understanding of program implementation challenges around the core expectations in order to more effectively provide the required technical and programmatic support.

Historically, the monitoring and evaluation of FETPs has been sporadic and not consistent across sites. Moreover, CDC and host organizations have not been documenting progress toward intended outcomes systematically. Given the importance of these programs, all FETPs should assure adequate attention to monitoring and evaluation and use this data to inform improvements to the program on a regular basis. In addition, TEPHINET should consider the most useful indicators from this study for use in the planned accreditation process.

Summary

FETPs are designed to meet the conditions and needs of the countries and regions where they are located. For CDC-supported FETPs, it is important to clearly understand how this variation is related to implementation of the program, progress toward the intended outcomes, and the path to sustainability of the program without donor or external resources. In general, the sites demonstrated progress towards important public health outcomes. And, despite substantial variation in design and implementation of the 10 programs, each is considered an important, respected capacity development activity in their countries and regions; these programs are valued by stakeholders. These strengths provide a sound starting point for improvements in the quality of the FETPs in these countries and regions.

Introduction to Field Epidemiology Training Programs

What is a Field Epidemiology Training Program?

A Field Epidemiology Training Program (FETP) is a 2-year applied epidemiology training through service program. By providing field experience in responding to disease outbreaks, natural disasters, and other public health priorities, as well as classroom instruction, FETPs support public health service while building a workforce of trained epidemiologists. The United States Centers for Disease Control and Prevention (CDC) began assisting other countries to develop these training programs in 1980, modeling them after CDC's own Epidemic Intelligence Service (EIS). CDC's objectives in supporting FETPs are to 1) decrease the shortage of skilled field epidemiologists worldwide; and 2) strengthen countries' capacities to respond to public health emergencies, conduct surveillance and public health research, and improve public health-related communications and networking within the FETP's host country and region (CDC 2006).

Distinguishing features of FETPs, according to the FETP Development Handbook (CDC 2006), are that they are positioned within the host country's Ministry of Health (MOH) and partner closely with the MOH to address the country's public health concerns. They implement competency-based training, with at least 75% of the training for fellows devoted to practicing epidemiology in active public health units under the close supervision and mentorship of a proficient field epidemiologist. They build systems capacity with an expectation that each FETP will become self-sustaining. The program aims to train field epidemiologists initially for the national and regional level. These are often physicians, but in some countries other backgrounds are included such as veterinarians, nurses, environmental officers, and others. The participants in most countries are recruited specifically from among MOH or other government sector employees. Some accept individuals from the private sector as well. Program participants are referred to as residents, fellows, officers, and other designations, depending on the program. For the sake of brevity and clarity, in this report they will be referred to as fellows.

FETP fellows in all countries need common skills and knowledge. Recognizing this need, CDC developed a standard core FETP curriculum (TEPHINET 2005; Traicoff et al. 2008). Countries may customize FETP trainings to meet their specific needs by adding specialized instruction or by targeting different audiences and levels of the public health system.

Typically CDC supports programs by placing Resident Advisors (RAs) on site for the first several years of a program. The RA is an experienced applied epidemiologist, usually a graduate of CDC's EIS or another FETP, who is assigned to the FETP to help guide training and provide technical assistance. They often serve as the primary technical supervisor for the fellows during the first years of the program. They provide technical assistance in developing training materials, teaching and mentoring fellows, and consulting on priority public health issues. CDC also provides targeted short-term technical assistance through its cadre of experts, including physicians, epidemiologists, public health advisors, instructional designers, health communications specialists, and support personnel.

Through the FETPs, CDC and its national and international partner organizations help MOHs and other national public health authorities to improve and strengthen their country's public health systems and infrastructure (Schneider et al. 2011). Many countries with an FETP share resources and practices through collaborating in nonprofit network organizations, including regional networks of FETPs and the Training Programs in Epidemiology and Public Health Interventions Network (TEPHINET) in Atlanta, Georgia, U.S.A.

What is the importance of Field Epidemiology Training Programs worldwide?

Development of a well-trained public health workforce is essential to strengthening health systems worldwide and achieving global public health objectives (Schneider et al. 2011). Dr. Thomas Frieden, Director of CDC, identified the FETP as one of CDC's key activities in improving global health, having stated "the Field Epidemiology Training Program…may be the single most important thing CDC does in global health" (Center for Strategic & International Studies 2010).

FETPs are designed to contribute in four ways to strengthening public health systems. First, they increase the number and quality of field epidemiologists in the public health workforce. Second, they develop worldwide capacity for timely detection, investigation of, and response to public health emergencies. Third, they improve capacity to collect public health data through improved disease surveillance systems and use the collected data effectively. Fourth, they promote the use of evidence-based recommendations in public health decision-making and policies.

FETP fellows provide valuable service to their MOH and the public health community. They are often on the front line of outbreak investigations, and they conduct surveillance evaluations and analyses that lead to improved public health systems. FETP fellows are involved in programs to prevent and control infectious diseases of global health importance such as polio, cholera, tuberculosis, HIV, malaria, and emerging infectious diseases of animal origin (e.g., SARS, Nipah virus, and avian influenza). Many FETP fellows also work to document and reduce the burden of noncommunicable diseases such as heart disease, cancer, diabetes, and environmental and occupational health problems. In addition, they share their findings nationally and internationally through publications, conference presentations, reports, and technical meetings.

CDC has supported the development and implementation of 49 FETPs since 1980, 16 of which are now operating independently. As of January 2013, CDC supports 21 two-year FETPs that cover 33 countries (CDC 2013).

An Overview of the Multisite Evaluation of Field Epidemiology Training Programs

What is a multisite evaluation?

Multisite evaluation is an approach to evaluation that assesses a program or an intervention that operates in more than one location. Programs such as the FETP can be implemented in the same way at every site or implemented slightly differently at each site. A multisite evaluation seeks to produce information about the overall program and variations among sites. Multisite evaluation answers questions about which aspects of a program's implementation are common to all sites and which aspects vary from site to site and why (IPDET 2007).

What are the purposes of the FETP multisite evaluation?

The FETP multisite evaluation is the first study in more than 10 years that looks at FETP implementation and proximal outcomes across multiple sites in a standardized and structured way. This evaluation was designed and implemented as a result of a close partnership between CDC, TEPHINET, and the host country FETPs.

During planning activities and technical consultations, a diverse group of program stakeholders determined the purposes of this evaluation:

- To document key aspects of program design and implementation;
- To document progress towards intended outcomes; and,
- To demonstrate accountability for use of resources and results.

The FETP stakeholders expected that the results of the evaluation could be used in a number of concrete ways:

- To inform ongoing development of the FETP;
- To identify opportunities to improve operations and accelerate progress toward intended outcomes;
- To inform allocation of resources (human and fiscal); and,
- To contribute to the evidence-base for design and implementation of FETP.

What are the evaluation questions?

The evaluation questions were developed during a technical consultation meeting with key stakeholders, which involved negotiating and prioritizing which aspects of the program to address. The following are the three key evaluation questions:

- How are selected FETP components being implemented across sites?
- What is the status of progress toward intended outcomes?
- What is the relationship between implementing FETP components and progress toward intended outcomes?

What are the guiding principles for the multisite evaluation of FETP?

The evaluation was designed and implemented according to CDC's "Framework for Program Evaluation in Public Health" (1999). Additionally, FETP stakeholders developed a set of guiding principles for the evaluation to assist those involved in or affected by the evaluation to understand the purposes of the evaluation process and its limits. The principles were reviewed and modified as needed during evaluation planning and implementation. The final set consists of the following items:

- The evaluation must accommodate variation in FETP implementation across sites.
- Several existing measurement activities focus primarily on characteristics and outputs of fellows. This evaluation should include collecting data that target other important facets of FETPs.

- Planning must acknowledge that language and terms relevant to FETPs vary in meaning across sites.
- To the extent possible, indicators or metrics will be drawn from the existing, relevant, program guidelines and evaluation tools.
- The evaluation will address only the aspects of FETPs agreed to by the evaluation stakeholders—not all aspects of FETPs.

How was this evaluation informed by related measurement activities?

When this evaluation was launched, there was little consensus regarding how to evaluate FETPs. However, a few approaches to measuring FETP activities existed. In 2005, TEPHINET developed the Continuous Quality Improvement Handbook for Training Programs in Epidemiology and Public Health Interventions Network (2005), a guide for self-assessment of the quality of individual FETPs, which provides some suggested standards for key program elements to be evaluated. CDC's Division of Public Health Systems and Workforce Development used that guidance in developing an FETP Self-Assessment (Scorecard), which was created in 2009 as a facilitated or guided self-assessment of FETP characteristics and implementation. The present evaluation, which was informed by those two processes, sought to examine FETP quality and outcomes more explicitly by developing a clear set of indicators for these areas.

Concurrently, TEPHINET is developing criteria and establishing a process for accreditation of national FETPs via formal, transparent review by peers. CDC and TEPHINET worked closely in designing this multisite evaluation to make sure there was no duplication of effort with other activities, including TEPHINET accreditation.

How were stakeholders engaged in planning and implementing the evaluation?

CDC and TEPHINET provided multiple opportunities for stakeholder participation throughout the evaluation. Stakeholders participated in defining the evaluation questions, developing indicators, identification of data collection methods and sources, and determining how sites would be selected for participation in this study. Annex A provides an annotated timeline of planning and implementation of the study, including more detailed information on participation of stakeholders in these activities. For example, to inform design and implementation of the evaluation, CDC hosted a technical consultation in June 2010 to discuss how to define and measure the quality of FETPs. Participants included representatives of programs in Brazil, China, Costa Rica, Egypt, Pakistan, Saudi Arabia, Tanzania, and Thailand; TEPHINET; the African Field Epidemiology Network (AFENET); the South East Asia Field Epidemiology and Technology Network (SAFETYNET); WHO; and CDC.

In August 2011, the evaluation team established an Advisory Panel that included stakeholders from TEPHINET and CDC including the Center for Global Heath and Office of Surveillance, Epidemiology and Laboratory Services (the location of the Epidemic Intelligence Service within CDC). One month later, the proposed design was discussed with Directors of FETPs worldwide at a meeting sponsored by TEPHINET and WHO. From October through December 2011, the evaluation team completed a series of consultations with stakeholders at regional events sponsored by TEPHINET; stakeholders included representatives of partner organizations, MOHs, and FETPs from countries worldwide. At these events, the evaluation team completed face-to-face interviews with RAs regarding their perspectives on important facets of FETPs and their role in implementation of the program.

In April 2012, RAs provided input on the design and plan for implementation of the study at the 61st Annual Epidemic Intelligence Service Conference sponsored by CDC. The evaluation team captured Information from these discussions, and others, in a table of feedback received; the information was updated after each meeting with stakeholders, and shared with stakeholders to assure transparency in planning the study. Stakeholders also participated in the interpretation of data collected. After data cleaning, validation, and preliminary analyses were complete, stakeholders met at the TEPHINET Global Conference in Amman, Jordan, in November 2012 to interpret the information, to determine and discuss key findings, and to identify opportunities for use of the information in the short-term.

Three Domains of Indicators Used to Document Processes and Proximal Outcomes of FETPs

How were the indicators selected?

The evaluation team relied on the input of stakeholders and subject matter experts, relevant standards of evaluation practice, and availability of human and fiscal resources. Specifically, the evaluation team selected indicators based on multiple consultations with stakeholders and review of similar or related data collection activities in individual countries, as well as those completed by CDC or partner organizations. The quality and utility of the indicators was considered against predetermined criteria including relevance to the evaluation questions; applicability in different settings (e.g., national or regional programs); degree of burden on participants; and resources (human and fiscal) required to collect, analyze, and use the information (MacDonald 2013).

The indicators (Table 1) address three aspects of FETPs:

- Basic characteristics refer to elements of program design and operations relevant to all sites. These indicators are intended to provide information on similarities and important differences or variations in design and implementation of FETPs.
- Process indicators focus on the role of CDC-supported RAs and the contributions of host countries to these programs. These are resource-intensive aspects of FETPs that have not been well-documented to date.
- Proximal outcomes refer to the expected short-term results of FETPs. The proximal outcomes are the initial, logical achievements on the path to the critical outcomes identified by CDC and host countries:
  - » Public health events are detected, investigated, and responded to quickly and effectively.
  - » A robust surveillance system is established and used effectively.
  - » Human capacity is developed in applied epidemiology and allied areas.
  - » Public health decisions are driven by scientific data.

How was each indicator defined?

To assure a shared understanding of the indicators, and promote accuracy and consistency in data collection across sites, the evaluation team prepared operational definitions for all of the indicators. The operational definitions include the rationale for using the indicator, the data to be collected for each indicator, the sources of information, any issues or limitations relevant to use of the indicator, and a list of references that support using the indicator as a meaningful marker of design, implementation, or outcomes of the program (Annex A). The indicators include both qualitative and quantitative information and some included multiple data points.

Table 1. FETP evaluation indicators and their components

Indicator	Definition and Focus
Basic Characteristics	
Rationale for the FETP	• A summary statement, including who started the program and why
FETP operations	• Organization where the FETP is hosted • Geographic scope of the FETP • Date FETP started • Overlapping cohorts trained
FETP components	• FETP has a laboratory track • FETP has other specialty tracks

Indicator	Definition and Focus
Characteristics of RAs	• Number of RAs working for the FETP • Organization used to employ each RA • Focus of each RA's position • Number of years FETP had an RA
Selection of fellows	• Eligibility requirements • Fellows nominated • Proportion of applicants accepted
Experiential or field component	• Number of weeks in classroom • Number of weeks on field assignment • Location and rotation of field assignment
Employment status of fellows	• Fellows participate in the FETP full-time • Fellows are paid a salary or stipend while in the FETP • MOH has a bonding requirement for fellows
Completion of FETP	• Graduation requirements • Graduates generally complete all requirements • Academic degree is awarded • Proportion of fellows who complete the program on time • Proportion of fellows who graduate on time
Process Indicators	
Degree of host country's ownership of the FETP	• Organization where the FETP is hosted • FETP is included on MOH's organizational chart or is a line item in the MOH budget • Level and type of fiscal resources provided by the country • How day-to-day supervision of the fellows is handled
Access to data	• Types of data available to fellows • Fellows' level of access to data
Use of the FETP by MOH	• Requests to FETP for assistance or work
Investment of host country in field supervision	• Proportion of field supervisors who are graduates of the FETP
Technical qualifications of the RA	• RA is a graduate of EIS or another FETP • RA's years of experience as an epidemiologist • RA's years of experience as a supervisor of epidemiologists
Engagement of the RA with the MOH	• In what ways the RA provides technical expertise to or consults with the MOH
RA as pathway to service to country	• Role of RA in linking CDC resources to the FETP
Engagement of the RA with the fellows	• Frequency and type of contact between the RA and fellows during outbreak investigations • Level of RA's review of fellows' work or work products • How RA is generally involved in the day-to-day technical supervision of fellows

Indicator	Definition and Focus
Outcome Indicators	
Fellows employed in epidemiology-related positions after graduation	• Number of graduates • Number of graduated cohorts • Location of graduates within the public health system • Function of graduates within the public health system
FETP fellows involved in outbreak investigation	• Proportion of recent reported outbreaks with evidence that FETP fellows participated in the investigation (selected from two databases: CDC's Global Disease Detection Operations Center Daily Report [GDD] and Program for Monitoring Emerging Diseases [ProMED])
Engagement in surveillance activities or systems	• Graduates worked on surveillance activities • Fellows assigned to surveillance units • How fellows used recent surveillance data
Use of pathway to decision makers	• The ways and frequency of FETP-related work presented to decision makers
Quality of fellows' abstracts	• Scientific rigor and merit of abstracts submitted by fellows to 6th Global TEPHINET Conference

Methods

How were sites selected to participate in the evaluation?

For a program to be included in the evaluation, it needed to 1) have a CDC-supported RA on site and 2) have graduated at least two cohorts of fellows. In addition, the FETP and its host country had to be willing to participate. The evaluation team selected programs that represented a broad spectrum of programs: FETPs from low- and middle-income countries, national and regional programs, long-standing and recently established programs, and programs with and without university affiliations.

Which FETPs participated in data collection?

Seven national FETPs (China, Ethiopia, Kenya, Nigeria, Pakistan, South Africa, and Vietnam) and 3 regional FETPs (Central America, Central Asia, and South Caucasus) participated in the evaluation. A single country hosts a regional program; the RA and program staff are located in this country. Fellows from neighboring countries come to the host country to complete the classroom component of the program and return to their home countries to complete the fieldwork component of the program. The Central America regional FETP includes Guatemala, El Salvador, Costa Rica, Honduras, Panamá, and Dominican Republic. The Central Asia regional FETP includes Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan. The South Caucasus regional FETP included Georgia, Armenia, and Azerbaijan at the time of the evaluation.

How were data collected and analyzed?

A team of CDC, TEPHINET, and other professionals with knowledge and experience relevant to the work of FETPs completed data collection for this evaluation. Specifically, the team consisted of CDC and TEPHINET personnel and external consultants with expertise in program evaluation or design and implementation of FETPs. For data collection in each site, two members of this team participated. The same two persons did not visit every site, but all team members participating in data collection visited more than one site. For nine of the 10 sites included in the evaluation, data were collected during face-to-face meetings in the host country that lasted from three to five days. For one site, data collection was completed via email correspondence and telephone interviews as a result of security concerns that limited travel to the site. Data collection included use of secondary and primary sources of information:

Secondary sources of information

- Existing documents or materials (e.g., content on program websites) on development, planning, or implementation of the program; and,
- Abstracts submitted by fellows to the 6th Global TEPHINET Conference.

Primary sources of information

- Face-to-face or phone interviews with current fellows, graduates of the program, field supervisors, RAs, program personnel or staff in the host country, public health officials or other stakeholders in the host country, and CDC personnel based in Atlanta.

Before each site visit to complete data collection, the evaluation team compiled information for indicators available from existing documents or records regarding the program; this information was captured in a standardized form used for all sites. To assure data collection in the host country was as efficient as possible, this form was used to capture information available at CDC Atlanta or, in some cases, from the programs' websites or TEPHINET in advance of travel to the host country.

In the host country, members of the evaluation team interviewed a sample of graduates. In most sites, the interviews included a random sample of graduates from the previous two years; in three sites, we interviewed a

convenience sample of graduates due to limited access to these participants and time available for completion of the interviews. Data collection also included interviews with key stakeholders (e.g., government leaders or officials, university personnel engaged in the program, and others suggested by the RA in each site). These interviews addressed the history and perceived value of the program to the host country or region.

In parallel with the collection of primary data, one of the secondary sources of information was review of the quality of conference abstracts submitted by fellows; these data indicate the status of one of the proximal outcomes of the program. Three epidemiologists with extensive experience in field epidemiology and mentorship of fellows reviewed 49 abstracts from the 10 FETPs as a component of the evaluation. For each site, we selected a random sample of abstracts submitted to the 2010 6th Global TEPHINET Conference by the program. Authors' names and all identifiers were removed from each abstract. The three epidemiologists reviewed the abstracts in random order (rather than reviewing all abstracts from a single program at the same time). To determine the quality of the abstract, the reviewers created a point system based on previous criteria used by EIS and TEPHINET to review abstracts submitted to other events; the criteria included the quality of the introduction, methods, results, and conclusions; the public health significance of the work described; the potential public health effect of the findings; and the clarity of the abstract as a whole. Each criterion was rated on a scale of zero to four, with a maximum combined score of 28. Each reviewer read every abstract and assigned a score for each criterion. Upon completion of this process, the reviewers discussed their ratings and came to consensus regarding the final score for each abstract. Subsequently, the group calculated the mean, median, and distribution for all abstracts from each site combined. Based on these calculations, the sites' overall level of performance on this particular indicator was determined to be very good, good, fair, or poor.

The sites' presence during outbreak investigations in the host country represents the status of the program with regard to another proximal outcome. To determine the site's participation in outbreak investigations, we used a sample of reported outbreaks from Global Disease Detection (GDD) Operations Center Daily Report and alerts recorded in the ProMED website published by the International Society for Infectious Diseases. To be included, each outbreak or emergency had to affect more than one person and to be recorded in at least one of the two sources above. For each site, we created a list of outbreaks beginning in August 2012 and going back until the evaluation team had approximately 10 outbreaks per site. The list of outbreaks from ProMED included only diseases drawn from WHO lists of priority diseases (WHO 1999; WHO 2013). The lists drawn from the GDD Operations Center Daily Report included all outbreaks recorded (as opposed to only those outbreaks of priority diseases). During the site visits the directors of each program and RAs determined whether the program participated in investigations of each of the outbreaks listed for their country or region.

For purposes of documentation and analysis, all data collected (primary and secondary) were entered into a single Excel spreadsheet. For presentations of the findings (including this report), all programs were de-identified. The evaluation team assigned values to the data for selected process and proximal outcome indicators in order to examine and compare the information across sites. For regional programs, the values were assigned according to the practices of the majority of countries in the region. The relative values assigned were based on expert consensus regarding what constitutes quality in this setting. Annex B includes detailed information on the calculation and scoring of indicators.

How was the data collection process pilot tested, and how were the results used to improve implementation of the evaluation?

The data collection form and the graduate and stakeholder interview protocols were pilot-tested with the South Caucasus and Ethiopia FETPs. Based on the pilot test, these instruments were modified for use with the remaining FETPs. Some indicators were also revised to ensure the quality and utility of data collected. When necessary to ensure data compatibility and completeness, additional information was later collected from the two FETPs that participated in the pilot test.

How did participating FETPs validate their data?

To ensure the accuracy and completeness of data collected (primary and secondary), members of the evaluation team met with the program director or RA before leaving the host country. They reviewed the data collected, discussed any concerns they had regarding the data or data collection processes, and amended the form as necessary. Later, a written synopsis of the summary information for each FETP was shared with the RA to review for accuracy and completeness.

Findings

Evaluation Question 1: How are selected FETP components implemented across sites?

Basic characteristics of FETPs

Table 2 includes the basic characteristics of the programs participating in this evaluation. This is the only table in which the programs are identified and the programs are not presented in the same order later in this report. At the time of evaluation, the FETPs had been operating from three to 12 years and had produced from five to 111 graduates in one to 10 cohorts. With the exception of the Central America FETP, all are structured to have overlapping cohorts, with new fellows entering the program each year. Seven of the 10 programs are national in scope and largely include people from the host country only, although some included fellows from other countries in some cohorts. The three regional programs are based in one country in their region but provide training to people from other specified countries in their region; these programs cover from three to seven countries in each region. Six of the programs are affiliated with GDD Centers in the host country or region.

Table 2. Basic characteristics of FETPs

Program	Start date	Number of cohorts	Number of graduates	Scope of FETP	In MOH*	Fellows participate full time	Degree Awarded	Laboratory Track Offered
Central America‡	2000	6	66	Regional	n/a†		✓	
China	2001	10	111	National	✓	✓		
Central Asia§	2003	8	66	Regional	n/a†			✓
Kenya	2004	7	78	National	✓	✓	✓	✓
South Africa	2007	4	38	National		✓	✓	✓
Pakistan	2007	3	33	National	✓			
Nigeria	2008	2	25	National	✓	✓	✓	✓
Ethiopia	2009	2	33	National	✓	✓	✓	
South Caucasus¶	2009	2	26	Regional	n/a†			✓
Vietnam	2009	1	5	National	✓			

* Ministry of Health or equivalent

† Not applicable

‡ The Central America program includes Guatemala, El Salvador, Costa Rica, Honduras, Panamá, and Dominican Republic

§ The Central Asia program includes Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan

¶ The South Caucasus program includes Georgia, Armenia, and Azerbaijan

With one exception, the national FETPs are hosted by the country's MOH or another national health agency, usually within a unit or department engaged with infectious disease surveillance. The exception was hosted by a parastatal (i.e., quasi-governmental organization) that supported national laboratory surveillance. Because regional FETPs are established to serve more than one country, a regional FETP's relationship with its host country's MOH is different from the relationship between a national FETP and that country's MOH. Respectively, the three regional programs are hosted by a private university, the CDC country office, and the public health agency of one country in the region.

Five FETPs are affiliated with a university and award a master's degree on completion of specified requirements. Four of these programs are in African countries, and one is a regional program.

Half of the programs were Field Epidemiology and Laboratory Training Programs (FELTPs), meaning they provide a laboratory track for fellows who have a laboratory background. The laboratory track was not a focus of this evaluation.

Resident Advisors (RAs)

All FETPs had at least one full-time epidemiology RA at the time of the evaluation; one FETP also had a full-time laboratory RA, and two had people who served as RAs for specific areas (veterinary and chronic disease) less than full-time. Four programs had gone without an RA from time to time, ranging from a few months to more than two years. In some cases, the vacancies were filled with short-term assignments by CDC epidemiologists. Despite the gaps, all of the programs had an EIS- or FETP-trained RA in place for at least 75% of the program's lifespan. Three FETPs had RAs who had been with the FETP for less than a year at the time of the evaluation.

Eligibility and admissions criteria

All FETPs required that applicants have a university degree (bachelor's, medical, or other graduate degree); six FETPs required a medical or other graduate degree. Nine also required a minimum number of years of work experience, varying from one to five years. Seven required that applicants be employed by the government, usually the MOH or equivalent. Nine of the 10 programs required applicants to have completed an epidemiology course or have taken an examination in epidemiology. In addition, all FETPs required a personal statement or interview. Eight FETPs required nomination of applicants by the MOH or some other governmental ministry for at least some of the candidates.

As shown in Table 3, the number of applicants for the most recent cohorts ranged from 17 to 172 across programs. The acceptance rate ranged from 8% to 71%. Class size for the most recently admitted cohorts ranged from five to 40 fellows.

Table 3. Applicants accepted for most recent cohorts of FETPs

FETP	Number of Applications	Admissions	
		Number	Percentage
P8	135	40	30%
P3	45	32	71%
P6	32	19	59%
P4	172	18	10%
P1	n/a†	18	n/a†
P9	n/a†	18	n/a†
P10	110	13	12%
P2	22	7	32%
P7	17	7	41%
P5	60	5	8%
All FETPs (median)	53	18	31%

† Data not available.

Employment status of fellows

For five FETPs, the fellows left their previous employment and participated in the program full-time. In four of these programs, the fellows held positions in the MOH or other relevant government ministry prior to joining the FETP. While in the program, they were still employed by the MOH but assigned to the FETP. In the fifth program, not all fellows were government employees before joining the program. For the other five FETPs, the fellows remained in their positions (usually within the MOHs) and returned to their worksites and job responsibilities when they were not engaged in classroom training. We refer to these as part-time fellows. The part-time fellows in some programs were required to take leave from their position to complete the required activities. Fellows in all of the regional programs participated part-time.

Four of the programs with full time participation required the fellows to work for the MOH for a specified period of time following program completion. One of the regional programs with fellows who participated part-time required this for some countries in the region.

Classroom instruction and field work

The amount of classroom instruction provided by the FETPs ranged from nine to 28 weeks during the two-year training period, as shown in Figure 1. This did not include the time set aside for activities that are often part of university-affiliated programs (e.g., preparation for examinations, thesis defense). Although FETPs that grant university degrees tend to have more classroom time, this was not consistently the case. The FETP with the shortest classroom time was a university program that required applicants to have either completed previous field epidemiology training or demonstrate that they possess the required epidemiology skills before entrance.

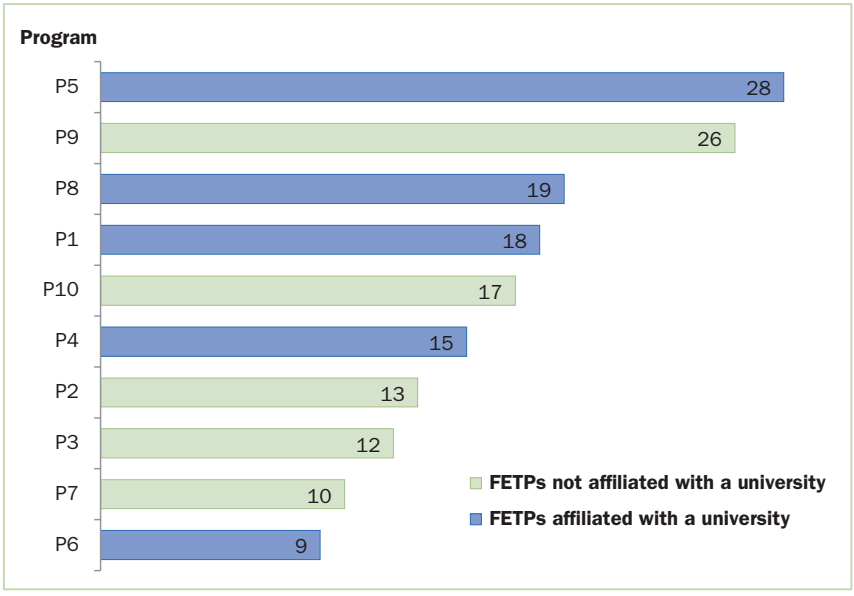

Figure 1. Number of weeks FETP fellows spend in the classroom

FETPs are intended to be on-the-job, competency-based training programs, with the expectation that the fellows will spend most of the two-year training period working in applied epidemiology. Fellows are expected to complete specified applied epidemiology activities. Fellows that participate full-time are typically assigned to specific national or subnational units within the MOH to carry out these activities. Fellows of the evaluated FETPs spent from 54 to 80 weeks in these field placements. Fellows of three FETPs usually moved to a second field assignment during their training. For instance, fellows of one FETP spent five months on a national assignment, followed by 14 months on a subnational assignment. Fellows of another FETP spent two months on a national assignment before returning to

their jobs, usually at the subnational level. For fellows who did not leave their positions during the program, the time in the field assignment could not be calculated as the fellows returned to their jobs and spent varying amounts of time engaged in FETP-specific activities. Their positions were generally in units working in surveillance and response but could also be disease-specific, such as HIV or TB, or units in the animal health sector.

FETP completion requirements

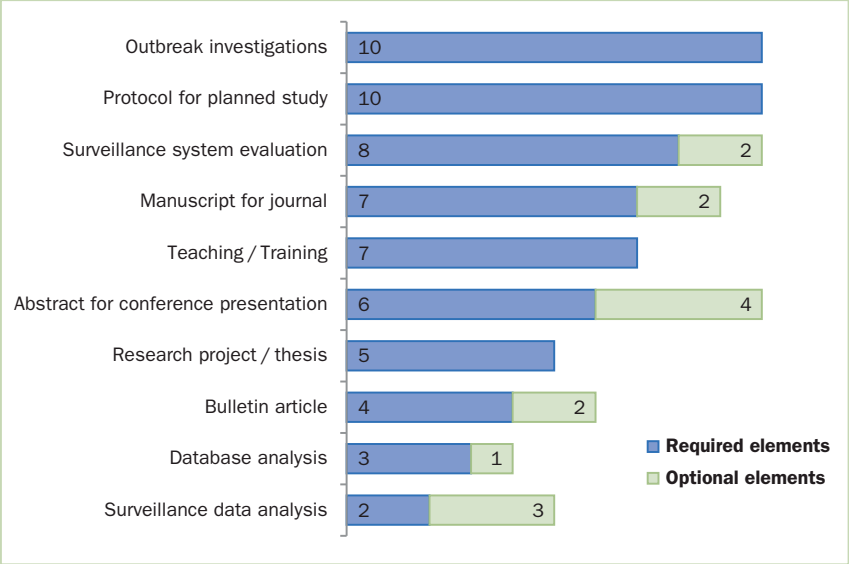

Figure 2. Number of FETPs that require fellows to complete specific work products

While there were commonalities in the completion requirements for each FETP, this aspect of the program varied across sites, as shown in Figure 2. All FETPs required that fellows complete at least one outbreak investigation; one FETP required four outbreak investigations, and eight required two. As seen in Figure 2, all FETPs required some surveillance activity, but these activities varied from one FETP to another. Eight of 10 programs required surveillance system evaluation while only two required analysis of surveillance data with three programs making this optional. All FETPs also required a protocol for a planned study, but only five required that the fellows conduct and complete the study. Of these five FETPs, four awarded academic degrees, and the planned study was used to meet the requirements for a thesis. One degree-granting FETP did not require a completed protocol-based study or thesis. All FETPs required fellows to produce some scientific communication for submission, usually an abstract for conference presentation, a bulletin article, or a manuscript for a journal. Six FETPs required more than one of these, and three required fellows to do all three. Fellows who completed FETP requirements and were generally considered to have finished the training are hereafter referred to as "graduates."

Despite the completion requirements listed by FETPs, the actual completion of all requirements varied widely across programs. In at least two FETPs, not all graduates had participated in an outbreak investigation, although they were all considered to have met the completion requirements. Fellows of many FETPs did not complete protocol-based projects even if they were required. The most common reasons given were lack of resources and delay in receiving protocol approval from local review boards. Actual activities accepted for program completion ranged from an analysis of surveillance data and evaluation with a report and presentation (in a program in which fellows participate part-time) to four completed outbreak investigations, a planned (protocol-based) investigation, a surveillance activity, and a manuscript or international presentation (in programs in which fellows participate full-time).

Fellows of FETPs with a university affiliation were more likely to experience delays in completion of requirements because of the need to meet university standards for a thesis. The fellows who participated part-time had difficulty

with timely completion of all listed requirements because they continued in their jobs where other obligations took priority, limiting time for field epidemiology opportunities. For two of the FETPs in which fellows participated part-time, a number of graduates finished a smaller set of activities than the listed requirements. At another, all graduates finished all requirements, but typically took at least three years to do so.

In summary, there was no single activity that fellows in all FETPs completed. However, most had participated in an outbreak investigation, conducted a surveillance evaluation or analysis of surveillance data, developed a protocol, and produced some form of scientific communication.

Role of country and CDC-supported Resident Advisor (RA) in program implementation and support

Degree of host country's ownership of the FETP

Countries support FETPs in a number of ways. Examination of the nature and extent of this support provides insights as to the status of the country's progress toward ownership and sustainability of FETP activities. To measure the degree of a country's ownership, the evaluation team took into account where it was physically and functionally located; whether the country had officially recognized the FETP in its system, as evidenced by a budget line item and/or designation on the organizational chart of the hosting institution; and the level and type of fiscal resources provided by the country. Elements of support that were examined by the evaluation are listed in Figure 4, which shows the number of programs that received full or partial support from the MOH for each element. Programs often have other sources of fiscal support for these program elements, and those are not shown in the figure below.

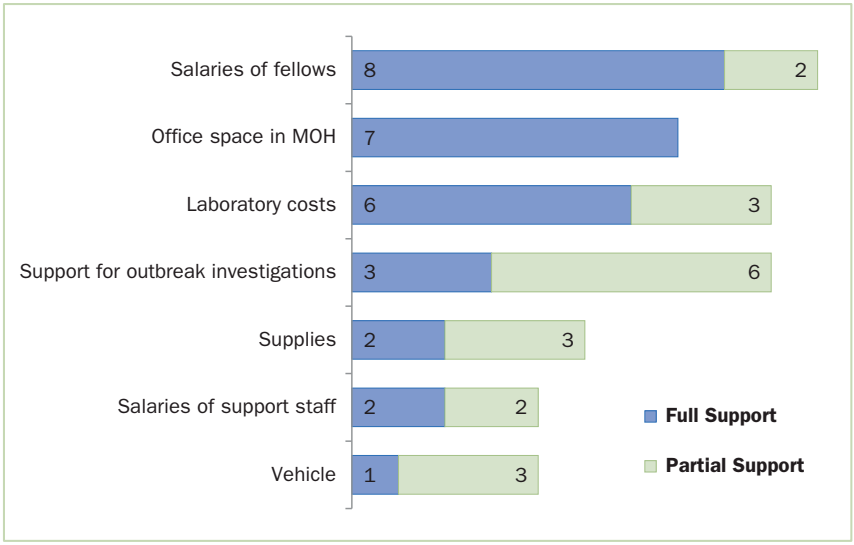

Figure 3.Number of FETPs that received full or partial MOH fiscal support for various program elements.

As shown in Figure 3, all FETPs received full or partial support for fellows' salaries from the MOH. In two programs, MOH support for salaries was coded as "partial" because not all fellows received compensation from the MOH. For most programs, the MOH provided office space for the programs and covered the laboratory costs associated with the fellows' work. Fiscal support from the MOH for other items was less consistent across programs. Of note, fewer than half of the programs received full support for outbreak investigations. In addition to the items presented in Figure 3, the presence of the program on the organizational chart of the MOH and position as a line item in the budget are meaningful indicators of the host country's ownership of the program. Only one FETP was both on the organizational chart of the MOH and represented as a line item in the host country's budget.

The following factors were used to create an index for the level of host country's ownership of the FETP by the host country: the physical location of the program, its presence as a line item in the budget or as a unit on the organizational chart, and the support provided for the specific elements presented in Figure 4. Location of the program within the MOH and funding of fellows and FETP staff were weighted most heavily. Possible scores ranged from 0 to 1, with 1 representing the greatest degree of host country ownership. See Annex B for more information regarding calculation of this and other single indicators or indices.

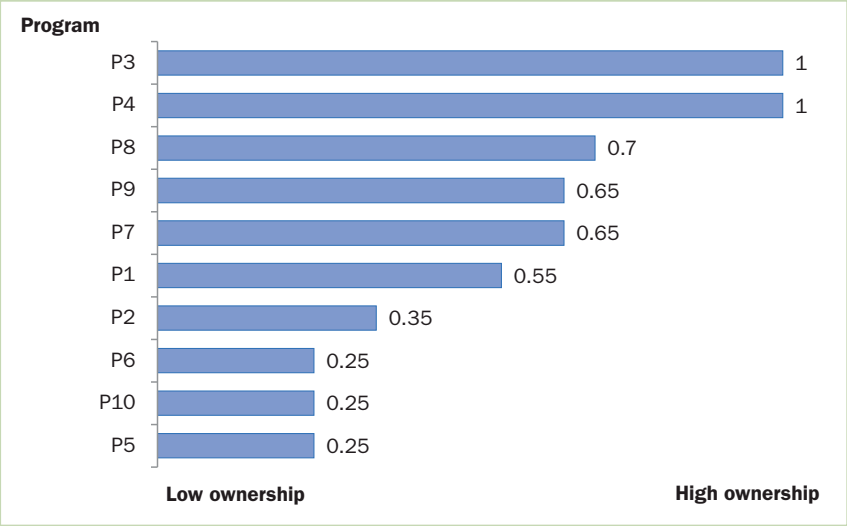

Figure 4: Scores for host country ownership of FETPs

The two programs with the highest level of country ownership were among the oldest national programs included in the evaluation. The four FETPs with the country ownership scores below 0.5 included the regional programs that tended not to be located within the host country's MOH because they serve multiple countries.

Access to public health data (e.g., surveillance data) is essential for the fellows to develop the necessary competencies in applied field epidemiology. We examined the level of access to routine surveillance data at the fellows' field sites, surveillance data at sites other than the location of the fellows' assignments and clinical or laboratory data needed to conduct outbreak investigations. We classified access as either regular (routine access provided to most fellows without special conditions) or conditional (access provided on a limited basis to some fellows or requiring special approval or permission). Fellows of two of the 10 FETPs had regular access to all types of data. At two others, access to all data types was conditional. Fellows at the remaining six FETPs had a mix of regular and conditional access to data. In some countries it was reported that, although the fellows may have had access to data, there were strict limitations on sharing data even within the country.

In general, the more long-standing programs had higher levels of access to data. Three of the four older (begun 2001–04) programs had more regular access compared to only two of the six newer (begun 2007–09) programs. Access to data was not greater at FETPs where fellows were participating part-time and work at their usual jobs when not taking classes. In addition, we found no consistent relationship between access to data and status as a national or regional program. The two programs with the most limited access faced different situations. One was a program where the fellows remained in their positions (i.e. participated part-time) and did not have regular access to data in other units. In the other program, the fellows were in a university-affiliated program and not consistently integrated into the field sites with regular data access.

Use of the FETPs by the Ministry of Health (MOH)

All FETPs are intended to provide service to the host country through the work of the fellows and the RA. This evaluation determined the types of FETP services requested by MOHs during the previous 12 months and the way the FETPs were used during outbreaks or emergencies. All FETPs were requested to work on specific disease outbreaks, some more than 20 times during the previous year. Three served regularly as the lead for outbreak investigations. The fellows of many FETPs were used to support outbreak investigations, but their role was limited (e.g., participating as a member of a larger team). All FETPs were asked to train non-FETP personnel (e.g., district surveillance officers). Nine were asked to support work on a surveillance system such as data analysis, system evaluation, or development of a surveillance system. Three FETPs were requested to develop guidelines related to a key public health issue for the national public health system (e.g., for foodborne outbreak investigations).

Although all FETPs provide services to their country's MOH or public health system, the scope of services varied. Types of service included outbreak investigations, surveillance, and teaching or training. To examine the use of the FETP by the MOH across sites, the evaluation team gave a certain value to each type of service to create a scoring index. In the score, the evaluation team weighted role in outbreak investigations heavily because this activity is intended to be a central function of FETPs. As a result, the three FETPs with the highest level of use by the MOH led outbreak investigations regularly. All three of these FETPs were national programs in which the fellows participated full-time. Two of those also had a university affiliation. Three of the four programs with the highest level of MOH use were long-standing FETPs. Scores for level of use of the FETPs by MOHs are shown in Figure 5.

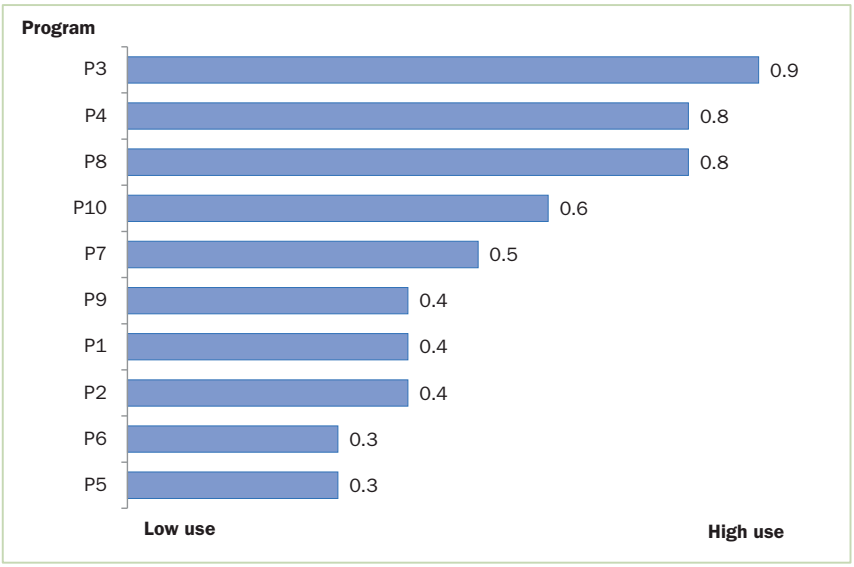

Figure 5: Scores for use of FETPs by MOHs

The three programs with the highest use by the MOH were the same FETPs with the highest country ownership. The two FETPs with the lowest use were also those with fewer elements of country ownership (Figure 6).

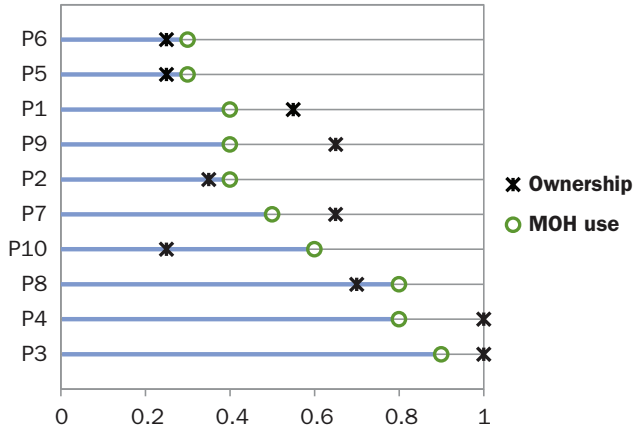

Figure 6. Dot plot of scores by program for country ownership and MOH use of program

Investment of host country in field supervision

To ensure that fellows achieve competency in field epidemiology, their supervisors and mentors should be individuals with expertise in field epidemiology. Over time it is expected that the fellows' technical supervision will be assumed by FETP graduates with the required competencies. We determined the number of technical supervisors for fellows in each FETP and the percentage of those who were graduates of the same FETP. Technical supervisors are those who provide guidance to the fellows on the scientific aspects of their fieldwork to assure use of appropriate epidemiologic methods and public health relevance and use. At three of the four oldest FETPs, most technical supervision (from 58%–94%) was provided by FETP graduates. At two regional FETPs, no graduates provided formal technical supervision. Among the remaining national programs, the proportion of technical supervisors who were graduates of the same FETP ranged from 8%–50%. The results for each program are shown in Table 4.

Table 4. Percentage of FETP technical supervisors who are FETP graduates

FETP	Total number of field supervisors	Field supervisors who are FETP graduates	
		Number	Percentage
P4	18	17	94%
P3	42	39	93%
P6	26	15	58%
P9	6	3	50%
P8	18	8	44%
P1	15	3	20%
P7	6	1	17%
P5	12	1	8%
P2	3	0	0%
P10	2	0	0%

Role of the Resident Advisor (RA) in FETPs

One of CDC's important investments in FETPs is placement of a trained field epidemiologist in the country as an RA. RAs can participate with the programs and the host countries in a number of ways. The evaluation team examined the technical qualifications and three major roles of the RAs. These roles are to 1) serve as the primary technical supervisor for the learning and field activities related to applied epidemiology; 2) support the FETP and MOH as an epidemiology expert; and 3) provide the country's MOH with a link to CDC's resources, including other subject matter experts.

Technical qualifications of the Resident Advisor (RA)

We determined the applied epidemiology training background of the RAs and their prior experience supervising epidemiologists and epidemiologists-in-training. One FETP had a RA for its laboratory track, and two FETPs had individuals functioning as part-time RAs, one for zoonotic diseases and the other for chronic diseases. Data on the part-time RAs were not included our calculations.

All epidemiology RAs were graduates of a field epidemiology training program, either the CDC's EIS or another FETP. At the time of the evaluation, seven FETPs had RAs who were EIS graduates and three were graduates of other FETPs. One program had a second EIS-trained epidemiology RA supporting the program for four years.

While all the epidemiology RAs had been trained in field epidemiology training programs or EIS, not all of them had experience supervising epidemiologists-in-training in EIS or other FETPs. Six FETPs had had a RA with at least two years of supervisory experience prior to beginning the program for more than 75% of the duration of the program. At the time of the evaluation, five FETPs had RAs with at least two years of EIS or FETP supervisory experience.

Engagement of the Resident Advisor (RAs) with fellows

We examined the role of the RA as technical supervisor of active fellows and a sample of recent graduates. At three FETPs, the RA provided direct technical supervision to most or all fellows. Two of those FETPs were relatively young (i.e., less than four years old) and the other was an older regional program. At one of the oldest FETPs, the RA's primary role was to supervise FETP graduates in the public health system who were doing the majority of the direct supervision of the fellows. At the remaining six FETPs, the RAs supervised some fellows or some of their activities, but supervision was shared with other country supervisors. In two of those six programs, the majority of the other supervisors were FETP graduates.

We asked graduates from the past two cohorts about the RA's supervision of their work during outbreak investigations and review of their fieldwork products, such as reports of investigations or abstracts for conferences. Most of the graduates we interviewed from six FETPs indicated the RA had either accompanied them or had near daily contact with them during outbreak investigations. Fewer than half the interviewed graduates from the other four FETPs indicated the same level of engagement. At least half of the graduates from nine FETPs indicated that they had exchanged more than two drafts of work products with the RAs during their training.

These findings indicate that qualified RAs are generally very engaged in providing technical supervision and mentoring for the fellows, though in a few programs where the supervision was largely shared with those without field epidemiology training there might be concerns about providing appropriate mentorship for the field epidemiology competencies.

Engagement of the Resident Advisor (RA) with the Ministry of Health (MOH)

In addition to assisting countries by training and mentoring FETP fellows, RAs may contribute to improved public health outcomes by providing direct service to the MOH. The evaluation team looked at how RAs at each FETP engaged with the MOH during the previous 12 months. All RAs consulted on public health issues with the MOH. The majority (seven of 10) provided assistance specifically related to an outbreak investigation or emergency response. Six of 10 participated in regular meetings with the MOH.

Resident Advisors (RAs) as pathway to service to country

Resident Advisors (RAs) also serve to link the MOH to CDC subject-matter expertise and resources. We examined how RAs connected their host countries with CDC during the previous 12 months. All the RAs had linked to CDC during the previous year for some support. The majority had connected specific subject-matter experts from CDC with public health activities in the host countries (nine of 10) and to laboratory assistance (seven of 10). Five of 10 RAs also secured non-FETP-related sources of CDC funding for their host country's public health activities or non-FETP training for the MOH.

Overall CDC Resident Advisor (RA) engagement

To capture all the elements we examined regarding RA roles and experiences, the evaluation team developed an RA engagement score that combined the technical qualifications of the RA, the length of time a qualified RA was available at an FETP during the entire life of the FETP, the fellow supervision activities of the RA, and engagement of the RA with the MOH and CDC. Therefore, our findings regarding the RA engagement reflect engagement and support during the life of the program and are not necessarily representative of the present RA engagement and support. Findings are shown in Figure 7. The four programs with RA engagement scores above 0.75 have had an experienced RA for the life of the program with no gaps in coverage, and the RAs had been highly involved in fellow supervision. The FETPs with engagement below 0.5 were those in which there were gaps in the presence of the RA and when the RA's role with the fellows was reported to be more limited.

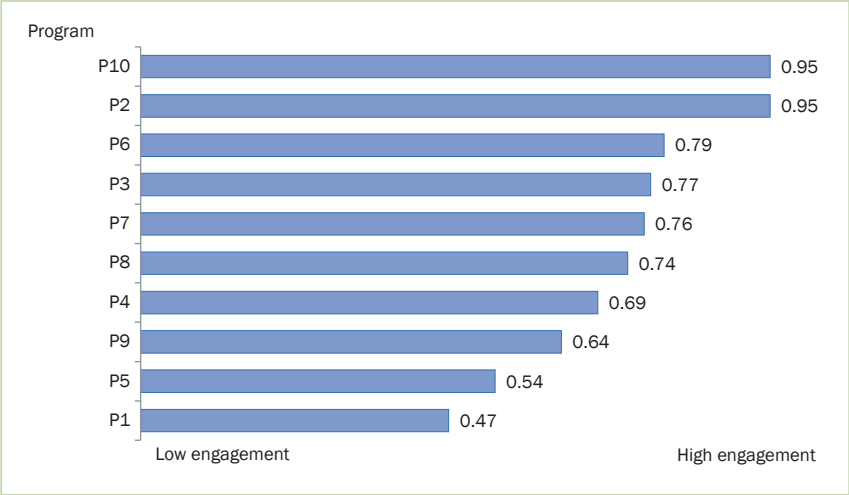

Figure 7. Scores for CDC RAs' engagement

RAs were providing support to the FETPs both as qualified and engaged technical supervisors to the fellows and in supporting the MOH through direct technical assistance and accessing other CDC resources.

Evaluation questions 2&3: What is the status of progress toward intended outcomes and what is the relationship between implementing FETP components and the status of progress toward intended outcomes?

Proximal outcomes

Based on the critical outcomes for well-functioning FETPs, proximal outcomes were identified for examination in this evaluation (See Table 1): the employment and activities of FETP graduates, the involvement of fellows in outbreak investigations, the engagement of fellows and graduates in surveillance activities or systems, the use of pathway to decision makers, and the quality of abstracts submitted by fellows to the 6th Global TEPHINET conference.

Are fellows employed in positions related to applied epidemiology after they complete FETP training?

FETPs are designed to build epidemiology capacity for national public health systems. Ideally, graduates of FETPs work in applied epidemiology or related positions within the public health system of their country or region.

As seen in Table 5, we interviewed between five and 19 graduates of each FETP. Most of those interviewed held positions related to applied epidemiology, and most were employed with a government's public health system at either a national or subnational (i.e., provincial, district) level. However, at least one-third of recent graduates from two programs were employed outside the government public health sector—in the private sector or other public health agencies such as CDC or WHO. These were both university-affiliated programs. It is possible that a clear career path for graduates within the MOH had not yet been developed.

Table 5: Employment of graduates by sector

FETP	Number of graduates interviewed	Number employed by MOH at national level	Number employed by MOH at subnational level	Number employed elsewhere (private sector, NGO, CDC)	Percentage employed by MOH at all levels
P3	8	1	7	0	100%
P4	12	5	6	1	92%
P9	11	1	9	1	91%
P10	19	10	7	2	90%
P1	10†	1	8	0	90%
P6	17	13	2	2	88%
P2	14	12	0	2	86%
P8	12	1	7	4	67%
P7	5	1	2	2	60%
P5	12	3	4	5	58%

†One graduate from this FETP had not been placed in a position at the time of the interview.

Fellows who maintained their prior employment were less likely to have moved to new positions after their training (median percentage of part-time graduates with new positions was 46% across FETPs; range 45%–67%) compared with those who completed full-time FETPs (median 83%; range 50%–100%). Not surprisingly, they were likely to continue to be in MOH positions, with over 80% of recent graduates from FETPs with part-time participation remaining in MOH positions in four of the five such programs.

More than half of the FETP graduates we interviewed were working in applied epidemiology. Most of those not working in applied epidemiology were engaged in administrative work, clinical practice, research, academics, or in laboratory settings. In some programs, the new graduates were promoted, which may have shifted their job responsibilities to focus more on supervision rather than applied epidemiology. Three of the four programs with less than

70% of graduates working in applied epidemiology had graduates from laboratory or veterinary tracks. However, in only one of those programs did the interviewed graduates cite working in a laboratory as the reason they were not working in applied epidemiology positions. Figure 8 shows the proportion of graduates working in applied epidemiology.

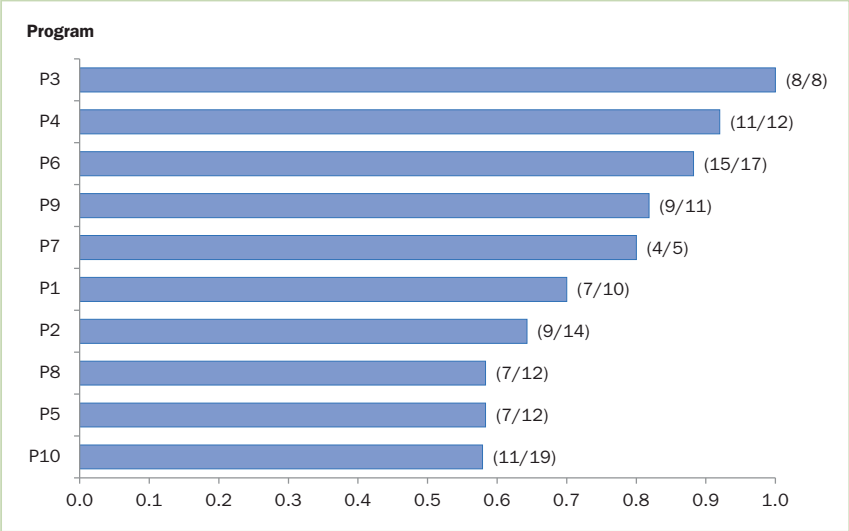

Figure 8. Proportion of FETP graduates working in applied epidemiology

Are FETPs engaged in the investigation of outbreaks in the host countries or regions?

FETPs are intended to improve detection, investigation, and response to public health emergencies or disease outbreaks in their host countries or regions. Having the FETP engaged in priority health issues is a necessary step in improving outbreak response. Using the ProMED website reports and other outbreak events of concern as identified in the Global Disease Detection Operations Center Daily Report, we identified between six and 11 recent outbreaks of priority diseases that occurred in FETP countries. Each FETP reported with which of these outbreak investigations it had been involved. Nine of the 10 programs were involved in more than 50% of the identified outbreaks.

As presented in Table 6, all but one of the FETPs were involved in the investigation of most of the outbreaks in their countries. However, the level of involvement and the variety of events investigated varied widely among the programs. Generally, engagement in outbreak investigations was strong across the programs. However, in some countries where there are political challenges to reporting outbreaks, the programs were sometimes limited in being able to engage in the investigations.

Table 6. Outbreak investigations with FETP involvement

Program	Number of priority outbreaks selected from GDD and ProMED databases	Outbreak investigations with FETP participation	
		Number	Percentage
P1	9	7	78%
P2	6	5	83%
P3	10	7	70%
P4	10	8	80%
P5	7	5	71%
P6	9	8	89%
P7	8	5	63%
P8	10	9	90%
P9	10	6	60%
P10	11	5	45%

How are fellows and graduates engaged in surveillance in the host countries or regions?

FETP activities should contribute to improvements in surveillance in the host country or region. As such, fellows need to undertake mentored surveillance activities, and graduates should be working in the surveillance system. To determine the nature and extent of fellows' engagement in surveillance, we examined their involvement in routine surveillance data analysis and reporting and long-term surveillance data analysis and whether they conducted a surveillance system evaluation. All FETPs had at least some fellows working in each of those areas. However, when we looked at the activities that most or all of the fellows participated in, we found that the FETPs varied considerably: most or all fellows in four FETPs engaged in routine analysis and reporting of surveillance data; most or all fellows in eight programs conducted a surveillance system evaluation; and fellows in five conducted a long-term analysis of surveillance data. In four programs, a surveillance evaluation was the only reported mentored surveillance activity conducted by most or all of the fellows. In three of these programs, fellows participated in the program part-time and some of them did work with surveillance data in their jobs, but this activity was generally not reviewed by the programs. Not surprisingly, FETPs with high access to data tended to have higher engagement in surveillance activities. Three of the four programs in which the fellows participated in at least routine data analysis and reporting and long term surveillance data analysis had a high level of access to data.

Ideally, FETP fellows work in mentored surveillance activities during the program in order to improve their competency in surveillance work once they have completed. The percentage of interviewed graduates working in surveillance ranged from 41% to 100%, as shown in Figure 9.

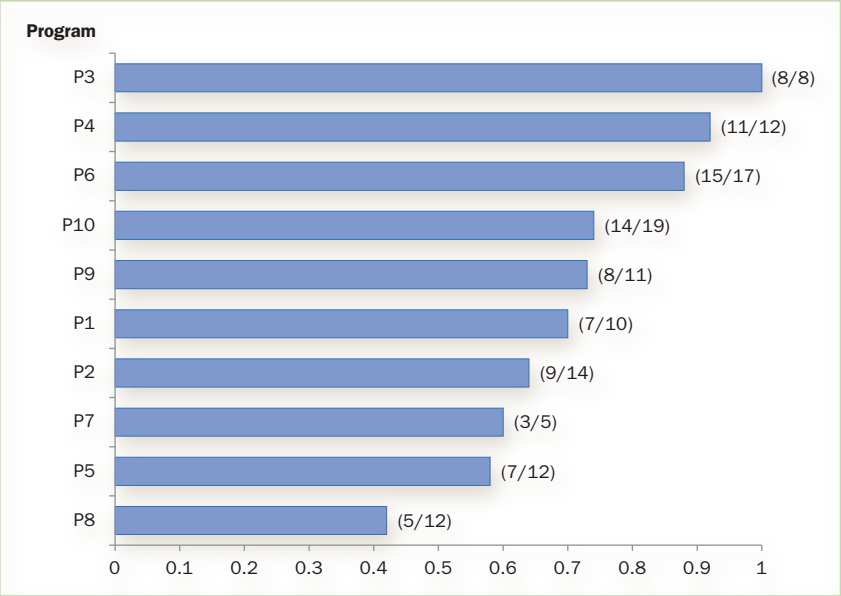

Figure 9. Proportion of FETP graduates working in surveillance

We found no relationship between fellows' engagement in surveillance activities during their training and the proportion working in surveillance after graduation. In general, FETP graduates were involved in surveillance in their countries, but they may not have all completed the full complement of mentored surveillance activities during the program.

How is the work of fellows presented to decision makers in the host country?

FETPs aim to improve their countries' use of data when public health decisions are made. To do so, FETPs must make their data accessible to decision makers. We looked at the ways information based on the work done by the fellows was shared with decision makers during the previous 12 months. In general, FETPs have opportunities to provide information to decision makers. Eight of 10 FETPs had access to decision makers (i.e., the FETP director, RA, or others were able to meet with decision makers as needed) to provide information based on the FETP's work. Eight FETPs also have regular meetings with decision makers in the MOH and seven published in public health bulletins at least once during the previous year.

We calculated the levels and frequency of access to decision makers. Ready access to decision makers was weighted most heavily. All FETPs had opportunities to present the work of the fellows, but the ease and frequency varied across programs. Figure 10 shows the variability in the levels of access among the FETPs. The three FETPs with scores of 0.9 and 1.0 for access to decision makers are full-time programs and are among those with the highest level of country ownership and use of the FETP by the MOH. The two programs with scores of 0.4 had the lowest aggregate RA engagement as well as limited use of the program by the MOH. The level of access was not higher in older programs (Figure 11). Level of access to decision makers tended to track with the use of the program by the MOH (Figure 12).

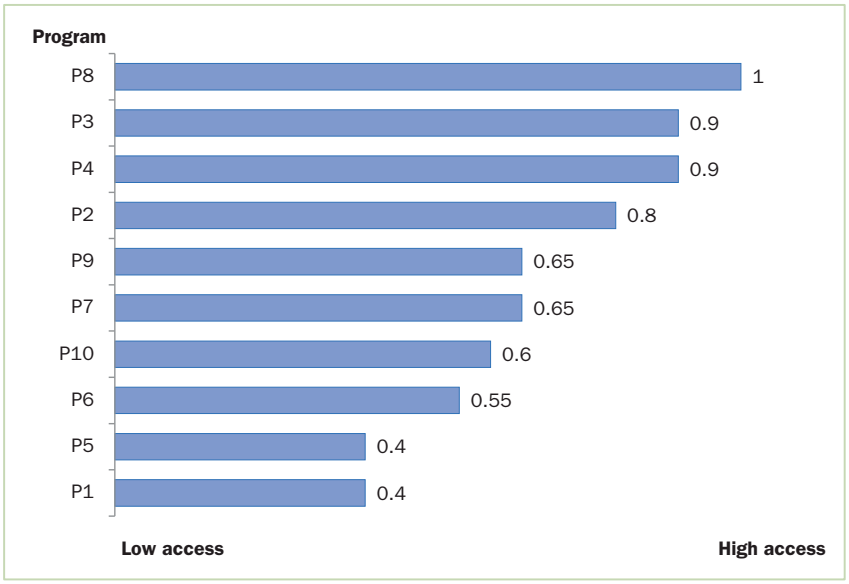

Figure 10: Scores for fellows' access to decision makers

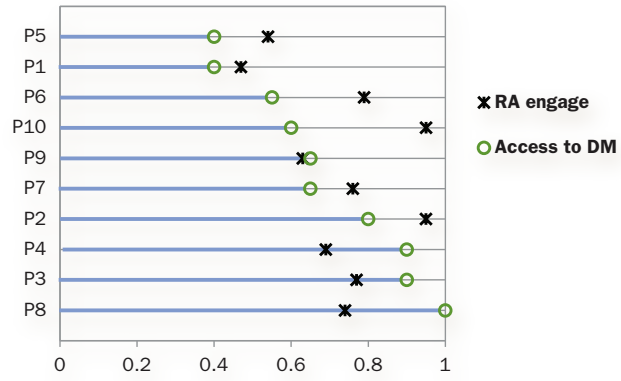

Figure 11. Dot plot of scores for RA engagement and fellow's access to decision makers (DM) by program

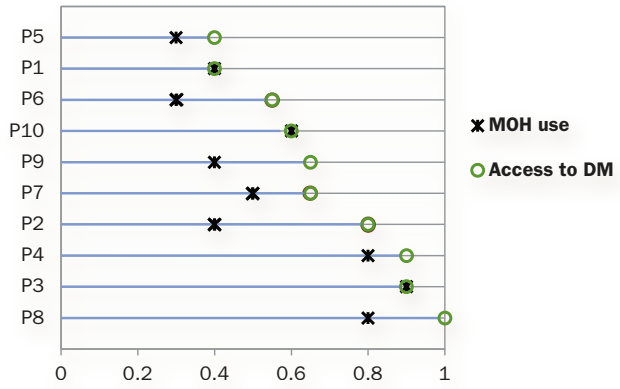

Figure 12. Dot plot of scores for MOH use of the program and fellow's' access to decision makers by program

What is the quality of abstracts submitted for presentation by fellows?

We conducted a blinded, systematic, consensus review of abstracts submitted to the 6th Global TEPHINET Conference (an FETP-specific conference). The reviewers were asked to evaluate each abstract, then to evaluate the combined abstracts, and to produce a summary assessment of the overall abstract quality for each FETP. The reviewers assessed scientific quality, public health value, and clarity using 7 criteria scored from 0 to 4 with total point scale ranging from 0 to 28.

Abstracts on outbreaks investigations (n=19) and surveillance evaluations (n=13) made up 65% of the abstracts reviewed. Abstracts on outbreaks generally scored well (range 8–23, median 18, interquartile range 15–20). Abstracts on surveillance evaluation generally scored the lowest (range 6–19, median 12, interquartile range 10–14), and only two scored >14. Figure 13 shows the number of programs with each level of abstract quality; five programs (P2, P3, P4, P7, P10) fell in the good to very good range, while five programs (P1, P5, P6, P8, P9) were fair or poor. The means, medians, and ranges of abstract quality scores for each FETP are presented in Annex C.

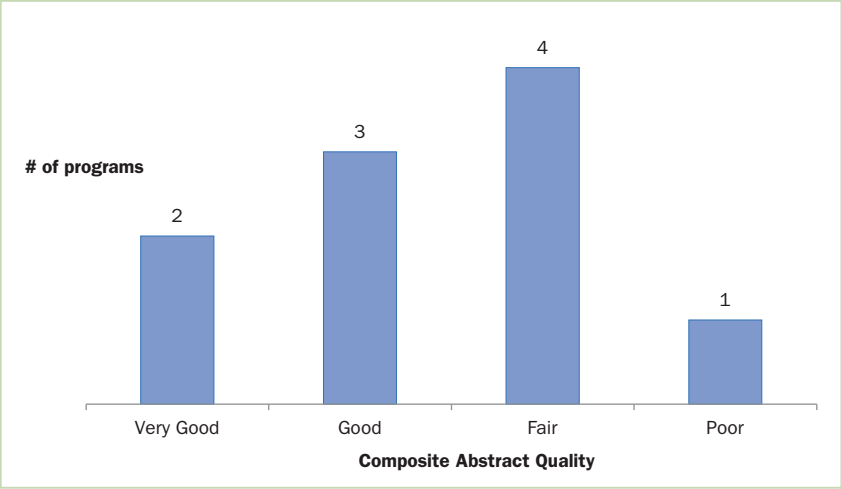

Figure 13: Quality of abstracts submitted by fellows to the 6th Global TEPHINET Conference

Programs with higher RA engagement scores received higher abstract quality ratings. Four of the five FETPs with aggregate abstract ratings of good or very good had RA engagement scores above 0.75. These four programs had a single RA for the life of the program who was providing direct technical supervision for the majority of the fellows or closely supervising the program graduates who had been trained as supervisors. English was not the first language of either the highest-ranked or lowest-ranked program; this did not seem to affect abstract quality. None of these four programs were affiliated with a university. The number of weeks in the classroom was generally less in the programs with abstract quality rated as good or very good compared to those rated fair or poor, with all five programs rated good or very good having less than 18 weeks in the classroom (median 13; range 10–17) and four out of five of the other programs having 18 weeks or more (median 19; range 9–28).

Limitations

The indicators do not address the contextual factors that shaped these programs over time (e.g., economic, historical, political, social factors). Also, the indicators do not capture the engagement and support provided by a variety of partners in the host country or region. This study aimed to document key features of implementation and outcomes for comparison across sites; as such, some of the richness of any single program is not fully understood or presented here for discussion. For example, data collected from the regional programs may not present the full range of activities in any single country sending participants to this program.

Not all data that we intended to collect were collected as planned. For example, some information was collected via telephone interviews instead of face-to-face due to restrictions on travel to the country. For many of the programs, we did not have access to all of the graduates to conduct the interviews as intended; thus, samples may not be fully representative of the entire graduate population. Given the number of FETPs in Africa, many sites in this region met the criteria for inclusion in the study; programs in Africa are over-represented among participating sites.

Finally, many of the indicators tracked together or were clearly related to each other (e.g., four of the five full-time programs were also based in a university and located in Africa; all three regional programs were part-time). However, it is hard to interpret precisely which operational or structural factors are influencing which outcomes. Moreover, the host country's ownership of the program may include many and various components that were not examined here. As a result of these limitations, conclusions regarding these programs must be drawn with caution.

Conclusions

This evaluation documented the institutional and operational status of FETPs and progress toward proximal outcomes. While there were consistencies in terms of program structure and processes across all 10 programs, a notable finding was the diversity of approaches to FETP implementation. Importantly, the true degree of diversity in implementation of these programs has not been well described in the past. These programs are often described as modeled on the U.S. CDC's EIS program. However, only one of 10 programs were national in scope, with full-time participation of fellows, non-degree granting, and located within the national public health agency, which are attributes of the EIS Program.

In general, the FETPs demonstrated success in achieving the identified early or proximal outcomes: the majority of all FETP graduates held positions in applied epidemiology within their countries' public health systems; fellows were provided opportunities to build competency in surveillance and work with the host country's surveillance systems; all FETPs were actively engaged in outbreaks of priority diseases; and most of the programs demonstrated that the work of their fellows reached decision makers within the MOH. In addition, many of the programs identified specific actions or activities, guidelines, or policies that were the direct result of the work of fellows reaching the appropriate persons.

Variability in implementation

This evaluation is the first to examine whether and how the considerable variation in program structure and implementation contributes to variation in achievement of early or proximal outcomes and other program elements. A fundamental aspect of FETPs is their relationship with the MOH or other government public health institutions. For the 10 programs included in this evaluation, the programs located in or with more investment by the MOH demonstrated more use of the program by the MOH and more opportunity to present epidemiologic data or findings to decision makers in the host country. These findings would suggest the ownership of an FETP and the primary location and affiliation of its fellows within the relevant epidemiology unit of the MOH an important structural or institutional attributes of successful FETPs.

While affiliation of an FETP to a university to earn a degree is not an aspect of the U.S. CDC EIS Program, a number of FETPs provide it to meet fellows' career advancement needs within the national public health system. This could make participation in the program a more attractive option to stronger candidates. This evaluation did not demonstrate that degree-granting programs were associated with higher quality work, at least by the review of the quality of abstracts submitted by fellows. Nor do the data indicate higher proportions of fellows participating in degree-granting programs remain within the MOH after completion of the program. This does not necessarily imply that FETP programs should not affiliate with universities or give degrees. However, the added complexity and cost of implementing a program across two different types of institutions (i.e., MOH and a university) does suggest that the actual challenges and benefits of dual affiliation should be carefully examined in each country.

FETPs are often described as full-time programs, but half of the FETPs in the evaluation have fellows participating part-time. The five programs that had fellows who participated part-time while continuing their employment tended to have difficulty assuring timely completion of all the program requirements. Because three of the part-time programs were also regional programs, it is difficult to determine the influence of part-time participation versus other characteristics of regional programs. Nonetheless, the prevalence of part-time programs suggests that these are an important program approach for which guidance may be needed. In the past, most stakeholders assumed participation in FETPs was predominantly full-time. As such, materials specific to part-time programs have not been developed previously.

Competency-based training

FETPs are intended to be competency-based training programs focused on learning by doing and mentorship. This evaluation did not examine to what degree the graduates of these programs attained competency in the expected areas of practice (e.g., outbreak investigation, surveillance, scientific communication), but several indicators provide information relevant to development of necessary competencies. The amount of time available for applied work in the field varied considerably because some fellows were only participating in the program part-time and classroom time varied from nine to 28 weeks. In addition, despite the similarity of completion requirements across programs, the types of mentored fieldwork completed varied substantially. In addition, FETPs varied greatly in the type of applied or fieldwork required. For example, FETPs varied in the number of outbreak investigations each fellow must complete (ranging from one to four); this results in quite different levels of outbreak experience and related competencies among graduates. Some FETPs allowed graduation without any outbreak investigation experience. Further, some FETPs did not require the fellows to conduct analysis of surveillance data and reporting as a mentored activity, despite requiring this competency for completion of the program. Insufficient time or opportunities dedicated to mentored or supervised fieldwork has implications for achievement of the desired competencies.

Perhaps the most fundamental element of both EIS and FETPs is mentored public health work to collect, analyze, and interpret epidemiologic data. The expectation is that the activities of fellows will be mentored and supervised by a highly skilled field epidemiologist. This evaluation is the first report of the variety of ways that RAs operate within the FETPs and the host countries. All10 programs included in this study had CDC-supported RAs trained in either EIS or another FETP. All RAs provided technical guidance to the fellows, but the type and level of this support varied across FETPs. Despite the presence of the RA, in a number of programs many fellows were not directly supervised by the RA or FETP graduates for much of their applied field work. This evaluation only documented the qualifications and experience of RAs, not all persons supervising the fellows, but quality of supervision was widely mentioned by programs as a gap.

Sustainability

While this evaluation did not explicitly examine program sustainability, a number of the indicators provided information about elements that would be important to sustain these programs over time. FETPs are intended to be owned and operated by MOHs in the same or similar ways that EIS functions as a part of the U.S. CDC. However, FETPs usually start with funding and technical support from external donors or partners. This evaluation looked at programs that are still supported by CDC but the expectation is that external resources (human and fiscal) will be replaced by support from the host country over time. Country support for the program was evaluated using indicators of material and financial resources provided by the host country, as well as how the MOH and other institutions used the fellows. Countries with the highest index of program ownership provided a wide range of supports and relied on the FETP for important public health work. The evaluation revealed that the selected indicators for country contribution tracked together (i.e., countries that provided more resources for the FETP also used the program more for public health work). The two older national programs with these characteristics also had a high proportion of program graduates employed as supervisors in the MOH. These aspects of planning and implementation of the program are important markers of the host country's engagement and sustainability of the FETP.

The evaluation included three regional programs. These programs demonstrated that they were able to train epidemiologists and conduct important epidemiologic and capacity-building work within their regions. Fellows participated in all of the regional programs part-time, but the regional programs varied in other aspects of implementation (e.g., host location, relationships with countries in the region, program completion requirements, modes of supervision). The regional programs had lower levels of ownership and use by the MOH, suggesting that their mandate as regional, rather than national, programs may limit the engagement and support by national governments . As external resources diminish, this could have important implications for the sustainability of regional programs.

Progress toward proximal outcomes

In general, the programs demonstrated success in achieving the intended proximal outcomes: the majority (over 70%) of graduates worked in applied epidemiology positions within their countries' public health systems; participants completed hands-on work with the host country's surveillance systems; FETPs were engaged in response to outbreaks of priority diseases in all 10 sites; and most of the programs demonstrated that the work of their fellows reached decision makers within the MOH. In addition, many of the sites identified specific actions or activities (e.g., development of guidelines or policies) that were the direct result of the work of fellows.

Recommendations

This sample of CDC-supported FETPs demonstrated considerable variation in program implementation that had not been previously documented. Of the 10 programs that participated in the evaluation, five were affiliated with a university and five trained fellows part-time. The amount of time available for applied work in the field and the mentored field-work completed varied substantially across the 10 programs. Each of these items is an important difference from the design of the CDC EIS Program that could influence progress toward the intended outcomes of FETPs. While any human resource development activity such as FETP must be adapted to the context and needs of the host country, as CDC works to develop and support FETPs, it will be essential to understand and document the aspects of structure and implementation of FETPs that are critical to implementation of the program and achievement of intended outcomes. This evaluation is an important step in doing that, and CDC and TEPHINET should continue to monitor and track the core elements of implementation and structure.

While the majority of programs have expectations and mentoring systems to support appropriate field activities and development of the core competencies for graduates, the variability of program structure and implementation raises a number of potential threats to consistent achievement of the desired competencies. These include part-time participation, time allotted for field activities, the type of mentored field activities expected and completed, and the technical qualifications and practice of the technical supervisors.

1. CDC, TEPHINET, and the organizations that host FETPs must clearly articulate the core components of the program, how the program is to be implemented, and assure these processes are linked to the intended outcomes logically (i.e., based on the best available evidence and practice wisdom relevant to FETPs). Specific recommendations for action to meet this aim include the following:
   - » FETPs are intended to be competency-based programs and TEPHINET and CDC have articulated a number of expected competencies, however, each program needs to assure the desired competencies in that program are articulated explicitly for participants and partners. Program completion requirements must be matched to these competencies and all programs should track the completion and quality of these requirements for all participants.
   - » All participants should be provided appropriate opportunities for work in the field (i.e., number of opportunities, type of work, and duration) and receive qualified supervision and mentorship during this work.
   - » Given the prevalence of programs with part-time participation of fellows, CDC, TEPHINET, and representatives of the organizations that host these programs should determine if expectations for the outcomes of these programs should be adjusted (i.e., are different from those of programs with full-time participation of fellows). Additionally, the materials and tools typically used in implementation of FETPs were created with the assumption of full-time participation of fellows; the appropriateness of these items should be assessed.

This evaluation documented the ways that the national MOHs or other public health agencies participate in supporting and using the FETP. The evaluation supported the premise that the level of MOH engagement is important for improved program functioning and may be important for sustainability. This information has not been collected systematically in the past, but this suggests that some of these elements should continue to be monitored and tracked during program development. Particular attention should be paid to MOH ownership and engagement in programs that are developed to serve multiple countries in a region. Similarly, clear MOH ownership and engagement, and the primacy of the time and experience in the field, needs to be assured with a clear and limited role for a university if a degree is considered critical.

2. CDC, TEPHINET, or the host organization should continue to collect data on some of the indicators used in this evaluation to document the participation in FETPs (national and regional) by MOHs and other authorities.
3. Critical consideration of need for and role for university degree in program development.

RAs are an important aspect of CDC's engagement with FETP development and this evaluation documented that they were providing support to the FETPs both as qualified and engaged technical supervisors to the fellow and in supporting the MOH through direct technical assistance and accessing other CDC resources. However, the variation in roles played by RAs would suggest that CDC needs to provide more clear guidance for RA performance expectations. In particular, more work is needed to assure that RAs and programs meet the expectations of developing graduates to provide high quality supervision to fellows in the future.

4. CDC and partner organizations must develop concise expectations for performance in these positions. In particular, more work is needed to assure that RAs and the host organization provide the highest quality mentorship and supervision to fellows now and in the future.
5. Historically, the monitoring and evaluation of FETPs has been sporadic and not consistent across sites. Moreover, CDC and host organizations have not been documenting progress toward intended outcomes systematically. CDC should improve information sharing with the programs it supports to assure better understanding of program implementation challenges around the core expectations in order to more effectively provide the required technical and programmatic support.
6. All FETPs should assure adequate attention to monitoring and evaluation and use these data to inform improvements to the program on a regular basis. In addition, TEPHINET should consider the most useful indicators from this study for use in the planned accreditation process.

FETPs are designed to meet the conditions and needs of the countries and regions where they are located. For CDC-supported FETPs, it is important to clearly understand how this variation is related to implementation of the program, progress toward the intended outcomes, and the path to sustainability of the program. In general, the sites demonstrated progress towards important public health outcomes. And, despite substantial variation in design and implementation of the 10 programs, each is considered an important, respected capacity development activity in their countries and regions; these programs are valued by stakeholders. These strengths provide a sound starting point for improvements in the quality of the FETPs in these countries and regions.

Dissemination and Use of Findings

What are the products of the evaluation and how will the information be used?

As presented in Table 7, the products of the evaluation serve various users and uses. The primary intended users include CDC, TEPHINET, MOHs, and partner organizations that contribute to these programs. However, this report should contribute to a wider dialogue regarding the evaluation of these programs globally.

Table 7. Products of the Evaluation with Intended Users and Uses

Product	Intended Users	Intended Uses
Final evaluation report	Organizations that host FETPs (e.g., MOHs, universities), donor and partner organizations, CDC, TEPHINET, and the public	• Inform planning and implementation of country or regional programs • Identify opportunities for ongoing development of these programs (e.g., shared materials, refinements to curriculum) • Document and explain use of resources dedicated to these programs • Provide a method and indicators for the evaluation of programs in the future
Program-specific reports of data released to individual sites (i.e., country or regional programs)	Organizations that host FETPs (e.g., MOHs, universities), CDC, and TEPHINET	• Identify opportunities for improvements in individual sites (e.g., design of the program, specific components of implementation) • Determine priorities for CDC or TEPHINET support to country or regional programs (e.g., technical assistance)

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Annex A. Annotated Timeline

Design and Implementation of Multisite Evaluation of Field Epidemiology Training Programs

June 2010	Met for technical consultation on measuring the quality of Field Epidemiology Training Programs (FETP) to inform design and development of a multisite evaluation. Participants were representatives of the FETPs in Brazil, China, Costa Rica, Egypt, Pakistan, Saudi Arabia, Tanzania, and Thailand; the Training Programs in Epidemiology and Public Health Interventions Network (TEPHINET); the African Field Epidemiology Network (AFENET); the Southeast Asia Field Epidemiology and Technology Network (SAFETYNET); the World Health Organization (WHO); and the Centers for Disease Control and Prevention (CDC) in Atlanta, Georgia, U.S.A.
June–July 2011	Completed a systematic review of related measurement activities (published and unpublished) to find existing metrics and sources of data, and ensure no duplication of effort among key partners.
August 2011	Consulted with recognized experts in monitoring and evaluation to inform planning and implementation of the study, including a process to engage stakeholders in developing indicators and data collection methods.
August 2011	Established an advisory panel of key stakeholders from TEPHINET and from CDC's Center for Global Health; Office of Surveillance, Epidemiology and Laboratory Services); National Center for Chronic Disease Prevention and Health Promotion.
September 2011	Consulted on design of the study with Directors of FETPs worldwide at a meeting sponsored by TEPHINET and WHO.
October–December 2011	Consulted on design and implementation of the evaluation with stakeholders, including representatives of partner organizations, MOHs, and RAs at meetings sponsored by TEPHINET in the Eastern Mediterranean Region, Southeast Asia and Western Pacific Regions, African Region, and the Americas Region.
January–May 2012	Prepared operational definitions for 20 indicators, data collection methods, and sources. Identified preliminary criteria for selecting sites.
April 2012	Consulted on design and implementation of the evaluation with RAs at the 61st Annual Epidemic Intelligence Service (EIS) Conference sponsored by CDC.
June–July 2012	Pilot tested indicators and data collection methods in the FETPs.
August 2012	Reviewed data collected via pilot tests, including assessing strengths and weaknesses of implementation. Revised indicators and methods to ensure the quality and utility of information collected.
September–October 2012	Completed data collection at six additional sites (Central America, Kenya, Nigeria, Pakistan, South Africa, and Vietnam).
October 2012	Completed data cleaning and validation with participating FETPs. Prepared preliminary analysis of data for presentation to stakeholders at the 7th Global TEPHINET Conference
November 2012	Met with stakeholders at the 7th Global TEPHINET Conference to interpret data, discuss key findings, and identify opportunities for use of information.

Annex B. Calculation of Indicator Weights

Calculation of Indicator Weights for Multisite Evaluation of Field Epidemiology Training Programs (FETPs), 2012–2013

Table 1A. Country ownership of FETPs: Multisite Evaluation of FETPs, June 2012–February 2013

Indicator	Value
Program in MOH	0.3
Line item in budget or present in MOH organogram	0.15
All salaries for fellows paid by MOH	0.25/0.15 if some salaries paid
Salaries of most professional support staff paid by MOH	0.2
Office space provided by MOH	0.1

Table 2A. Use of the Field Epidemiology Training Program (FETP) by the Ministry of Health (MOH): Multisite Evaluation of FETPs, June 2012–February 2013

Indicator	Value
FETP regularly serves as lead on outbreak investigations[§]	0.4
FETP participation is requested during specific outbreaks	0.1
Surveillance development or evaluation	0.1
Requests for data analysis	0.1
Development of guidelines	0.2
Participation in national surveys	0.1

MOH: Ministry of Health or equivalent

Table 4A. CDC Resident Advisor' (RAs') Engagement with Field Epidemiology Training Programs (FETPs): Multisite Evaluation of FETPs, June 2012–February 2013

Domain	Indicator	Value	Relative Weight of Domain
RA consultation with MOH	Technical consultation	0.3	0.1
	Recurrent or standing meetings	0.3	
	Outbreak or emergency response	0.3	
	Non-FETP training	0.1	
RA as pathway to service	Consultation with subject matter experts	0.3	0.1
	Opportunities for other training	0.2	
	Lab-related services or support	0.3	
	Sources of fiscal support	0.2	
RA coverage and technical qualifications	No gaps in RA coverage greater than six months	0.2	.35
	RA coverage by EIS or FETP graduate more than 75% of lifetime of program	0.4	
	RA coverage by person with at least two years EIS/FETP supervisory experience more than 75% of lifetime of program	0.4	
RA technical supervision—current	Majority of supervision is by RA or by RA-supervised program graduates (with specific mentoring training)§	1.0	0.25
	Some supervision by RA and graduates§	0.5	
RA technical supervision—past	Accompanied or near daily contact during outbreak investigations	0.5	0.2
	Exchanged more than two drafts of work products	0.5	

§ For calculation of the RA technical supervision, FETPs were categorized as either having the majority of supervision by the RA or FETP graduates OR some supervision by RA and graduates (mutually exclusive).

MOH: Ministry of Health or equivalent

Outcome Indicators

Table 5A. Access to Decision Makers by Fellows of Field Epidemiology Training Programs (FETPs): Multisite Evaluation of FETPs, June 2012–February 2013

Indicator	Value
Ready access to decision makers	0.4
Articles published in bulletins [>10 = 0.25, 1–9 = 0.15]	0.25
Regular meetings	0.25
Conferences for decision makers	0.1

Annex C. Quality of Abstracts Aggregate Data

Table 6A. Quality of Abstracts Submitted by Fellows to the 6th Global TEPHINET Conference: Multisite Evaluation of FETPs, June 2012–February 2013

FETP	Overall Quality of Abstracts	Summary Scores	Mean	Median	Range
P3	Very Good	97	19.4	20	15–22
P10	Very Good	76*	19	19	17–21
P7	Good	87	17.4	18	12–24
P2	Good	75	15	15	9–21
P4	Good	75	15	12	10–23
P9	Fair	68	13.6	14	10–19
P8	Fair	67	13.4	13	11–17
P1	Fair	64	12.8	13	11–16
P5	Fair	60	12	11	8–17
P6	Poor	56	11.2	9	6–20

*Only four abstracts were available for review for P10.

Annex D. Operational Definitions for Indicators

Indicator	Impetus or Rationale for the FETP (B1)	
Rationale for using this indicator	The factors that prompted the initiation of FETPs have not been documented consistently in programs. Information regarding the history and origin of the program provides additional context to the interpretation of data on program implementation and outcomes.	
Definition	A **summary statement**, including who initiated or started the program and why (e.g., in response to an emergency or event, request from the MOH*, encouragement or availability of funds from a partner organization).	
Data points to be used for analysis	**Data point**	**Components of data point**
	(B1.1) Summary statement	Include the following: • Who started the FETP? • Why was FETP started? (e.g., disease outbreak, emergency, order from the MOH) • Who initially funded the FETP?
	Coded data will be presented to individual sites for discussion and validation prior to analysis.	
Sources of information	• Country's Ministry of Health (MOH).* • Resident Advisor (RA) • National program director or similar • Program documents	
Data issues or limitations	In some cases, the history of the program is multifaceted, and capturing all the relevant information in a brief statement may be difficult.	
Publications that support using this indicator	Krause G, Aavitsland P, Alpers K, Barrasa A, Bremer V, Helynck B, et al. Differences and commonalities of national field epidemiology training programmes in Europe. Euro Surveill 2009;14(43):19378–84. Lopez A, Caceres VM. Central America Field Epidemiology Training Program (CA FETP): a pathway to sustainable public health capacity development. Hum Resour Health 2008;6:27–32.	

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Indicator	FETP Operations (B2)	
Rationale for using this indicator	The design and implementation of FETPs vary by country and region. These differences may influence how the FETP functions or stakeholder participation. This indicator provides important context to the interpretation of data on implementation of the program and outcomes.	
Definition	This indicator includes the following: 1. **Organization where the FETP is hosted:** The organization that hosts or houses the program. 2. **Scope of the program:** The geographic area the program serves. 3. **Program start date:** The year the first cohort of fellows began training. 4. **Overlapping cohorts:** Whether or not two cohorts are being trained in a given year.	
Data points to be used for analysis	For each data point, information is extracted from the sources listed below and recorded using codes established in consultation with stakeholders.	
	Data point	**Components of data point**
	(B2.1) Organization where the FETP is hosted	• MOH* or equivalent (specify) • University (specify) • Parastatal (performing a function usually associated with a government and under its indirect control) (specify) • Other (specify)
	(B2.2) Scope of the program	• Regional: a program identified by a collection or group of countries as a regional program • Multi-country: a host country program that accepts fellows from other countries, which are not involved in the design or implementation of the FETP • National: a program that includes fellows from a single country • Sub-national: a program that includes fellows only from a specific sub-national area
	(B2.3) Program start date	Year the first cohort of fellows began training for the FETP
	(B2.4) Overlapping cohorts	• Yes: Two cohorts are being trained at the same time • No: One cohort is being trained at a time
	Coded data will be presented to individual sites for discussion and validation prior to analysis.	
Sources of information	• U.S. Centers for Disease Control and Prevention (CDC) • Training Programs in Epidemiology and Public Health Interventions Network (TEPHINET) • Country's Ministry of Health (MOH)* • Resident Advisor (RA) • National program director or similar	
Data issues or limitations	The management and operation of FETPs may include many important activities or tasks not documented here.	
Publications that support using this indicator	Center for Global Health. Field Epidemiology Training Program Development Handbook. Atlanta, GA: US Department of Health and Human Services, CDC; 2006. Kuonza L, Tint K, Harris B, Nabukenya I. Public Health Systems Strengthening in Africa: the Role of South Africa Field Epidemiology and Laboratory Training Programme. Pan African Medical Journal 2011. 10(Supp 1).	

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Indicator	FETP Components (B3)
Rationale for using this indicator	Historically, countries implemented FETPs to address needs in the context of communicable diseases. The indicator documents the expansion of these programs to include laboratorians and responsiveness to shifts in the burden of disease. The indicator provides comparable information on investments and focus of programs across sites.
Definition	This indicator includes the following: 1. **Includes a laboratory track:** Program includes a specialized course of study for laboratory scientists with laboratory-specific training and competencies. 2. **Focus areas or specialties for which the program receives funds:** Any specialized training within a FETP designed to address a specific epidemiological need of a country. Criteria for a focus include: • A funded specialization within a defined area of public health (e.g., HIV/AIDS, zoonoses, noncommunicable diseases, etc.) and, • Fellows focus on their specialization for at least one year of their training, i.e., they are placed within programs/departments within their specialization and the majority of their FETP-related activities (planned studies, surveillance activities, etc.) are related to the focus area.
Data points to be used for analysis	For each data point, information is extracted from the sources listed below and recorded using codes established in consultation with stakeholders. **Data point** — **Components of data point** (B3.1) Includes a laboratory track — • Yes • No (B3.2) Focus areas or specialties for which the program receives funds and where fellows are assigned — All that apply coded as: • HIV/AIDS • Immunizations • Malaria • Noncommunicable diseases • Zoonoses • Tobacco • Other (specify). Coded data will be presented to individual sites for discussion and validation prior to analysis.
Sources of information	• U.S. Centers for Disease Control and Prevention (CDC) • Training Programs in Epidemiology and Public Health Interventions Network (TEPHINET) • Country's Ministry of Health (MOH)* • Resident Advisor (RA) • National program director or similar

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Data issues or limitations	The indicator describes the program at a single point in time; it does not include information on changes to the program, or the evolution of its content, over time. The indicator does not measure the level of attention or the number or type of activities for each specialty.
Publications that support using this indicator	Jones DS, Tshimanga M, Woelk G, Nsubuga P, Sunderland NL, Hader SL, St Louis ME. Increasing leadership capacity for HIV/AIDS programmes by strengthening public health epidemiology and management training in Zimbabwe. Hum Resour Health2009;7(69). KariukiNjenga M, Traicoff D, Tetteh C, Likimani S, Oundo J, Breiman R, Nyamongo J, Burke H, Nsubuga P, White ME. Laboratory epidemiologist: skilled partner in field epidemiology and disease surveillance in Kenya. J Public Health Policy2008 Jul;29(2):149–64. Schneider D, Evering-Watley M, Walke, H, Bloland, P. Training the Global Public Health Workforce Through Applied Epidemiology Training Programs: CDC's Experience 1951–2011. Public Health Reviews, 2011; 33(1).

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<table>
<tr><th>Indicator</th><th colspan="2">Characteristics of RAs (B4)</th></tr>
<tr><td>Rationale for using this indicator</td><td colspan="2">RAs are an important component of FETPs. The indicator provides basic information on the presence and role of the RA in each site, and a foundation for analysis of data specific to the work of the RA.</td></tr>
<tr><td>Definition</td><td colspan="2">This indicator includes the following:
1. Number of RAs working in the program at the time of data collection.
2. Organization used to employ each RA: Process or organization that was used to employ the RA.
3. Focus of position(s): Specification of subject matter expertise required for the position.
4. Number of years RA present since start of program: Presence of RA(s) beginning from the year the first cohort of fellows accepted to the program.</td></tr>
<tr><td>Data points to be used for analysis</td><td colspan="2">For each data point, information is extracted from the sources listed below and recorded using codes established in consultation with stakeholders.
<table>
<tr><th>Data point</th><th>Components of data point</th></tr>
<tr><td>(B4.1) Number of RAs working in the program</td><td>Recorded as the number of RAs present at the time of the study</td></tr>
<tr><td>(B4.2) Organization used to employ each RA</td><td>• U.S. CDC FTE
• U.S. CDC contractor
• World Health Organization (WHO)
• African Field Epidemiology Network (AFENET)
• South East Asia Field Epidemiology and Technology Network (SAFETYNET)
• South American Network of Field Epidemiology Training Programs (RED SUR)
• Eastern Mediterranean Public Health Network (EMPHNET)
• Training Programs in Epidemiology and Public Health Interventions Network (TEPHINET)
• Other (specify)</td></tr>
<tr><td>(B4.3) Focus of position(s)†</td><td>• Epidemiology
• Laboratory
• Veterinary/One Health
• Other (specify)</td></tr>
<tr><td>(B4.4) Number of years RA present since start of program</td><td>Recorded as years and months when epidemiology RA and laboratory RA (if applicable) were present in country; Tallied to determine total number of years and months</td></tr>
<tr><td colspan="2">†If no RA present at the time of data collection, refer to the most recent RA and document when present</td></tr>
<tr><td colspan="2">Coded data will be presented to individual sites for discussion and validation prior to analysis.</td></tr>
</table></td></tr>
<tr><td>Sources of information</td><td colspan="2">U.S. Centers for Disease Control and Prevention (CDC)
Country's Ministry of Health (MOH)*
Resident Advisor (RA)</td></tr>
</table>

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Data issues or limitations	Some data regarding experience of past RAs may be difficult to obtain
Publications that support using this indicator	Center for Global Health. Field Epidemiology Training Program Development Handbook. Atlanta, GA: US Department of Health and Human Services, CDC; 2006. Training Programs in Epidemiology and Public Health Interventions Network (TEPHINET). Continuous Quality Improvement Handbook; 2005.

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Indicator	Selection of Fellows (B5)
Rationale for using this indicator	The qualifications of fellows and the process of selection of participants may affect the program's contributions to the public health workforce. How fellows are selected is a marker of the quality and visibility of the program.
Definition	This indicator includes the following: 1. **List of eligibility requirements:** The qualifications necessary for acceptance or participation in the program. 2. **Fellows nomination requirement:** Whether applicants must be nominated to apply to the program. 3. **Proportion of applicants accepted to the program:** Proportion of applicants accepted to the program for each of the two most recently admitted cohorts.
Data points to be used for analysis	For each data point, information is extracted from the sources listed below and recorded using codes established in consultation with stakeholders.

Data point	Components of data point
(B5.1) List of eligibility requirements	Recorded as qualitative data
(B5.2) Nomination requirement	• Yes • No
B5.3) Proportion of applicants accepted to the program	• *Numerator:* the number of applicants accepted to the program • *Denominator:* the total number of applicants Data prepared for the last two accepted cohorts
Coded data will be presented to individual sites for discussion and validation prior to analysis.	

Sources of information	• U.S. Centers for Disease Control and Prevention (CDC) • Training Programs in Epidemiology and Public Health Interventions Network (TEPHINET) • Country's Ministry of Health (MOH)* • Resident Advisor (RA) • National program director or similar
Data issues or limitations	This indicator does not capture changes in eligibility requirements that may have occurred over the life of the program.
Publications that support using this indicator	Music S, Schultz M. Field Epidemiology Training Programs. JAMA, 1990; 263(24). Mmubiji P, Mukanga D, Mghamba J, Ahly M, Mosha F, Azima S, Senga S, Moshiro C, Semali I, Rolle I, Wiktor S, McQueen S, McElroy P, Nsubuga P. The Tanzanian Field Epidemiology and Laboratory Training Program: Building and Transforming the Public Health Workforce. Pan African Medical Journal 2011.10(Suppl 1). Ntahobakurira I, Antara S, Galgalo T, Kakoma J, Karema C, Nyantanyi T, Theogene R, Mukabayire O, Lowrance D, Raghunathan P, Ayebazibwe N, Mukanga D, Nsubuga P, Binagwaho A. The Rwandan Field Epidemiology and Laboratory Training Program: training skilled disease detectives. Pan African Medical Journal 2011, 10(Suppl 1).

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<table>
<tr><th>Indicator</th><th colspan="2">Experiential or Field Component (B6)</th></tr>
<tr><td>Rationale for using this indicator</td><td colspan="2">FETPs aim to develop human capacity in applied epidemiology and allied areas. Meaningful, long-term assignments in the field give fellows opportunities to gain practical, real-world experience in the above areas. The indicator provides a description of this experience and variations in this component of the program across sites.</td></tr>
<tr><td>Definition</td><td colspan="2">This indicator includes the following:
1. Number of weeks on field assignment: The number of weeks out of the two-year program that fellows are actually at their field placement sites.
2. Number of weeks in classroom: The number of weeks out of the two-year program that fellows are in formal classes that are part of the program.
3. Location of the field assignment: The setting(s) of fellow field assignment (including national level, sub-national level, or a mix of national and sub-national).
4. Rotation of the field assignment: Whether the majority of fellows are assigned to one or more field placements for the entire program.</td></tr>
<tr><td rowspan="5">Data points to be used for analysis</td><td colspan="2">For each data point, information is extracted from the sources listed below and recorded using codes established in consultation with stakeholders.</td></tr>
<tr><td>Data point</td><td>Components of data point</td></tr>
<tr><td>(B6.1) Number of weeks in field assignment†</td><td>Calculated as the number of weeks out of the two-year program that fellows are actually at their field placement</td></tr>
<tr><td>(B6.2) Number of weeks in classroom†</td><td>Calculated as the number of weeks out of the two-year program that fellows are in formal classes that are part of the program</td></tr>
<tr><td>(B6.3) Location of the field assignment</td><td>Coded separately for Year 1 and Year 2 as:
• National
• Sub-national
• Mix of national and sub-national</td></tr>
<tr><td>(B6.4) Rotation of the field assignment</td><td>• Yes (describe)
• No
If some fellows rotate field assignment and some do not, that program has rotation</td></tr>
<tr><td colspan="3">Coded data will be presented to individual sites for discussion and validation prior to analysis.</td></tr>
<tr><td>Sources of information</td><td colspan="2">• Resident Advisor (RA)
• National program director or similar
• Training Programs in Epidemiology and Public Health Interventions Network (TEPHINET)
• Country's Ministry of Health (MOH)*</td></tr>
<tr><td>Data issues or limitations</td><td colspan="2">The length, location, and number of field assignments indicate the extent of fellows' field experience but indicate nothing about the output or quality of work done during those field assignments.</td></tr>
</table>

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† Not included: holidays, vacations, or time spent preparing for field assignments or examinations. The sum of parts 1 and 2 should be less than 104.

Publications that support using this indicator	Bosman A, Schimmer B, Coulombier D. Contribution of EPIET to public health workforce in the EU, 1995–2008. Euro Surveill2009;14(43). Center for Global Health. Field Epidemiology Training Program Development Handbook. Atlanta, GA: US Department of Health and Human Services, CDC; 2006. Training Programs in Epidemiology and Public Health Interventions Network (TEPHINET). Continuous Quality Improvement Handbook; 2005. Ntahobakurira I, Antara S, Galgalo T, Kakoma J, Karema C, Nyantanyi T, Theogene R, Mukabayire O, Lowrance D, Raghunathan P, Ayebazibwe N, Mukanga D, Nsubuga P, Binagwaho A. The Rwandan Field Epidemiology and Laboratory Training Program: training skilled disease detectives. Pan African Medical Journal 2011, 10(Suppl 1).

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† Not included: holidays, vacations, or time spent preparing for field assignments or examinations. The sum of parts 1 and 2 should be less than 104.

<table>
<tr><th>Indicator</th><th>Employment Status of Fellows (B7)</th></tr>
<tr><td>Rationale for using this indicator</td><td>For fellows, the intensity of participation in the program may influence the quality of their experience; and, stakeholders report that intensity of participation contributes to the outcomes of the program. The indicator provides an important, feasible marker of intensity of participation in the program.</td></tr>
<tr><td>Definition</td><td>This indicator includes the following:
1. Fellows participate in the program full-time: In general, during the program fellows have no additional regular employment or other duties or responsibilities and are not working in the same position as before the program.
2. Fellows paid while participating in the program: In general, fellows receive a salary while in the program.
3. Other than a base salary, fellows receive a regular stipend or supplemental funds: In general, there is additional, routine, financial support for fellows during program participation (does not apply to special project support).
4. The program includes a bonding requirement: In general, fellows are required to work in MOH* following completion of the program.</td></tr>
<tr><td>Data points to be used for analysis</td><td>For each data point, information is extracted from the sources listed below and recorded using codes established in consultation with stakeholders. Coded as a general practice for Fellows:
<table>
<tr><th>Data point</th><th>Components of data point</th></tr>
<tr><td>(B7.1) Fellows participate in the program full-time</td><td>• Yes
• No</td></tr>
<tr><td>(B7.2) Fellows receive a salary while participating in the program</td><td>• Yes
• No</td></tr>
<tr><td>(B7.3) Other than a base salary, fellows receive a stipend or supplemental funds</td><td>• Yes
• No</td></tr>
<tr><td>(B7.4) The program includes a bonding requirement</td><td>• Yes (specify length of bond)
• No</td></tr>
</table>
Coded data will be presented to individual sites for discussion and validation prior to analysis.</td></tr>
<tr><td>Sources of information</td><td>• Resident Advisor (RA)
• National program director or similar
• Country's Ministry of Health (MOH)*</td></tr>
<tr><td>Data issues or limitations</td><td>Because data are presented as categorical (i.e., yes or no), data on unique conditions or events relevant to employment status are not captured by this indicator.</td></tr>
<tr><td>Publications that support using this indicator</td><td>Bosman A, Schimmer B, Coulombier D. Contribution of EPIET to public health workforce in the EU, 1995–2008. Euro Surveill2009;14(43).
Center for Global Health. Field Epidemiology Training Program Development Handbook. Atlanta, GA: US Department of Health and Human Services, CDC; 2006.</td></tr>
</table>

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Indicator	Completion of FETP (B8)
Rationale for using this indicator	Although all FETPs have similar training methods and materials, their requirements for graduation may differ, which may lead to differences among FETP outcomes. The indicator provides context for the interpretation of data on program implementation and outcomes.
Definition	This indicator includes the following: 1. **List of graduation requirements:** The listed conditions, items, or tasks necessary for completion of the program. 2. **Graduate completion of graduation requirements:** Whether, in general, graduates actually complete the listed requirements. 3. **Academic degree awarded on completion of the program:** Whether a degree is provided and the type of degree. 4. **Proportion of fellows that complete the program or graduate on time:** Proportion of fellows from the last two cohorts that graduated or completed the program within the expected program completion timeframe (includes separate analysis for completion of university-based requirements and FETP).
Data points to be used for analysis	For each data point, information is extracted from the sources listed below and recorded using codes established in consultation with stakeholders.

Data point	Components of data point
(B8.1) List of graduation requirements	Information recorded as qualitative data for university-based requirements and program-specific requirements, as applicable
(B8.2) Generally, graduates complete listed requirements	• Yes • No (specify)
(B8.3) Academic degree awarded on completion of the program	• Yes (specify) • No
(B8.4) Proportion of fellows who complete the program or graduate on time	• *Numerator:* number of fellows who complete the program requirements on time • *Denominator:* total number of fellows per cohort *Note: prepared for the last two graduated cohorts*

Coded data will be presented to individual sites for discussion and validation prior to analysis.

Sources of information	• U.S. Centers for Disease Control and Prevention (CDC) • Training Programs in Epidemiology and Public Health Interventions Network (TEPHINET) • Country's Ministry of Health (MOH)*
Data issues or limitations	The data collected give no indication of the conditions or events that prevent a fellow from graduating on time.
Publications that support using this indicator	Jones DS, Tshimanga M, Woelk G, Nsubuga P, Sunderland NL, Hader SL, St Louis ME. Increasing leadership capacity for HIV/AIDS programmes by strengthening public health epidemiology and management training in Zimbabwe. Hum Resour Health2009;7(69). Center for Global Health. Field Epidemiology Training Program Development Handbook. Atlanta, GA: US Department of Health and Human Services, CDC; 2006.

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Indicator	Degree of Host Country's Ownership of the FETP (P1)
Rationale for using this indicator	The indicator provides important information on the status of program operations within the country. Stakeholders from MOH*, TEPHINET, and CDC identified the items below as meaningful markers or milestones on the path to ownership and sustainability of FETP activities within the country or region.
Definition	This indicator includes the following: 1. **Organization where the FETP is hosted:** The organization that hosts or houses the program. 2. **FETP included on the organizational chart or organogram of the MOH:** The FETP is a named program or unit in the structure of MOH.* 3. **Country provides fiscal resources to the program:** Government provides financial support to programmatic activities. 4. **Program is a line item in the budget of the MOH:** Budget of a specific office, unit, or sub-group within the MOH includes FETP. 5. **Day-to-day supervision of fellows:** Primary responsibility for providing technical supervision and mentorship for field activities.
Data points to be used for analysis	For each data point, information is extracted from the sources listed below and recorded using codes established in consultation with stakeholders.

Data point	Components of data point
(P1.1) Organization where the FETP is hosted	• Country's MOH* • Parastatal (specify) • University (specify) • Other (specify)
(P1.2) FETP included on the organizational chart or organogram of the MOH	• yes • no
(P1.3) Country provides fiscal resources to the program	• Salary of fellow • Salaries for national professional staff (e.g. epidemiology field supervisor, etc.) If yes, does country supply at least 50% of salary? • Tuition for university-based activities or coursework • Stipends or supplements to base salaries of fellows • Office space • Travel to conferences • Vehicle • Support for outbreak investigations • Laboratory costs • Housing • Supplies • Other (specify)
(P1.4) Program is a line item in the budget of the MOH	• yes • no

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	(P1.5) Day-to-day supervision of fellows in field activities	• External or non-citizen RA • Internal personnel, trained epidemiologists (specify) • Internal personnel, non-epidemiologists (specify) • Combination (describe) (i.e., external or non-citizen RA and internal personnel share responsibility for day-to-day supervision of fellows)
	Coded data will be presented to individual sites for discussion and validation prior to analysis.	
Sources of information	• U.S. Centers for Disease Control and Prevention (CDC) • Resident Advisor (RA) • National program director or similar • Country's Ministry of Health (MOH)*	
Data issues or limitations	In the context of public health, the construct of *ownership* of activities or programs may include many and varied components not included here.	
Publications that support using this indicator	Bosman A, Schimmer B, Coulombier D. Contribution of EPIET to public health workforce in the EU, 1995–2008. Euro Surveill2009;14(43). Training Programs in Epidemiology and Public Health Interventions Network (TEPHINET). Continuous Quality Improvement Handbook; 2005. Tshimanga M, Gombe N, Shambira G, Nqobile N. Strengthening field epidemiology in Africa: The Zimbabwe Field Epidemiology Training Program. Pan African Medical Journal 2011.10(Suppl 1). Music S, Schultz M. Field Epidemiology Training Programs. JAMA, 1990; 263(24).	

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Indicator	Access to Data (P2)	
Rationale for using this indicator	FETPs include competencies relevant to data and evidence-based decision making, as well as improvements in surveillance activities and systems. To develop competency and apply what they learn, fellows need access to relevant data and information systems. This indicator is used to document an important contribution by the country to implementation of the program and progress toward intended outcomes.	
Definition	**Level of access to data by fellows:** Availability of public health data generally provided to the majority of current fellows by data type.	
Data points to be used for analysis	For each data point, information is extracted from the sources listed below and recorded using codes established in consultation with stakeholders.	
	Data point	**Components of data point**
	(P2.1) Level of access to data by fellows	Types of data made available to fellows: • Surveillance data in field site • Surveillance data from other sites or units • Clinical or laboratory data needed for outbreak investigations • Other (specify) Access level for each data type: • Regular: Access is regular or routine • Conditional: Access is conditional (special purpose or task-specific, or requires approval or by request) • None: Fellows do not have access to data or information systems
	Coded data will be presented to individual sites for discussion and validation prior to analysis.	
Sources of information	• Country's Ministry of Health (MOH)* • Resident Advisor (RA) • National program director or similar	
Data issues or limitations	Access to data and information systems may vary from country to country and among fellows in a single country. This indicator does not document reasons for these differences.	
Publications that support using this indicator	Kuonza L, Tint K, Harris B, Nabukenya I. Public Health Systems Strengthening in Africa: the Role of South Africa Field Epidemiology and Laboratory Training Programme. Pan African Medical Journal 2011. 10(Supp 1). Peterson LR, Ammon A, Hamouda O, et al. Developing National Epidemiologic Capacity to Meet the Challenges of Emerging Infections in Germany. EmergInf Dis 2000; 6 (6).	

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Indicator	Use of FETP by the OH* (P3)
Rationale for using this indicator	The benefits of the FETP to fellows are well documented. However, the FETP is also intended to provide service and value to the host country, particularly the MOH.* This indicator is a marker of FETP's visibility and perceived value within the country.
Definition	This indicator includes the following: 1. **Requests to the program for assistance or work:** Specific appeals made by the MOH to the FETP for service by the fellows (by type of activity and frequency over the previous 12 months) and use of the program for outbreak investigations. 2. **Sources of requests to the program for assistance or work:** Request initiated from either national or sub-national level.
Data points to be used for analysis	For each data point, information is extracted from the sources listed below and recorded using codes established in consultation with stakeholders.

Data point	Components of data point
(P3.1a) Requests to the program for assistance or work—type and frequency	• Outbreak or emergency response (specify number) • Surveillance (specify number) • Teaching or training (specify number) • Other (specify type and number)
(P3.1b) Use of program for outbreak investigations	• Program is the primary responder to outbreaks • Fellows work in response units and thus participate in outbreak investigations • FETP engagement is requested for specific outbreaks.
(P3.2) Sources of requests to the program for assistance or work	• National • Sub-national
Coded data will be presented to individual sites for discussion and validation prior to analysis.	

Sources of information	• Country's Ministry of Health (MOH)* • Resident Advisor (RA) • National program director or similar
Data issues or limitations	The reasons for a request to FETP and the responses to those requests vary by site. The indicator does not document the reasons for these differences.
Publications that support using this indicator	Center for Global Health. Field Epidemiology Training Program Development Handbook. Atlanta, GA: US Department of Health and Human Services, CDC; 2006. Tshimanga M, Gombe N, Shambira G, Nqobile N. Strengthening field epidemiology in Africa: The Zimbabwe Field Epidemiology Training Program. Pan African Medical Journal 2011.10(Suppl 1). Patel MS, Phillips CB. Strengthening field-based training in low and middle-income countries to build public health capacity: Lessons from Australia's Master of Applied Epidemiology program. Aust New Zealand Health Policy2009;6:5.

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Indicator	Investment of Host Country in Field Supervision (P4)	
Rationale for using this indicator	Investments in field supervision are essential to the success and sustainability of the program. The work of field supervisors to provide technical supervision and mentorship to fellows is a vital component of FETPs. Stakeholders identified the indicator as a meaningful descriptor or marker of the implementation and operations of the program.	
Definition	**Proportion of field supervisors that are graduates of the FETP:** Proportion of individuals that have provided technical supervision for programmatic field work for at least one fellow in the past 12 months and who have graduated from the same FETP.	
Data points to be used for analysis	For each data point, information is extracted from the sources listed below and recorded using codes established in consultation with stakeholders.	
	Data point	**Components of data point**
	(P4.1) Proportion of field supervisors that are graduates of the FETP	Calculated as: • *Numerator:* the number of field supervisors in the past 12 months who are graduates of the same FETP • *Denominator:* the total number of field supervisors in the past 12 months
	Coded data will be presented to individual sites for discussion and validation prior to analysis.	
Sources of information	• U.S. Centers for Disease Control and Prevention (CDC) • Training Programs in Epidemiology and Public Health Interventions Network (TEPHINET) • Country's Ministry of Health (MOH)* • Resident Advisor (RA) • National program director or similar	
Data issues or limitations	Graduates of FETPs are not the only qualified field supervisors.	
Publications that support using this indicator	Fink A. Evaluation fundamentals: insights into the outcomes, effectiveness and quality of health programs. Thousand Oaks, CA: Sage; 2005. Lopez A. Caceres VM. Central America Field Epidemiology Training Program (CA FETP): a pathway to sustainable public health capacity development. Hum Resour Health 2008;6:27. Walke HT. Simone PM. Building capacity in field epidemiology: lessons learned from the experience in Europe. Euro Surveill 2009;14(43): 2–3.	

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Indicator	Technical Qualifications of the RA (P5)
Rationale for using this indicator	RAs contribute to the implementation and outcomes of FETPs. RAs work directly with fellows to develop their applied epidemiology skills. For this task, RAs must have strong experience, knowledge, and skills in epidemiology, as well as the ability to mentor, supervise, and train fellows. The indicator documents the qualifications of the RA as an important component of program implementation.
Definition	This indicator includes the following: 1. **Graduate of the U.S. Epidemic Intelligence Service (EIS):** RA completed U.S. EIS. 2. **Number of years worked as an epidemiologist prior to beginning current RA assignment:** Years of experience in any type of work as an epidemiologist by the RA. prior to beginning current RA assignment. 3. **Experience as a supervisor of epidemiologists prior to beginning current RA assignment:** Whether or not the RA has experience supervising epidemiologists. If applicable, the indicator also documents the number of years the RA supervised epidemiologists, including EIS or FETP fellows prior to beginning current RA assignment.
Data points to be used for analysis	For each of the data points below, information is extracted from the RA's curriculum vitae. When more than one RA is present in the program, the data points are recorded for each RA. **Data point** — **Components of data point** (P5.1) Graduate of the U.S. Epidemic Intelligence Service (EIS) — • Yes; • No (specify whether an FETP graduate; if so, give date of graduation and host country) (P5.2) Number of years worked as an epidemiologist prior to beginning current RA assignment — Number of years (P5.3) Experience as a supervisor of epidemiologists prior to beginning current RA assignment — • Yes. If yes, then code experience as » Number of years supervising epidemiologists » Number of years supervising any EIS or other FETP fellows » Number of years supervising epidemiologists but not supervising any EIS or FETP fellows; • No Coded data will be presented to individual sites for discussion and validation prior to analysis.
Sources of information	• Country's Ministry of Health (MOH)* • Resident Advisor (RA)
Data issues or limitations	The indicator documents only limited aspects of the technical qualifications of an RA.

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Publications that support using this indicator	Schneider D, Evering-Watley M, Walke, H, Bloland, P. Training the Global Public Health Workforce Through Applied Epidemiology Training Programs: CDC's Experience 1951–2011. Public Health Reviews, 2011; 33(1). Peterson LR, Ammon A, Hamouda O, et al. Developing National Epidemiologic Capacity to Meet the Challenges of Emerging Infections in Germany. EmergInf Dis. 2000; 6 (6): 576–584. Nsubuga P, Johnson K, Tetteh C, Oundo J, Weathers A, Vaughan J, Elbon S, Tshimanga M, Ndugulile F, Ohuabunwo C, Evering-Watley M, Mosha F, Oleribe O, Nguku P, Davis L, Preacely N, Luce R, Antara S, Imara H, Ndjakani Y, Doyle T, Espinosa Y, Kazambu D, DelissaintD, Ngulefac J, Njenga K. Field Epidemiology and Laboratory Training Programs in sub-Saharan Africa from 2004 to 2010: need, the process, and prospects. Pan Afr Med J. 2011;10:24

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Indicator	Engagement of the RA with the MOH* (P6)
Rationale for using this indicator	In addition to assisting countries by training and mentoring FETP fellows, RAs may contribute to improved public health outcomes by providing direct service to the MOH.* This indicator documents the RA's value to the MOH beyond participating in the FETP.
Definition	This indicator includes the following: • **Consults or participates with the MOH*:** Whether, and for what activities, the RA was engaged with the MOH in the previous12 months. This data point does not include training and supervising fellows.
Data points to be used for analysis	For the data point below, information is extracted from the sources listed below and recorded using codes established in consultation with stakeholders. When more than one RA is present in the program, the data points are recorded for each RA. **Data point** — **Components of data point** (P6.1) Consults or participates with the MOH* — • Yes. If yes, then record participation as » Recurring or standing meeting (specify frequency) » Outbreak or emergency response » Technical consultation » Training outside the FETP » Other (specify) Coded data will be presented to individual sites for discussion and validation prior to analysis.
Sources of information	• Resident Advisor (RA) • Country's Ministry of Health (MOH)
Data issues or limitations	It may sometimes be difficult to distinguish between service provided by the FETP program as a whole and the RA as an individual.
Publications that support using this indicator	Peterson LR, Ammon A, Hamouda O, et al. Developing National Epidemiologic Capacity to Meet the Challenges of Emerging Infections in Germany. EmergInf Dis 2000; 6 (6): 576–584.

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Indicator	RA as Pathway to Service to Country (P7)
Rationale for using this indicator	In addition to assisting the host country by training and mentoring FETP fellows, RAs may link the MOH* to resources and expertise at the CDC in the United States. This indicator documents the extent to which the RA helped the MOH in the host country access the full range of CDC resources and expertise.
Definition	This indicator includes the following: • **Connect country to services or support from CDC:** Types of activities between the MOH and the U.S. CDC facilitated by the RA
Data points to be used for analysis	For the data point below, information is extracted from the sources listed above and recorded using codes established in consultation with stakeholders. When more than one RA is present in the program, the data points are recorded for each RA.
	Data point / **Components of data point**
	(P7.1) Connects host country to services or support from U.S. CDC • Yes. If yes, then indicate which services: » Consultation with subject matter expert (specify) » Other types of training (specify) » Laboratory-related service or support » Sources of fiscal support » Other (specify)
	Coded data will be presented to individual sites for discussion and validation prior to analysis.
Sources of information	• U.S. Centers for Disease Control and Prevention (CDC) • Resident Advisor (RA)
Data issues or limitations	Important connections may be made with CDC or other U.S. government agencies through sources other than the RA; that information is not captured by this indicator.
Publications that support using this indicator	Music S, Schultz M. Field Epidemiology Training Programs. JAMA, 1990; 263(24).

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Indicator	Engagement of the RA with the Fellows (P8)	
Rationale for using this indicator	The role of a RA is to strengthen the learning experiences of fellows and to help ensure the quality of their training is consistent with the standards of the FETP. Intentional engagement is a critical component in the relationship between RAs and the fellows that can facilitate training processes and development of requisite competencies. This indicator was identified by stakeholders and in literature as an important marker of CDC's contribution to FETP success.	
Definition	This indicator includes the following: 1. **RA contact with the fellows during outbreak investigation:** The amount of interaction and support during outbreak investigation by RA with fellows as reported by graduates of the last two completed cohorts. 2. **Level of work product review by the RA:** The degree of involvement by the RA in the review and revision of the fellows' work products.	
Data points to be used for analysis	For a random sample of the graduates from the past two cohorts, information is extracted from the sources listed above and recorded using codes established in consultation with stakeholders.	
	Data point	**Components of data point**
	(P8.1) RA contact with the fellows during outbreak investigation	• Did the RA accompany or have daily contact with the graduates during FETP outbreak investigations? • Frequency and method of contact per investigation
	(P8.2) Level of work product review by the RA	• How many drafts of program work products did the RA exchange with the majority of interviewed graduates? Excludes thesis revisions for programs with thesis requirement
	Coded data will be presented to individual sites for discussion and validation prior to analysis.	
Sources of information	FETP graduates	
Data issues or limitations	Varying amount of participation in outbreak response by individual fellows can affect the interpretation of the level of contact with the RA.	
Publications that support using this indicator	Kilminster S, Jolly B. Effective Supervision in Clinical Practice Settings: A Literature Review. Medical Education 2001. 34(10). Lopez A.; Caceres VM. Central America Field Epidemiology Training Program (CA FETP): a pathway to sustainable public health capacity development. Hum Resour Health. 2008;6:27. Peterson LR, Ammon A, Hamouda O, et al. Developing National Epidemiologic Capacity to Meet the Challenges of Emerging Infections in Germany. EmergInf Dis 2000; 6 (6). Schneider D, Evering-Watley M, Walke, H, Bloland, P. Training the Global Public Health Workforce Through Applied Epidemiology Training Programs: CDC's Experience 1951–2011. Public Health Reviews, 2011; 33(1).	

† Quality of abstracts is a floating data point whose interpretation is based on the response to the day-to-day supervision of fellows data point under Indicator P.1.

<table>
<tr><th>Indicator</th><th colspan="2">Fellows Employed in Epidemiology-Related Positions after Graduation (O1)</th></tr>
<tr><td>Rationale for using this indicator</td><td colspan="2">FETPs address the shortage of skilled epidemiologists worldwide. Ideally, graduates of the program work in applied epidemiology or related positions, within the health system of their country or region. The indicator provides documentation of an important component of the results of the program.</td></tr>
<tr><td>Definition</td><td colspan="2">The number and percentage of FETP graduates who are working as epidemiologists (or in related positions) in the host country or region. The indicator includes the following:
Number of graduates: The total number of graduates since inception of the program and for specific cohorts of interest.
Number of graduated cohorts: The total number of graduated cohorts since inception of the program.
Location of graduates within the health system: Upon completion of the program, graduates' employment or position within the MOH* or another organization.
Function or role of graduates within the health system: Specific focus of graduates' initial employment or position.</td></tr>
<tr><td>Data points to be used for analysis</td><td colspan="2">For each data point, information is extracted from the sources listed below and recorded using codes established in consultation with stakeholders. Information is collected for a sample of graduates from the last two cohorts of fellows.
<table>
<tr><th>Data point</th><th>Components of data point</th></tr>
<tr><td>(O1.1) Number of graduates</td><td>Total number of fellows who completed the program</td></tr>
<tr><td>(O1.2) Number of graduated cohorts</td><td>Total number of cohorts of fellows who have completed the program</td></tr>
<tr><td>(O1.3) Position held by each graduate within the public health system</td><td>First new employment or position within the MOH or other (specify) immediately following graduation
For each graduate, whether their position is at national or sub-national level
For each graduate, whether the position is within home country
For position above, identify as new position since entering the program or not
For position above, if not new position, identify whether graduate has new responsibilities related to applied epidemiology since completing the program. If yes, describe.
Data prepared for a random sample of the fellows to complete the program in the last two cohorts</td></tr>
<tr><td>(O1.4) Position or role of each graduate within the public health system</td><td>Applied epidemiology (specify position)
Other (specify position); example: laboratory quality assurance
Data prepared for a convenience sample of the fellows to complete the program in the last two cohorts.</td></tr>
<tr><td colspan="2">Coded data will be presented to individual sites for discussion and validation prior to analysis.</td></tr>
</table></td></tr>
</table>

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Sources of information	• U.S. Centers for Disease Control and Prevention (CDC) • Training Programs in Epidemiology and Public Health Interventions Network (TEPHINET). • Graduates of FETP • Resident Advisor (RA) • National program director or similar
Data issues or limitations	The information for this indicator is limited to the graduates' first work assignment after completing the program. No information on the progression of fellows to leadership or management positions is included for this indicator.
Publications that support using this indicator	Bosman A, Schimmer B, Coulombier D. Contribution of EPIET to public health workforce in the EU, 1995–2008. Euro Surveill2009;14(43). Jones DS, Tshimanga M, Woelk G, Nsubuga P, Sunderland NL, Hader SL, St Louis ME. Increasing leadership capacity for HIV/AIDS programmes by strengthening public health epidemiology and management training in Zimbabwe. Hum Resour Health2009;7(69). Training Programs in Epidemiology and Public Health Interventions Network (TEPHINET). Continuous Quality Improvement Handbook; 2005. Mukanga D, Namusisi O, Gitta SN, Pariyo G, Tshimanga M, Weaver A, Trostle M. Field Epidemiology Training Programmes in Africa—Where are the Graduates? Hum Resour Health2010;8(18). Traicoff DA, Walke HT, Jones DS, Gogstad EK, Imtiaz R, White ME. Replicating success: developing a standard FETP curriculum. Public Health Rep2008;123 Suppl 1:28–34. Walke HT. Simone PM. Building capacity in field epidemiology: lessons learned from the experience in Europe. Euro Surveill. 2009;14(43); 2–3.

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Indicator	FETP Fellows Involved in Outbreak Investigations (O2)
Rationale for using this indicator	The FETP contributes to improvements in detection, investigation, and response to public health events in the host country or region. The level of participation by the program in outbreak investigations is a necessary foundation to these improvements.
Definition	**Proportion of outbreaks with evidence of FETP participation or role:** Proportion of outbreaks identified from PROMED and GDD with one or more current fellows, or graduates of the program, on the team that responds to the outbreak.
Data points to be used for analysis	For the data point below, information is extracted from the sources listed below and recorded using codes established in consultation with stakeholders. **Data point** — **Components of data point** (O2.1) Proportion of outbreaks with evidence of FETP participation or role — • *Numerator:* the number of unique outbreaks with evidence of FETP-trained members on the response team • *Denominator:* the last 10 unique reports of outbreaks of priority diseases in ProMED and GDD For each site, data include the last 10 reports (starting in August 2012 and going back in time until 10 outbreaks could be identified) of unique outbreaks of priority diseases included in the alerts on the ProMED website and unique outbreaks reported in the *Global Disease Detection Operations Center Daily Report (GDD).* Each outbreak or emergency had to affect more than one person and had to be recorded in at least one of the sources. Data include all outbreaks found in GDD but included only ProMED outbreaks involving a priority set of diseases drawn from WHO lists of priority diseases (WHO 2013).Response to an outbreak may include activities beyond the investigation (e.g., work to prevent transmission or spread of disease immediately following the outbreak). Coded data will be presented to individual sites for discussion and validation prior to analysis.
Sources of information	• Reports of outbreaks in The Program for Monitoring Emerging Diseases (ProMED) and *Global Disease Detection (GDD)* • Program information from each training site • Resident Advisor (RA) • National program director or similar • U.S. Centers for Disease Control and Prevention (CDC)
Data issues or limitations	Although ProMED and *GDD* are important sources of information on outbreaks of infectious diseases and acute exposures to toxins that affect human health, not all outbreaks of interest to stakeholders are reported there. If the 10 reports drawn from ProMed and GDD occur within a short time, documentation of the accomplishments of the site may be limited.

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Publications that support using this indicator	Bosman A, Schimmer B, Coulombier D. Contribution of EPIET to public health workforce in the EU, 1995–2008. Euro Surveill2009;14(43). Peterson LR, Ammon A, Hamouda O, et al. Developing National Epidemiologic Capacity to Meet the Challenges of Emerging Infections in Germany. EmergInf Dis 2000; 6 (6). Center for Global Health. Field Epidemiology Training Program Development Handbook. Atlanta, GA: US Department of Health and Human Services, CDC; 2006. Training Programs in Epidemiology and Public Health Interventions Network (TEPHINET). Continuous Quality Improvement Handbook; 2005. Music S, Schultz M. Field Epidemiology Training Programs. JAMA, 1990; 263(24). World Health Organization (WHO). Global Alert and Response—Pandemic and Epidemic Diseases. Geneva, Switzerland: WHO; 2013. Available at: http://www.who.int/csr/disease/en/

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Indicator	Engagement in Surveillance Activities or Systems (O3)
Rationale for using this indicator	FETPs include a wide range of activities relevant to disease and risk factor surveillance. These activities are intended to contribute to improvements in surveillance in the country or region. This indicator is a marker of progress toward this end.
Definition	The indicator includes the following: 1. **Graduates work on surveillance activities:** Surveillance-related activities in current work positions for program graduates from last two completed cohorts. 2. **Fellow assigned to a surveillance unit:** The number of current program fellows assigned to field placements in MOH* programs or units whose primary activity is related to disease surveillance. 3. **Use of surveillance data by fellows:** Description of use of surveillance data by fellows during the past 12 months.
Data points to be used for analysis	For the data point below, information is extracted from the sources listed below and recorded using codes established in consultation with stakeholders.

Data point	Components of data point
(O3.1) Graduates work on surveillance activities	• Yes (specify major activity) • No Data to be collected from a random sample of graduates
(O3.2) Fellow assigned to a surveillance unit	• Yes (specify which unit and number of fellows assigned to each) • No
(O3.3) Use of surveillance data by fellows	Recorded as all that apply: • Analyzes routine data • Conducts long-term projects or studies using surveillance data • Reports routine surveillance data • Evaluates a surveillance activity or system • Provides training for non-FETP personnel on surveillance topics • Other (specify)
Coded data will be presented to individual sites for discussion and validation prior to analysis.	

Sources of information	• FETP graduates • Country's Ministry of Health (MOH)* • Resident Advisor (RA) • Country program director or similar
Data issues or limitations	None
Publications that support using this indicator	Center for Global Health. Field Epidemiology Training Program Development Handbook. Atlanta, GA: US Department of Health and Human Services, CDC; 2006. Traicoff DA, Walke HT, Jones DS, Gogstad EK, Imtiaz R, White ME. Replicating success: developing a standard FETP curriculum. Public Health Rep2008;123 Suppl 1:28–34. Nsubuga P, Nwanyanwu O, Nkengasong JN, Mukanga D, Trostle M. Strengthening public health surveillance and response using the health systems strengthening agenda in developing countries. BMC Public Health2010;10 Supp 1(S5).

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Indicator	Use of Pathway to Decision Makers
Rationale for using this indicator	FETPs include training in evidence-based decision making with regard to matters of public health. These programs aim to encourage or improve use of data or evidence to inform decisions in the country. To ensure such use, data or evidence must be first made accessible to decision-makers. An FETP should have an opportunity to communicate relevant information to decision makers. This indicator documents the status of an important component of the host country or region's capacity to use public health information generated by the FETP.
Definition	**Established forum or mechanism for the work of fellows to be communicated to decision makers:** Documentation of regular or standing opportunities within the country where data and findings from field investigations have been conveyed to public health decision makers.
Data points to be used for analysis	For the data point below, information is extracted from the sources listed below and recorded using codes established in consultation with stakeholders.

Data point	Components of data point
Established forum or mechanism for the work of fellows to be communicated to decision makers	Recorded for the past 12 months: • Meetings (Specify frequency and type; also the number of field investigations that were communicated this way) • Bulletins (Specify frequency of publications and type; also the number of field investigations that were communicated this way) • Other (Describe; specify frequency of events and the number of field investigations that were communicated this way) • None *Note: Exclude presentations at meetings intended for an academic audience, for program participants or staff, or at scientific conferences not directed principally to the host country's decision makers.*
Coded data will be presented to individual sites for discussion and validation prior to analysis.	

Sources of information	• Country's Ministry of Health (MOH)* • Resident Advisor (RA) • National program director or similar
Data issues or limitations	Field investigations are not the only activities that result in data or findings useful to decision makers.
Publications that support using this indicator	Center for Global Health. Field Epidemiology Training Program Development Handbook. Atlanta, GA: US Department of Health and Human Services, CDC; 2006. Training Programs in Epidemiology and Public Health Interventions Network (TEPHINET). Continuous Quality Improvement Handbook; 2005. Bloland P, Simone P, Burkholder B, Slutsker L, De Cock K. The Role of Public Health Institutions in Global Health System Strengthening Efforts: The US CDC's Perspective. PLOS Medicine 2012; 9(4). Tshimanga M, Gombe N, Shambira G, Nqobile N. Strengthening field epidemiology in Africa: The Zimbabwe Field Epidemiology Training Program. Pan African Medical Journal 2011.10(Suppl 1).

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Indicator	Quality of Fellows' Abstracts	
Rationale for using this indicator	FETPs include training in conducting evidence-based studies of public health related events. Fellows must be able to both carry out and communicate their epidemiological studies effectively. This indicator documents the status of an important component of the program's capacity to both conduct and present different to studies relevant to public health of the county/region. Scientific quality of conference abstracts can be used as a proximal marker of overall training quality.	
Definition	**Scientific rigor and merit of some FETP participant products as determined by expert panel review of abstracts submitted to the 2010 6th Global TEPHINET Conference.**	
Data points to be used for analysis	For the data point below, information is extracted from the sources listed below and recorded using codes established in consultation with stakeholders.	
	Data point	**Components of data point**
	(O5.1) Quality of abstracts submitted by the fellows.	Consensus scores and ratings given by an expert panel that reviewed a sample of abstracts submitted by FETP fellows to the 2010 6th Global TEPHINET Conference.
Sources of information	• Training Programs in Epidemiology and Public Health Interventions Network (TEPHINET).	
Data issues or limitations	• FETPs fellows work on various projects, which means that abstract quality alone does not capture the full extent of FETP's work. • Quality of abstracts is affected by factors other than how well the writer was supervised.	
Publications that support using this indicator	Cohen IT, Patel K. Peer review inter-rater concordance of scientific abstracts: a study of anesthesiology subspecialty and component societies. AnesthAnalg 2006;102(5):1501–3. Fink A. Evaluation fundamentals: insights into the outcomes, effectiveness and quality of health programs. Thousand Oaks, CA: Sage; 2005. Landis JR, Koch GG. The measurement of observer agreement for categorical data. Biometrics 1977;33:159–74.	

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the U.S. Centers for Disease Control and Prevention.

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