THE GLOBAL FIELD EPIDEMIOLOGY ROADMAP

A Report of the Meeting held
at the Rockefeller Foundation Bellagio Center
June 11-15, 2018

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FETP fellow Dany Bakoly Ranoaritiana interviews a young boy during a rubella outbreak in a public school in Madagascar.
EXECUTIVE SUMMARY

To safeguard and promote the health of its citizens, every country must have effective field epidemiology capacity. To that end, in 1980, the US Centers for Disease Control and Prevention (CDC) began supporting the development of Field Epidemiology Training Programs (FETPs) in countries throughout the world. This initiative has grown in importance since then, as many countries and regions with inadequate public health capacities face public health threats of increasing scope and complexity.

The FETP initiative has been enormously successful, such that after 38 years of steady investment by CDC, other US Government agencies, the World Health Organization, the European Union, individual countries, philanthropic foundations, and others, there are now 86 FETPs serving more than 160 countries throughout the world. While initially conceived simply as a training program producing field epidemiologists, over the years, it has become clear that the impact of the program is far greater, and more important, than the number of its graduates. The defining essence of the program today is the provision of critically-needed public health and global health security services, through a mentored, learn-by-doing approach that improves the effectiveness of the workforce and systems required to provide those services.

However, as the number and variety of programs has grown, a variety of challenges to continued progress have emerged, including the slow pace of in-country institutionalization of the FETPs; program quality assurance; securing adequate, sustainable funding; assuring a career path for FETP graduates; specifying evidence-based targets for field epidemiology capacity; updating and enhancing the FETP curriculum and the larger FETP system; and mobilizing FETP graduates and fellows in support of international response to epidemics and other public health emergencies.

To provide an opportunity to address these challenges, the Task Force for Global Health convened a meeting of key leaders and partners from across the globe working to develop effective global field epidemiology capacity. The meeting was held on June 11-15, 2018 at the Rockefeller Foundation Bellagio Center. The goals of the meeting were to craft a guiding, long-term vision of the global FETP initiative; clarify the roles and responsibilities of the various partners in this effort; harmonize identifying current strengths and challenges, the group developed the following statement to serve as our guiding vision: Every country in the world has the applied epidemiology capacities needed to protect and promote the health of its own population, and to collaborate with others to promote global health.
The group also recognized that what had begun as a relatively small CDC grant program has now grown into a complex, multi-partner undertaking to improve public health and global health security by developing applied epidemiology capacity throughout the world. Consequently, the group developed a new, more comprehensive framing for this global partnership: the FETP Enterprise, defined as the totality of the leaders, funders, implementing partners, government agencies, and other stakeholders engaged in this global effort, along with associated workforce competency targets, standards, agreements, technologies, etc. that undergird this work.

The group then specified a set of critical functions that the enterprise must perform to reach its vision. These functions include (1) health system strengthening, through the team-by-doing epidemiologic work undertaken for each country’s public health system; (2) education, training, and mentorship of FETP fellows, via provision of real-world experience in applied epidemiology; (3) mobilization for mutual assistance in response to international outbreaks and other public health emergencies; (4) management of specific epidemiologic and other projects that provide experience and deliver services; (5) quality assurance and improvement of FETPs; (6) institutionalization of FETPs into country public health systems; (7) program accountability; (8) monitoring and evaluation, including targeted operational research; and (9) strategic management of the overall FETP Enterprise, to sense and respond to needs and significant changes in the environment in which graduates work.

Keeping in mind the vision statement, the conceptual framing of the FETP enterprise, and the specification of critical enterprise functions, the group developed the following set of recommendations for action:

1. A broadly representative group of key partners and stakeholders should be explicitly tasked with the strategic management function of the FETP enterprise.
2. This Strategic Management group should identify needed changes in all aspects of the FETP enterprise, and adapt the system incrementally while preserving core principles.
3. The Strategic Management group should launch a process to develop applied epidemiology workforce targets at each level of a country’s need (basic [Frontline], intermediate, and advanced), to assure the development of a workforce capable of achieving the public health and global health security capacities identified in the International Health Regulations of the World Health Organization (WHO). Finally, operational research should be initiated as soon as possible to evaluate and further refine these workforce targets.
4. The Strategic Management group should accelerate the institutionalization of FETPs in country ministries of health or other governmental public health authorities, through enhanced advocacy; explicit country planning for the transition from external support; technical support for transition planning (including securing of in-country funding); the development of clear workforce targets; integration of FETP into apex national public health institutes; and engagement of WHO to include and emphasize FETP in their normative policy guidance to countries with regard to their national health workforce.
5. The Strategic Management group should ensure there is a cadre of trained field epidemiologists who can contain an outbreak at the source and respond rapidly to an international public health emergency; and develop the framework needed to support cross-border mobilization of FETP alumni and fellows.
6. The Strategic Management group should continue and enhance efforts to assure and improve the quality of FETPs and the supporting FETP enterprise; and in particular, should continue and seek to expand the current FETP accreditation system.
7. The Strategic Management group should work to assure sustainable funding for the FETP enterprise. In particular, it should (a) sponsor an externally-commissioned, big-picture assessment of FETP effectiveness and impact; (b) develop a compelling, evidence-based narrative to support investment in applied epidemiology; (c) document the actual costs of the current FETP enterprise; (d) develop a mechanism for private sector contributions to support the FETP enterprise; and (e) improve efficiencies wherever possible.

Together with the vision statement, conceptual framing, and enterprise functional elements, we believe these seven recommendations comprise the roadmap to the future for the global FETP enterprise. This roadmap is intended to guide and coordinate the work of the many partners and stakeholders engaged in this effort. There is much work yet to do to build demonstrably effective applied epidemiology capacity throughout the world, but the goal is now clearly visible, and the path to success lies before us.

On June 11-15, 2018, the Task Force for Global Health held a meeting of key leaders and partners from across the globe who have worked for years to ensure effective field epidemiology capacity in countries throughout the world. The meeting was held at the Rockefeller Foundation Bellagio Center in Italy. Nineteen participants worked diligently over several days to develop solutions to long-standing challenges and barriers to progress; and to chart a common path forward for developing global applied epidemiology capacity.

**Background**

To safeguard and promote the health of its citizens, every country must have effective field epidemiology capacity: the ability to detect, investigate and control infectious disease outbreaks and other public health threats; carry out health-related surveys; conduct disease surveillance; perform applied field research; and evaluate the impact of prevention and control programs. In 1951, to enhance field epidemiology capacity in the United States (US), the US Centers for Disease Control and Prevention (CDC) established the Epidemic Intelligence Service (EIS), a two-year postgraduate program of service and on-the-job training for health professionals. EIS officers are assigned to programs at CDC or to state or local health departments,
where they conduct epidemiologic investigations, research, and public health surveillance nationally and internationally under the guidance of experienced mentors.

In 1980, CDC began supporting the development of Field Epidemiology Training Programs (FETPs) in countries throughout the world, modeled on its EIS program. The goal of the FETPs is to develop skilled and experienced field epidemiologists who can detect and respond to disease outbreaks, conduct and evaluate surveillance, carry out applied epidemiological studies, evaluate programs, and develop technical policies, all with the goal of turning public health data into action. Today, the FETP initiative is more important than ever, as many countries and regions with inadequate public health capacities face public health threats of increasing scope and complexity.

The number of countries with FETPs has grown enormously since 1980. There are now 86 FETPs providing field epidemiology services to more than 160 countries around the world. Most of the funding for the programs still comes from CDC, but two major regional programs are supported by the European Union (EU), several country governments now directly support their own FETPs, and additional support comes from the World Health Organization (WHO) and philanthropic foundations. The growth in the number of countries and regions with FETPs is the result of almost forty years of steady investment in the FETP initiative is more important than ever, as many countries and regions with inadequate public health capacities face public health threats of increasing scope and complexity.

However, as the number and variety of programs have grown, challenges have emerged that limit the collective effectiveness of this decades-long investment in global epidemiology capacity:

- **Institutionalization of the FETPs** within each country’s health system has not occurred as quickly as was originally envisioned. From its inception, the goal of FETP funding was to help partner countries create strong, self-sustaining, indigenous training programs in applied epidemiology, thereby strengthening national capacities for disease prevention and control (Music et al., 1990).

This was to be achieved through institutionalization of the FETP in each country’s ministry of health or national public health authority, which would include organization-al integration, the provision of technical and administrative oversight, and stable financial support from in-country resources. However, in many countries, varying levels of political support for FETP within the health system, funding limitations in the face of competing priorities, and weaknesses in health system infrastructure have prevented or delayed the establishment of a sufficient institutional framework to ensure long-term programmatic survival (Jones et al., 2017).

- **Assuring the quality of the FETPs** as well as the graduates they produce is challenging given the great variety of countries and settings in which FETPs have been implemented.

- **Securing adequate, sustainable funding** for all elements of the global FETP enterprise is challenging on several levels. First, though funding and technical support for new FETPs has been sustained by CDC over many years, this funding is not guaranteed. It depends on continued political support for such US-led initiatives as the President’s Emergency Plan for AIDS Relief (PEPFAR), the President’s Malaria Initiative (PMI), and the Global Health Security Agenda. Second, as noted above, the long-term future of each FETP depends on the institutionalization of the program within each country’s national public health system, which in turn depends on available in-country organizational and financial resources. Third, several critical system-level elements of the FETP enterprise—e.g., the global meetings that provide experience in scientific communication; the program accreditation system that promotes and improves FETP quality; and networking platforms like TEPHIConnect that promote shared learning and potentiate cross-national mutual assistance in times of need—are inadequately funded, since to date almost all funding has been directly allocated to the FETPs themselves, and not to enterprise-level functions.

- **Assuring a career path for FETP graduates** has been a challenge for many years. The lack of opportunities in ministries of health that utilize the competencies of FETP graduates is a barrier to institutionalization and can diminish the impact of the program.

- **There is a lack of compelling, evidence-based targets for field epidemiology capacity** at each level of the public health system, aligned to competencies developed through different tiers of applied epidemiology programs—basic (Frontline), intermediate, and advanced—which could guide countries in developing national public health workforce strategies.

- **There is an ongoing need to update and enhance the global FETP system,** to (a) adapt to changes in technology, new analytic techniques and capacities, and enhanced means of communication; (b) address new challenges and needs related to global health security; (c) regularly enhance training (and training modalities) for fellows, and develop lifelong learning opportunities for graduates; and (d) expand as appropriate the scope of traditional applied epidemiology to incorporate new areas of emphasis, e.g., chronic disease and injury epidemiology, the One Health approach, and ‘upstream’ social, environmental, and economic determinants of health. There is a concomitant challenge to ensure that, as we adapt the FETP system, we remain true to the original, applied epidemiology mission.

- **There is a need to develop the competencies and systems to potentiate the mobilization of trained FETP graduates for the provision of mutual, cross-border assistance in times of crisis** (e.g., international disease outbreaks and disaster response).

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1 See Appendix I for a review of the history of the FETP initiative and a map of current programs.

2 We define the “FETP Enterprise” as the totality of the leaders, funders, implementers, partners, government agencies, and other stakeholders engaged in this global effort, along with the associated workforce—competency targets, standards, agreements, technology, etc. that underpin this work. This concept and its functional implications are discussed below in the Roadmap to the Future section, beginning on page 11.
MEETING ORIGIN AND PURPOSE

Given these diverse and long-standing challenges, an over-arching need was recognized to develop a clear, coherent path forward that would re-establish the larger mission of the global FETP development program; streamline and clarify the roles and responsibilities of the various partners in this effort; harmonize the goals and expectations of funders and implementers; and assure effective in-country organizational integration and sustainable long-term funding for this global capacity-building effort.

To meet this need, the Task Force for Global Health proposed a multi-day meeting of FETP funders, implementers and stakeholders, to develop and collectively endorse a global field epidemiology roadmap to guide partners in their efforts to develop strong, sustainable field epidemiology capacity worldwide. The idea and scope for the meeting developed through dozens of conversations with FETP leaders and stakeholders as well as a review of the pertinent literature in this area.

The meeting was held June 11-15, 2018, at the Rockefeller Foundation Bellagio Center in Bellagio, Italy, through the generous sponsorship and financial support of the Rockefeller Foundation. Funding and other support was also provided by the Task Force for Global Health. Planning for the meeting was chiefly guided by a committee comprising Dr. Kip Baggett, chief of the branch that oversees CDC’s global FETP initiative; Dr. Dionisio Herrera, director of Training Programs in Epidemiology and Public Health Interventions Network (TEPHINET), which manages and supports the global network of FETPs; Prof. Martyn Kirk of the Australian National University, and former director of the Australian FETP; and Dr. Patrick O’Carroll, head of health systems strengthening at the Task Force for Global Health.

Nineteen people from across the globe attended this meeting, collectively representing a diverse and highly experienced assemblage of leaders, partners and stakeholders. (Participants and their affiliations are listed on page 2.)
A VISION FOR GLOBAL FIELD EPIDEMIOLOGY CAPACITY

As the number of FETPs has grown since 1980, great variability has arisen in the nature and settings of these programs across numerous countries and regions; and the nature of the work that FETP fellows are called upon to undertake has become increasingly broad and diverse. Given these factors, the group felt it was important to reestablish and focus the ultimate vision that drives this global undertaking.

To that end, a envisioning exercise was begun during the first day of our meetings. This deliberation produced the following consensus vision statement, depicting the ‘final mile’ that motivates our collective efforts:

Every country in the world has the applied epidemiology capacities needed to protect and promote the health of its own population, and to collaborate with others to promote global health.

This consensus vision has several important elements:

First, it defines the goal of the FETPs as assuring capacities for each country in the world. In other words, FETP is about capacity building, not training per se. Indeed, given the on-the-job, learn-by-doing philosophy of FETP, it is inherent to the program that the fellows and their mentors provide critical epidemiologic services to each country’s public health system throughout the training period. Following FETP, many trained and experienced FETP graduates subsequently become part of their country’s public health workforce. The name of the program—Field Epidemiology Training Program—has misled some to assume that the singular purpose of FETP is to provide training. The group actually discussed changing the name of the program to emphasize learning by doing.

Second, in calling for the assurance of applied epidemiology capabilities, the vision indirectly points to the need to explicitly define such capabilities in a way that can be demonstrated and measured. Defining such capabilities, improving a country’s ability to assure and measure these capabilities, and appropriately enhancing target capabilities over time were the subject of several discussions at Bellagio.

Third, the final clause of the vision statement points to the importance of domestic applied epidemiology capacity in protecting global health security. Not only does such capacity help a country to control its own infectious disease epidemics (thereby preventing their spread to other countries), but in times of crisis, trained FETP fellows and graduates can collaborate internationally to help control large-scale disease epidemics and respond to other public health emergencies.

THE FETP ENTERPRISE

Implicit in our discussions was the notion that CDC’s original initiative to support field epidemiology training programs in other countries has now grown into a multifaceted, multi-partner set of efforts that we refer to as the FETP Enterprise.

CDC’s consistent financial and technical support for FETPs around the globe, with important contributions in recent years from the US Departments of Defense and State, continue to provide a critical foundational element in this global undertaking. However, the EU and WHO have supported several FETPs; and several countries have institutionalized the program, supporting their FETPs through their own public health budgets and authorities. In addition, a variety of system-level functions are carried out by TEPHINET, regional networks such as AFENET (the African Field Epidemiology Network) and EMPHNET (the Eastern Mediterranean Public Health Network), and others. These implementing partners work across the FETP network to provide technical support; foster shared learning; develop new learning resources and enhanced FETP curricula; host global and regional meetings where FETP fellows present and defend their epidemiologic work; and assure quality through a formal accreditation process. Leaders and partners at CDC, TEPHINET, the regional networks, and the FETPs themselves have developed standards over time (e.g., in workforce competencies and program accreditation) that improve and guide FETP development, as well as technologies (e.g., for distance learning and field investigation) for use by FETP fellows.

IMPLEMENTING PARTNERS

STANDARDS

THE ROADMAP TO THE FUTURE

A. The FETP Enterprise, defined.

In this document, the terms field epidemiology and applied epidemiology are used interchangeably. Both refer to the ability to engage in field-based epidemiologic investigations to identify and control disease outbreaks, assess population risk factors, etc. The group felt that applied epidemiology was probably the better understood term.

Global health security may be defined as a world safe and secure from infectious disease threats.
In sum, the group felt that the term FETP Enterprise best describes what has evolved into a complex, global collaboration to achieve the vision of ensuring comprehensive applied epidemiology capacity worldwide. The group defined the FETP Enterprise as follows:

**T**he FETP Enterprise comprises the totality of the leaders, funders, implementing partners, government agencies, and other stakeholders engaged in this global effort, along with associated workforce competency targets, standards, agreements, technology, etc. that undergird this work.

**B. Functions of the FETP Enterprise**

If the FETP Enterprise is the global collaborative responsible for developing effective field epidemiology capacity worldwide, then it follows that there is a set of functions the enterprise must perform to achieve this end. A draft set of functions was presented at Bellagio and developed further at the meeting. Nine specific functions, and the current means by which they are accomplished, were specified by the group as follows:

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<th>FUNCTIONS</th>
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<td>1. System strengthening, through mentored learning-by-doing epidemiologic work undertaken for each country’s public health system.</td>
<td>FETP fellows, working at the direction of Ministries of Health, under the guidance of FETP directors and mentors; WHO leadership; support of CDC and other funders; technical support by TEPHINET Secretariat and Advisory Board; regional networks, et al.</td>
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<td>2. Education; Training; Mentorship; Provision of real-world experience</td>
<td>FETPs, conferences, peer learning, new learning resource development, learning-by-doing projects.</td>
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<td>3. Mobilization for mutual assistance in response to international outbreaks and other public health emergencies.</td>
<td>Tabletop exercises and drills; deployment-specific training and actual deployments; development of policies and procedures; MOUs; networking platforms like TEPHINETConnect; trainee credentialing.</td>
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<td>4. Management of specific epidemiologic and other projects that provide experience and deliver services</td>
<td>FETP directors; project funders (e.g., CDC); implementing partner organizations with management capacity, accounting standards, HR (e.g., TEPHINET and the regional networks).</td>
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<td>5. Quality Assurance and Improvement</td>
<td>Program accreditation; trainee credentialing (in discussion); career-long learning; global/regional conferences; FETP exchange opportunities.</td>
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<td>6. Institutionalization of FETPs: Advocacy and planning for in-country, sustainable institutionalization, including clear workforce targets at each FETP site, and a system to assure appropriate career placement of graduates.</td>
<td>Domestic financial resources; political will; advocacy; WHO resolutions; research to determine optimal workforce targets for various settings; network communications; integration of FETP into apex national public health institutes.</td>
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<td>7. Program accountability</td>
<td>Enhanced strategic management of the FETP enterprise (Function #9).</td>
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<td>8. Monitoring and evaluation; targeted operational research</td>
<td>CDC and other funders; TEPHINET Secretariat and Advisory board; FETP directors; academic partners and foundations.</td>
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<td>9. Strategic Management of the FETP Enterprise at all levels, to: (a) sense and respond to specific needs and significant changes in the environment in which graduates work; (b) grow the network; (c) prioritize and support new programs, etc.</td>
<td>CDC and other funders; TEPHINET Secretariat and Advisory Board; FETP directors; ‘hallway conversations’ at global and regional meetings, etc.</td>
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Note that the primary functional elements of the FETP enterprise are enumerated as the first two functions: the service delivery and training and experiential learning that comprise the essence of the FETP capacity-building work in a given country.

Functions number 3 through 8 represent enterprise-level (i.e., cross-FETP) work that must also be done to assure that FETP fellows and graduates are truly prepared and positioned to strengthen and protect national, regional and global health security.

The ninth function—strategic management of the FETP enterprise—is also an enterprise-level function, and is discussed in the next section.

**C. The Need for Strategic Management**

As the number of FETPs has grown and various supporting structures have been developed, many if not all of the enterprise-level functions listed above have been performed to a certain extent. For example, the need for change has been recognized, such as the need to evolve from the original, two-year training model to a three-tiered approach encompassing basic (Frontline), intermediate, and advanced training programs (André et al., 2017). The need to promote and assure quality was also recognized, which led to TEPHINET’s program accreditation system. Systems to promote accountability, to assure quality, to foster cross-program communication and promote shared learning, and so forth have all been developed to some extent as the need was recognized and as funding allowed. This has proceeded organically, resulting in an approach that has been relatively effective. To date, this ‘strategic management’ has been informally accomplished through a variety of mechanisms that have been led by CDC and other funders; the TEPHINET Secretariat and its advisory board; FETP directors via their regular meetings; and innumerable ‘hallway conversations’ among a broad group of stakeholders at the global and regional FETP meetings managed by TEPHINET and the regional network partners.

Again, this informal approach has been relatively effective to this point, but it is not optimally configured to achieve the vision developed at the Bellagio meeting. For example, there has at times been confusion over roles and responsibilities among the various support structures that have been developed for initiating, guiding, developing, networking, and assuring the quality of FETPs. There has also been inadequate systematic effort devoted to enterprise-level challenges such as institutionalization; development of sustainable funding; diversification of partners; and critical operational research needed to develop meaningful workforce targets. This is no criticism of the tremendous and visionary work that has been done to date. It is rather a recognition that, going forward, we need a more coordinated, systematic approach to strategic management of the FETP enterprise to realize our vision of global applied epidemiology capacity.

Thus, the group recommended the following:

_A broadly representative group of key partners and stakeholders should be explicitly tasked with the strategic management function of the FETP enterprise._

A new group could be constituted, or the mandate of an existing group (e.g., the Advisory Board to the TEPHINET Secretariat) could be expanded to meet this recommendation. It would be the responsibility of this body to assure the performance of the various enterprise-level functions described, to recognize and attend to the need for changes in approach as opportunities or challenges arise, and to recommend and carry out such actions as the group determines appropriate over time. One of the key responsibilities of the strategic management entity would be to sense and respond to the need for changes in the FETP curricula and FETP model itself as new challenges, technologies and new opportunities arise. This is discussed further in the next section.
The group had a wide-ranging discussion on the need to modernize FETP in the face of a variety of new and evolving challenges and opportunities, including:

- Growth of e-learning platforms, potentiating changes or supplementary means for didactic teaching;
- Advances in genomics;
- New bedside and field-based technologies for rapid diagnostics;
- New data systems and data analytic techniques;
- Massive linked datasets;
- Increasingly ubiquitous mobile phone and mobile technologies;
- Cloud-based data storage and access;
- Globalization, leading to different risk profiles;
- Changing demographics, disease profiles, and environmental challenges;
- Broadening scope of applied epidemiology, including enhanced collaboration with animal and environmental health partners (One Health), expanded work in non-communicable diseases, and investigations of ‘upstream’ social, environmental, and economic determinants of health;
- Changing social dynamics and social expectations, such as how data are handled in an era of online privacy concerns;
- Social media as a means of communication and citizen science.

In responding to new opportunities, and in adapting to new challenges and expectations, the group stressed the need to stay true to a core set of principles that undergird the FETP challenges and expectations, the group stressed the need to:

- In responding to new opportunities, and in adapting to new challenges and expectations, the group stressed the need to stay true to a core set of principles that undergird the FETP challenges and opportunities, including:

  - The defining essence of the program should always be the provision of critically-needed public health services, through a learn-by-doing approach that improves the effectiveness of the workforce and systems required to provide those services. This duality of function has always been a hallmark of FETP. It is at once a health systems strengthening program that provides real-world epidemiologic services within the context of the government public health system and also an experience-based training program in field epidemiology. The group noted the imperative need to ensure that FETP fellows gain sufficient actual field experience.

  - The capacity for detection, response, and control of infectious disease is essential. Though applied epidemiology is fundamental to each country’s public system in myriad ways (e.g., in monitoring health trends, determining the prevalence of various behavioral and environmental risk factors, etc.), it is most readily appreciated when applied to the rapid detection, response, and control of infectious disease epidemics. This capacity is central to both aspects of our vision for the global FETP enterprise: to protect and promote the health of a country’s own population, and to collaborate with others to promote global health security.

  - The range of training and service should be adapted to the needs of the country. In terms of the relative effort applied to basic (Frontline), intermediate and advanced FETP:

    - The nature of the work should be relevant to local context.

  - The FETP should be an integral, capacity-building element of a country’s public health system. It was noted that in some circumstances, a regional FETP—that is, an FETP designed to serve the epidemiology capacity-building needs of several countries in a geographic region—is most appropriate. In any case, the ultimate goal of regional FETPs remains the same as for country-based FETPs: to build an effective sustained applied epidemiology capacity in each country in the region.

Several options were discussed for adapting to new opportunities and challenges:

- Building more flexibility into the FETP in terms of electives;
- Providing an optional third year of training for those who want to specialize in some aspect of applied epidemiology (currently an option in some countries);
- Incorporating more training in laboratory skills essential to modern applied epidemiology;
- Providing enhanced opportunities for training in multi-disciplinary team work, especially as it relates to responding to large-scale or complex outbreaks, natural disasters or other health emergencies;
- Adapting the core curriculum to incorporate the One Health paradigm; and,
- Ensuring training and capacity-building for cross-border mutual aid.

This broad range of options for enhancing and broadening the scope of FETP obviously raises the challenge of adapting the curriculum without compromising the core mission of developing fundamental capacity in applied epidemiology.

With this in mind, the group recommended the following:

The Strategic Management group (as defined above) should identify needed changes in all aspects of the FETP enterprise, and adapt the system incrementally while preserving core principles.

At present, there is no single, deliberative body mandated to hold such discussions. Several members of the group suggested that a subcommittee of TEPHINET (as the global Secretariat for the FETP network) would be the appropriate body for convening such discussions. WHO might also play an important convening role. The group noted that the challenge was not only about modernizing the FETP curriculum, but adapting the larger FETP enterprise as and when appropriate. The question to be considered is more than just what type of graduate we are seeking to develop, but rather what capacity-building effect we seek to have on the country’s health system, from the training, the work during residency, and the influence and effect of FETP graduates once they work in the system.

This deliberative body would assess in an ongoing way the need for incremental changes to the FETP approach and curriculum over time. As a complement to this incremental approach, several members of the group advocated for a thorough, system-wide review at this juncture—essentially a big-picture evaluation of the FETP enterprise, that would review different models, assess the effectiveness and impact of the programs, and suggest long-term opportunities and strategies going forward. This idea is discussed further in the Assuring sustainable funding section, below.
E. The Need for Clear, Evidence-based Workforce Targets

In its most recent analysis of data on human resources for health, WHO estimates that there was a global shortage of over 17 million health care workers in 2013, a deficit expected to only slightly improve by 2030 (Scheffler, 2016). Hidden within these statistics is an acute but largely unmet need for a public health workforce of sufficient size and experience to allow countries to address the most important health concerns of their populations, contribute to global health initiatives, achieve the sustainable development goals, and meet their obligations under the WHO International Health Regulations (IHR).

FETPs are optimally positioned to not only alleviate this gap but also to address these critical public health priorities while doing so. A hallmark of the program is the focus on improving the effectiveness of critical public health systems and services. This includes improving systems for surveillance for infectious and non-communicable diseases; responding to infectious disease outbreaks and natural or man-made public health emergencies; strengthening laboratory systems and networks; evaluating public health program service delivery; investigating emerging public health threats; and providing strategic health information to decision-makers for policy development.

Based on WHO’s Joint External Evaluation (JEE) process (Bell et al., 2017), there is a current workforce target for each country of one trained field epidemiologist per 200,000 population (Boulton et al., 2009; Schneider et al., 2011). The evidence justifying this target is thin, and the target itself is insufficiently granular to allow each country to set its own targets based on specific demographics, health system and geopolitical structures, and population needs (e.g., percent rural vs. urban population). Moreover, specific and appropriate targets are needed for each level of epidemiologic training, from advanced through intermediate to basic (Frontline).

This issue is of central importance to the overall FETP enterprise, as it seeks to assure the development of a workforce capable of achieving the public health and global health security capacities identified in the WHO IHRs. Clear, specific, evidence-based workforce targets would help ministers of health, legislators, and other funders and decision-makers appreciate the need for training and employing specific numbers of various kinds of epidemiologists in their country’s public health system. Clear workforce targets would also promote institutionalization of FETPs and help ensure a career path for FETP graduates.

Workforce targets could be developed and refined via expert consensus (based on existing research as well as experience in managing a variety of small and large disease outbreaks), in close collaboration with public health leaders in a variety of countries. Operational research will be essential to evaluate and further refine these targets, and ideally enable public health leaders in each country to develop targets that take a variety of evidence-based, workforce-relevant factors into account (e.g., the country’s demographic profile, percent urban vs. rural population, age of retirement, etc.).

The group agreed that, once developed, the applied epidemiology workforce targets should be endorsed by international bodies like WHO, to foster an understanding of the critical need for adoption of workforce targets by country public health leaders throughout the world. WHO-endorsed workforce targets could serve as one of the benchmarks for national public health workforce strategies (a JEE indicator). This will require engaging parts of WHO in addition to the emergencies program, to ensure that the wider UN is aware of the role of FETP in developing workforce capacity.

Thus, the group strongly endorsed the following recommendation:

The Strategic Management group should launch a process to develop applied epidemiology workforce targets for each level of a country’s need (basic [Frontline], intermediate and advanced), based on the best available evidence; and initiate operational research as soon as possible to evaluate and further refine these targets.

F. The Path to Institutionalization of FETPs

As noted, it has proven challenging for many countries to transition their FETPs from start-up financial and technical support by CDC, EU, WHO, and others to full organizational and financial support from their ministries of health or other public health authorities. However, in various ways, several countries have successfully navigated this transition. Six examples described at the Bellagio meeting are summarized in Appendix II.

Dimensions of FETP Institutionalization

CDC views institutionalization as a pathway to sustainability, and CDC colleagues have now defined several dimensions of institutionalization, each with associated indicators:

- Organizational integration in a ministry of health
- Program oversight – including an advisory board
- Existence of a strategic plan that is actually used
- National technical support and staffing
- National management/administration support
- National financial support
- Functional program integration and use

Challenges to Institutionalization of FETPs

A common challenge to institutionalizing FETPs is the lack of a true champion for the program who has the authority and political will to push for full country ownership. Many public health leaders recognize the value of FETP to their country’s public health system, and speak highly of their program; but for various reasons—often but not solely financial—they would prefer that external sources continue to fund and support it. Some program directors prefer not to make their program part of their country’s ministry of health, as that might result in the loss of funding from external sources, or the loss of other support resources such as resident advisors.

Another challenge lies in the fact that currently there is no systematic, evidence-based method for determining a given country’s applied epidemiology workforce needs (See discussion in Section E, above), making it difficult to argue for sustained in-country organizational and financial investment. In addition, to date no explicit recommendation has been promulgated by world bodies such as WHO, recommending that all countries institutionalize their capacity to develop and sustain an effective applied epidemiology workforce.
A third challenge is that, when initially launching a country’s FETP, insufficient emphasis has sometimes been placed on planning for eventual institutionalization of the program within the ministry of health or national public health institute.

Ideas to foster and accelerate FETP institutionalization

Various ideas to accelerate the institutionalization of FETPs were discussed at Bellagio. The group suggested that TEPHINET, regional networks, and key international organizations (among others) should enhance their advocacy for in-country, sustained support for developing and maintaining field epidemiology capacity. The group thought advocacy by leaders of regional FETP networks, Africa CDC, and other regional officials might be especially effective with country leaders in their regions. In addition to advocacy, the regional networks could also foster institutionalization by providing enhanced technical and programmatic support to countries in their region that are working to institutionalize their FETPs.

Closer collaboration should be explored between the FETP enterprise and the International Association of National Public Health Institutes (IANPHI). IANPHI links and strengthens the government agencies responsible for public health, and could be an important advocate (and an organizational home) for FETP institutionalization. The development of national public health institutes (NPHIs) has many potential benefits, one of which is to potentiate a clear career path for FETP graduates.

To foster long-term sustainability, it was suggested that the FETP should be a line item in the budget of each country’s ministry of health. The IHR and the JEE process represent planning for eventual institutionalization of the program within the ministry of health or national public health institute. CDC has developed an assessment tool for FETP directors and staff to use in measuring progress toward institutionalization. The group strongly encouraged CDC to continue to refine the institutionalization tool, and suggested CDC modify the tool so it could be used by regions (i.e., groups of countries served by a single FETP), as well as by individual countries. It was agreed that each FETP country (or region) should develop an explicit transition plan to move toward institutionalization. CDC will continue to develop tools to facilitate the transition process.

In summary, the group recommended the following:

The Strategic Management group should accelerate the institutionalization of FETPs in country ministries of health or other governmental public health authorities, through:

- enhanced advocacy
- explicit country planning for the transition from external support
- technical support for transition planning
- development of clear workforce targets
- integration of FETP into apex national public health institutes
- engagement of WHO to include and emphasize FETP in their normative policy guidance to countries with regard to their national health workforce

G. Providing Mutual Assistance

Recent epidemics of Ebola in west Africa and Zika virus in central and Latin America have highlighted the value of trained FETP graduates and fellows, as well as the need to be able to deploy these epidemiologists across international boundaries in support of large-scale outbreak responses. Indeed, a key role of FETP is to provide surge capacity during public health events of national or international significance.

In Africa, several such cross-border deployments have already been facilitated by AFENET; and TEPHINET recently used its TEPHICConnect alumni networking platform to identify qualified FETP graduates for possible deployment to the 2018 Ebola outbreak response in the Democratic Republic of Congo. Current mechanisms and models of deployment for FETP fellows and alumni could be improved, however, to ensure that deployment is simple and can be done at scale. Work is needed to clarify roles and develop agreements (e.g., memoranda of understanding) among the several relevant parties (WHO, GOARN, TEPHINET, the regional support networks, etc.)

The group discussed the idea of a credentialing system for individuals (as contrasted with the accreditation system for field epidemiology training programs), to verify competencies of field epidemiologists. Credentialing epidemiologists would be analogous to credentialing physicians and other medical providers. One option would be to credential individuals for a limited number of field epidemiology competencies that are especially important in an international response. This would enable the rapid identification of certified responders for potential deployment to such outbreaks. There was no final recommendation, but the group agreed that the topic warranted further consideration.
**H. Assuring Quality**

Since the inception of the FETP initiative, the development of high quality FETPs has been a priority for program directors as well as CDC and other funders and implementation partners. CDC fosters quality improvement through technical support by in-country regional advisors and headquarters staff. Quality is also improved through learning resource development and standard setting, generally developed and supported through ongoing collaboration among CDC, TEPHINET, the regional networks, advisory committees, FETP directors, and other partners.

However, given the rapid growth in the number of FETPs and the great variety of countries and settings in which FETPs have been implemented, the need was recognized for a formal accreditation process to assure and improve program quality. Led by TEPHINET and guided by the TEPHINET Accreditation Working Group, the processes and standards for program accreditation were developed with broad partner input over a five-year period. Since the launch of the first accreditation cycle in 2016, the TEPHINET Global Accrediting Body (GAB) has accredited programs in the US, Canada, the United Kingdom, Brazil, Kenya, Cameroon, the Philippines, and Zimbabwe. In 2018, eight additional countries are in the process of seeking accreditation.

The group agreed that assuring and improving quality remains critically important to the success of the global FETP enterprise, and that we should continue and expand the accreditation process currently under way. To that end, it is important that we consider engaging new partners who can help support the accreditation process. A sustainable funding model for accreditation is needed, as costs are not currently covered either by FETPs or country ministries. There may be important synergies with the FETP-V initiative (for veterinarians) as regards program accreditation.

TEPHINET is exploring ways to provide lifelong learning support to FETP graduates. This may occur through online learning materials, advanced courses, networking, and conferences. This would serve as another mechanism for quality improvement, by ensuring that FETP graduates maintain their skills and education, and remain connected with the initiative. However, as with the accreditation system, a sustainable funding strategy for lifelong learning needs to be developed.

In sum, the group recommended the following:

**The Strategic Management group should continue and enhance efforts to assure and improve the quality of FETPs and the supporting FETP enterprise; and in particular, should continue and seek to expand the current FETP accreditation system.**

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**I. Assuring sustainable funding**

In considering how to sustainably fund the work to achieve our vision, the group articulated a set of key principles:

- **We should seek to maximize the impact of our investments;**
- **We should invest in FETPs strategically, i.e., in alignment with the mission, and appropriate to country and regional needs;**
- **We should carefully set priorities as to what the enterprise does and where. (This will require a thorough understanding and accounting of the costs of all parts of running the enterprise);**
- **We should advocate for funding FETPs that covers the full costs of training—including presentations of epidemiologic work by FETP fellows at global and regional FETP conferences;**
- **We should be accountable, and demonstrate accountability through good stewardship;**
- **We should avoid duplication of effort;**
- **We should act ethically at all times;**
- **We should adapt to local realities and capabilities;**
- **We should evaluate program performance and assess our impact on health and preparedness;**
- **We should seek to make funding of FETPs predictable and reliable, to enable well-considered, long-term strategic plans.**

**Strategies to develop sustainable funding**

There was strong consensus on the need to develop an investment case for epidemiology capacity building. The FETP enterprise needs to articulate a compelling value proposition for investing in FETPs specifically and field epidemiology capacity generally.

The group supported commissioning a well-respected external organization to assess the approach and impact of the current FETP enterprise, and based on this assessment to articulate a clear, compelling, evidence-based narrative to support the case for investment in applied epidemiology. The group felt that a report by a high-profile, external group would be most authoritative. Two possibilities were discussed: engaging the US National Academy of Sciences, Engineering and Medicine to develop a report in collaboration with analogous national academies in several other countries; or engaging a reputable contractor (e.g., Deloitte) to undertake such an assessment.

Consistent with the principles listed above, the FETP enterprise should seek to improve efficiencies wherever possible, to maximize effectiveness but also to cut costs. As a first step, the group noted that there is a clear need to develop a better understanding of the actual costs of the current FETP enterprise. It was also suggested that, where feasible, CDC should use local or regional Resident Advisors (RAs) instead of CDC-assigned RAs. This is not always possible, but is much less costly in those places where it is.

The group discussed the need for a mechanism by which the private sector can contribute funds to support the FETP enterprise, perhaps along the lines of the Gavi model. It was noted that many industries benefit very directly from the rapid identification and control of potentially serious epidemics, including transportation and ports; food and livestock; mining and extractive industries; tourism; health insurance; and the pharmaceutical industry. These industries might be willing to support FETPs under the right circumstances.

In sum, the group recommended the following:

**The Strategic Management group should work to assure sustainable funding for the FETP enterprise. In particular, it should:**

- **sponsor an externally-commissioned, big-picture assessment of FETP effectiveness and impact**
- **develop a compelling, evidence-based narrative to support investment in applied epidemiology**
- **document the actual costs of the current FETP enterprise**
- **develop a mechanism for private sector contributions to support the FETP enterprise**
- **improve efficiencies wherever possible**

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6. Gavi, The Vaccine Alliance, was formerly called the Global Alliance for Vaccines and Immunization (GAVI). Gavi is a global, public-private partnership committed to increasing access to vaccines for children in lower-income countries. It is supported by developing country and donor governments, the World Health Organization, UNICEF, the World Bank, the vaccine industry and technical agencies, civil society, the Bill & Melinda Gates Foundation and other private philanthropists.
Conclusion

The Field Epidemiology Roadmap meeting at Bellagio originated in the sense that the FETP initiative had reached an important inflection point. It seemed the time was right to assemble a select group of FETP leaders, partners, and other stakeholders to address long-standing challenges to the development of global applied epidemiology capacity. Indeed, the opportunity for deep engagement afforded by the meeting was wonderfully productive. It allowed for the development of an inspiring vision for the initiative; a unifying conceptual framing of our global efforts as a complex, multi-partner FETP enterprise; the definition of a set of specific functions that the enterprise must perform to achieve our vision; and a concrete set of recommendations that collectively chart a roadmap into the future for the FETP enterprise. There is much work yet to do to build demonstrably effective applied epidemiology capacity throughout the world, but the goal is now clearly visible, and the path to success lies before us.

References


APPENDIX I. THE FETP INITIATIVE, PAST AND PRESENT

A. A History of the FETP Enterprise

As noted above, a Field Epidemiology Training Program, or FETP, is a supervised, on-the-job, competency-based training and service program to develop field epidemiologists at all levels of a country’s health system. It is modeled on Centers for Disease Control and Prevention’s (CDC’s) Epidemic Intelligence Service (EIS), a US-based, two-year applied epidemiology training program founded in 1951 (Thacker et al., 2001). CDC has been supporting the development of FETPs for 38 years. Since the establishment of the first CDC-supported FETP in Thailand in 1980, CDC has helped establish FETPs accessed by more than 70 countries, and trained more than 11,300 field epidemiologists and surveillance officers who play key roles in disease surveillance and response worldwide. The European Union has developed a regional approach, providing FETP opportunities in almost 50 countries in Europe, North Africa and the Middle East.

For many years, CDC focused on developing two-year FETPs, which strengthened epidemiology capacity primarily at the national level of a country’s public health system. In recent years, CDC and ministries of health (MOH) have recognized the importance of strengthening the capacity of the public health workforce at all levels of their public health systems. In response, a three-tiered training model was created to strengthen surveillance and epidemiology capacity at all levels of a country’s health system, from the local to the regional to the national level. Though varying in length and sophistication of training, all three tiers use the same approach of condensed classroom instruction (<25%) followed by field placements (>75%) to gain experience and competence in field epidemiology (Traicoff et al., 2015; André et al., 2017).

At present, 86 FETP programs across the globe provide epidemiologic services and training to more than 160 countries (see Map, next page). Of the 86 FETPs, 71 are members of TEPHINET (Training Programs in Epidemiology and Public Health Interventions Network), a global network of FETPs founded in 1997 to foster collaboration and peer-to-peer assistance, promote program quality, support continuous learning, and facilitate mobilization of trained field epidemiologists in response to global disease threats. Several regional FETP support networks have been established to supplement the global TEPHINET network, including the African Field Epidemiology Training Network (AFENET), the Eastern Mediterranean Public Health Network (EMPHNET), the South Asia Field Epidemiology and Technology Network (SAFETYNET), the European Programme for Intervention Epidemiology Training (EPIET), and REDSUR (the network of Central and South American FETPs). These regional networks foster collaboration and cooperation among countries in their respective regions, in collaboration with the TEPHINET Secretariat.

Today, FETPs are supported not only by CDC and other US government agencies, but also by the European Union, World Health Organization (WHO), individual country governments, and philanthropic organizations. However, CDC and the US government provide the majority of support for national FETPs that still require external funding. Funding from CDC is complex with multiple sources. A high percentage of funding comes from disease-specific initiatives like the President’s Emergency Plan for AIDS Relief (PEPFAR), the President’s Malaria Initiative (PMI), and polio eradication. Most funding comes tied to specific national programs, so it does not support essential system-wide activities important to the larger enterprise (e.g., scientific conferences, networking platforms, and accreditation).
From the outset, CDC has sought to help public health officials in other countries develop high quality programs that ultimately become institutionalized and sustained within their MOH or other appropriate public health authorities. As originally envisioned, CDC’s technical and financial assistance for a given FETP would decrease over time with commensurate increases in support from the MOH. However, as noted above, institutionalization of FETPs has been challenging for many countries.

The global network of FETPs has become increasingly important as concerns about global health security have grown in recent decades. In 1997, the International Health Regulations (IHR) entered into force, requiring countries to report certain disease outbreaks and public health events to WHO. The IHR recognize the need for a well-trained public health workforce for countries to achieve core capacities to detect and respond to public health events. The IHR and JEE—a part of WHO’s monitoring and evaluation framework for IHR—specifically calls for countries to establish applied epidemiology training programs like FETP. The IHR and JEE provide a framework for efforts to strengthen public health workforce capacity through FETP.

FETP has had tremendous impact over the years and has grown well beyond initial expectations. The long-term goal has remained constant, however, as articulated by Music et al. in 1990: to “create strong, self-sustaining, indigenous training programs … in applied epidemiology, thereby strengthening national capacities for disease prevention.”

**B. Current Opportunities and Challenges**

To help develop the agenda for the Bellagio meeting, a two-item survey of participants was undertaken in advance. The survey asked meeting participants to (1) describe the top 1-3 strengths of the current FETP enterprise; and (2) describe the most important 1-3 issues or challenges to be addressed at this time.

The major strengths identified by two or more participants were as follows:

- There is an agreed-upon approach to training and competencies at each level of training, yet the approach remains adaptable to local context and changing needs;
- There is a focus on quality at the program level;
- The approach is practice-oriented;
- The approach employs on-the-job, field-based learning;
- The system embraces shared learning and collaboration via the supporting networks;
- There has been enduring support from CDC, et al.;
- There is increasing recognition of the central importance of field epidemiology in general, and FETP specifically; and,
- FETP is a globally recognized brand.

Individual respondents noted additional strengths including the linking of epidemiology and laboratory practice; the integration of FETP within government ministries of health; and a high retention rate of FETP graduates in many countries following training.

The major challenges currently facing the global FETP initiative were identified as follows (in decreasing order of their frequency of mention):

- Institutionalization of the FETP in MOHs or other public health authorities;
- Variable quality of FETPs and their graduates;
- Funding to support the FETPs as well as the enterprise level systems that support them;
- Assuring a career path for FETP graduates in their countries’ MOHs;
- Making a compelling, evidence-based case for different levels of field epidemiology capacity;
- Adapting to changes in technology, data analytic capacities, and means of communication;
- Staying true to the mission of applied epidemiology;
- Enhanced training for both fellows and graduates;
- Mobilizing FETP fellows to provide mutual (i.e., cross-border) assistance in times of emergency; and,
- Adapting FETP to the One Health framework.

The agenda for the Bellagio meeting was designed to allow participants to address the major challenges identified in the survey, while building on the strengths and accomplishments of the FETP enterprise to this point.
APPENDIX II: INSTITUTIONALIZED FIELD EPIDEMIOLOGY TRAINING PROGRAMS - EXAMPLES

In various ways, several countries have successfully navigated the transition of their FETPs from start-up financial and technical support by CDC and others, to full organizational, technical, and financial support from their ministries of health or other public health authorities. Six examples were described at the Bellagio meeting:

- Dr. Sam Bracebridge talked about the establishment of UK-FETP in Public Health England (PHE). The program was established as a result of a committee recommendation, with funding coming via a direct line from government. In 2010, there was a reduction in the program budget. However, the subsequent Ebola crisis resulted in the formation of a rapid response team that included funding for two FETP fellowships each year. In total, the program trains between 5-7 fellows per year. There has been debate about the optimum number of epidemiologists that they produce. The program is TEPHINET-accredited and is currently undergoing a formal evaluation. The FETP fellows are viewed as being at the core of PHE business. There is discussion about expanding the current FETP focus to include non-communicable diseases.

- Dr. Martha Lucia Ospina Martínez talked about the Colombian FETP, which has been housed in Colombia’s National Institute of Health (Instituto Nacional de Salud, or INS) for the last 25 years. Every year FETP leaders must justify their funding to the Ministry of Health. They graduate 3-8 fellows per year. There have been 120 advanced FETP fellows and around 3,000 trained at Intermediate and Frontline levels. Many FETP graduates work in the NIH or in other government departments. Some go on to work for universities, global health organizations, etc. There is an official job title of ‘epidemiologist’ in the government human resources system, but FETP fellows do not get a certificate that satisfies this role.

- Prof. Mufuta Tshimanga described the Zimbabwe FETP that started in 1993 as a Public Health School Without Walls, funded by the Rockefeller Foundation. The program transitioned to CDC funding from PEPFAR, until 4-5 years ago. The Zimbabwe government now provides most of the support to the FETP. The program had to institute a revised model in 2011, funding ceased and the program had to institute a revised model. The program was originally funded by US CDC. They still have a CDC resident advisor and scientific writer. The biggest challenge they currently face is that NCD has funding for only 4 fellows/year. There is to be a change in the FETP’s programmatic home to a National Institute of Public Health, which will change potential funding and governance positions. The South Africa FETP has also trained fellows from neighboring countries, with funding coming from external sources or the resident’s government.

- Prof. Martyn Kirk described the Australian FETP - the Master of Philosophy in Applied Epidemiology (MAE) program. The MAE program is in a university and was established in 1991. The program was originally funded centrally from the Ministry of Health. In 2004, funding ceased and the program had to institute a revised model. The program now has a memorandum of understanding with the federal department of health, and receives monies from the federal government and field placements. The Australian FETP has become very successful and takes in about 15 fellows per year. Program graduates end up working in public health, academic institutions, and international health.