

# Tracking Trainees to Success

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**Abstract** – The Fogarty International Center (FIC) is a pioneer in the arena of global health research capacity development. Over two decades, FIC funded training programs have generated thousands of scientists that are currently leaders in health research around the world. Despite these successes, FIC doesn't have a systematic way to track its trainees and measure the impact of its training on the research capacity of the trainee's country. To address this issue, FIC developed an innovative web-based trainee tracking tool – CareerTrac. The goal of this system is to create a complete trainee roster for all FIC research training programs and to monitor outputs, outcomes and impacts of FIC international trainees.

The Fogarty International Center (FIC) at the National Institutes of Health (NIH) is a pioneer in the field of international research capacity building and has been funding global health research and training programs focused on low and middle income countries for over two decades. FIC's training programs have contributed significantly to the growth of a worldwide community of global health scientists who have made remarkable advances and discoveries and become leaders in the global research enterprise.

The mission of FIC is to “support and facilitate global health research conducted by U.S. and international investigators, building partnerships between health research institutions in the U.S. and abroad and training the next generation of scientists to address global health needs.” [1] Operationally, FIC achieves its mission through research and research-training programs.

One of the important agendas of FIC has been to develop critical mass of scientists in developing countries in order to address global health needs. Over the years, FIC funded training programs have produced thousands of scientists that are trained to compete successfully for research support, develop and publish new knowledge and advance science [2]. Many of these scientists are now leaders in health research, medical education and priority setting for health-care around the world [1]. Despite this fact, there has not been a system in place that would allow FIC to track its trainees and conduct long-term assessment of these training programs on the research capacity of the trainee's country.

As FIC-funded programs continue to flourish and train scientists, grantees around the world have been striving hard to monitor an increasing pool of trainees. Grantees have been repeatedly requesting FIC to develop a system that can serve as a repository for all their trainees and can help them to

track, monitor, and compare trainees across countries. This overwhelming call to track the trainees and thereby assess the impact of FIC training programs has resulted in the origination of an innovative web-based tool– CareerTrac. CareerTrac is an online application that is used to collect, track and report qualitative and quantitative information on trainees that are funded by FIC. This first of its kind system was developed as a tool for:

- FIC staff to evaluate the effectiveness and impact of its health research training programs
- FIC grantees to track their trainees and use the information in progress reports and when applying for other grants.

## II. NEED FOR A TRAINEE TRACKING SYSTEM

FIC is one of the key players in the arena of global health research capacity development. When compared to other NIH Institutes and Centers, FIC has a considerably large proportion of its investment in research-training programs. In FY 2008 alone, FIC invested almost 60% of its extramural grant budget in its training programs and this has been consistent over the past decade. Currently, FIC administers 13 training programs that have both infectious disease focus and non-communicable disease focus [3]. These training programs are structured to build research capacity by training researchers at institutions around the world.

In spite of this huge investment, there is no way for FIC to track, in the short or long term, the complex indicators necessary for evaluating the effects of training on international research trainees and their institutions. FIC Program Officers often receive anecdotal information on the success and accomplishments of trainees from grantees and other sources. While this data has been useful, it does not inform FIC about the training impact. There is also selection bias – usually, only the best and accomplished trainees are anecdotally discussed.

Program evaluations are very important in assessing the progress of the program towards reaching its goal. It provides qualitative and quantitative evidence and informs the management to help make policy and programmatic decisions. FIC reviews its programs once every 5 years using FIC Framework for evaluation ([http://www.fic.nih.gov/about/plan/eval\\_framework.htm](http://www.fic.nih.gov/about/plan/eval_framework.htm)).

Every time a training program is evaluated, the Evaluation

Officers grapple with lack of historical and trans-grantee trainee data. Lack of available data slows the evaluation process and sometimes makes it less accurate and useful.

Precise data is required by the FIC management to analyze how its investments in training programs are translated into trainee's successes and subsequently how these successes increase the research capacity of an institution and, hopefully a country. Trainees are the informants of the program [4]. When a trainee decides to deviate from their field of training, FIC would like to know why. Such data is very important in optimizing program features, modifying the nature of training and/or altering the mentoring process [4].

Understanding the impact of FIC's training on the research capacity is very complex and it requires an innovative data system and metrics to prove association, let alone causation. It is important for FIC management to have a robust data tool that can provide accurate long-term information on trainees.

### III. ENVIRONMENTAL SCAN OF TRAINEE TRACKING SYSTEM

Once the need for a data system was established, the Evaluation Officer at FIC inquired around NIH to see if there were any data tools in existence, that could be modified to meet FIC's needs. NIH uses trainee tracking tools like Trainee and Fellows File (TFF) managed by National Science Foundation (NSF) and the Information for Management, Planning, Analysis and Coordination (IMPAC) database that is centralized and electronic at NIH; however neither contains adequate qualitative and quantitative data for long-term tracking of foreign trainees [4]. Overall, NIH doesn't collect or track foreign trainee data through a formal data system.

Since there was no appropriate data tool within NIH, FIC looked at other agencies for similar systems that would track international trainees and it found a system at the US Agency for International Development (USAID) –TraiNet (<https://trainetweb.usaid.gov/Welcome.do>). USAID tracks its international trainees to monitor training costs and results for all USAID funded training activities occurring in the U.S. and abroad. The USAID collection was reviewed extensively by FIC for applicability. Several discussions were held with USAID and FIC in 2003 and 2004 prior to FIC embarking on a new data collection. Although TraiNet was used as a basis for FIC's CareerTrac, significant modifications were made to the system in order to cater to unique FIC needs.

### IV. HOW FIC TRAINING PROGRAMS ARE UNIQUE?

FIC training programs are very different from other training programs at NIH and research capacity building programs at other organizations. This uniqueness is the driving force for FIC to chart its own path for collecting trainee data. The following are some of the challenges faced by FIC –

#### A. *Wide variety of program areas:*

FIC administers 13 training programs in focused areas – including AIDS/TB, Trauma, Infectious disease, Environmental and Occupational Health, Non-communicable diseases as well as Bioethics and Bioinformatics. The vastness in focus area makes it difficult for FIC to compare between the programs. FIC chooses focused training areas based on its Core Operating Principles highlighted in FIC Strategic Plan including - Pioneering new fields and filling gaps in global health based on the needs of training institution, country and region; Promoting international research training and collaboration; Advancing global health research at NIH and Encouraging Science for Diplomacy [1].

#### B. *Types of degrees awarded:*

FIC training programs do not require grantees to train a specific number of masters, doctoral or post-doctoral level trainees in a given country. Based on the country's needs, program goals as well as the incoming student composition each program trains students in one or more of the following - masters, doctorate, post-doctorate, certificate programs or even short-term courses.

#### C. *Geographic distribution:*

FIC funded trainees are mostly international and are dispersed through out the world. Each country/region is different in terms of their scientific and technical advancement. FIC funded training programs provide the trainee with the flexibility of conducting their research in institutions in their home countries but can be trained in the United States. Similarly, the degree, certificate, or training they are granted can be from an overseas or domestic institution and the degree or certificate earned may or may not differ from those granted in the United States. Frequently, these trainees publish their results in important national, regional, or international journals that may or may not be familiar to U.S scientists or indexed in U.S. databases such as PubMed.

Although the inbuilt flexibility (in terms of degree earned, scientific area and country, to name a few) of FIC training programs is necessary and well received by the research community, it is a challenge for FIC management to analyze the program impact because of the lack of control group. Inherent differences between and within each programs suggests that FIC needs to develop benchmarks for each program by country/region in order to effectively assess its training portfolio. This endeavor would require large amounts of trainee data by country/region and program, which can only be collected by a trust-worthy data tool like CareerTrac.

### V. WHAT IS CAREERTRAC?

CareerTrac (<https://careertrac.fic.nih.gov>) is an innovative global trainee tracking and evaluation system for

FIC. The goal of this system is to create a complete trainee roster for all FIC research training programs and to monitor outputs, outcomes and impacts of FIC international trainees. The data collection system provides a streamlined, web-based application permitting grantees record trainee's career achievement. The system collects and facilitates analysis of trainee career achievements funded by FIC grants, including career accomplishments achieved during and post training.

*A. Data input into CareerTrac:*

The CareerTrac application has been operational since December 2008. FIC grantees enter both qualitative and quantitative information about their trainees including: trainee's name, gender, country of origin, contact information, pre-training and training information, in-training education, accomplishments – such as fellowships, awards, employment, education, publications, funding received, and posters at scientific conferences, etc. that are related to FIC training. FIC is cognizant of the sensitivity of trainees' personally identifiable information (PII) and recommends that the trainee signs a privacy statement before FIC will use the data. In order to protect trainee's privacy, most of the trainee data is aggregated or anonymized. Currently there are about 3500 trainees in CareerTrac. Prior to releasing CareerTrac to the grantees, FIC uploaded information on 2000 historical trainees into the database. This data has been meticulously collected from various evaluations over the years and still requires verification from grantees.

All grantees with access to the Internet are able to access the system from anywhere at any time. Drop-down selection lists and radio button selections are leveraged to streamline and standardize the data collection. Overall, the system is user-friendly and has been developed with the intention of enhancing the end user-experience.

*B. Data output from CareerTrac:*

In addition to collecting trainee data, CareerTrac is able to generate outputs as PDF reports, Excel download and a query module. The query module can be used on every data field in the system. PDF reports are preformatted output options and will retrieve trainee data based on the type of report selected. Some of the standard reports are - trainee's career highlights, their role in product or policy development, honors/awards conferred, leadership roles and publication summary, to name a few. Fig 1 shows a sample CareerTrac report – FIC Trainee Information Snapshot that summarizes the training experience, research area, duration, trainee accomplishments and publications that can be attributed to FIC training. These types of reports can be used by the grantees to demonstrate their training success or can be used by trainee themselves in their resume to showcase their accomplishments. Finally, the excel download generates a list of all trainees for all fields in CareerTrac. This tool is very useful for FIC and the data lends itself to performing a variety of qualitative and quantitative analyses.

Over the past couple of months, FIC has started to use CareerTrac data to analyze specific programs and compare it across other programs within and outside of the geographic region. The data has provided answers to some important issues and has also raised some interesting questions. For example, CareerTrac data highlighted that there are very few trainees from the Middle East & North Africa region and this has driven FIC to rethink strategies that will improve training opportunities in the region.

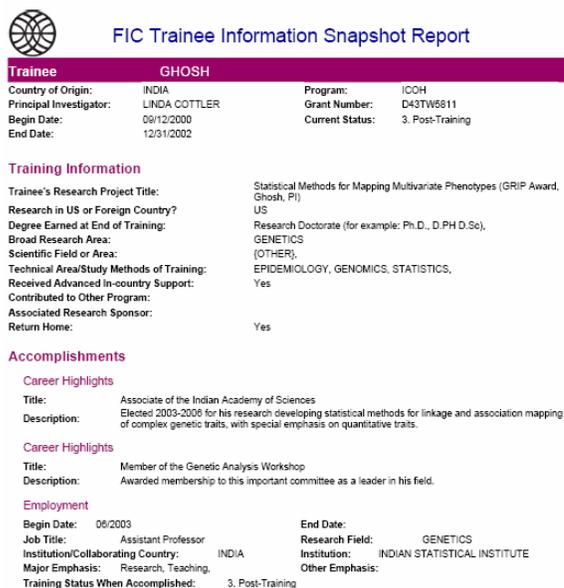


Fig 1: Snap-shot of a CareerTrac Report

The following section is a snippet from CareerTrac data analysis and this will provide the reader with a perspective on the breadth of analysis that can be conducted using the information from CareerTrac. Fig 2, provides data on the number of trainees trained in each region and the degree earned.

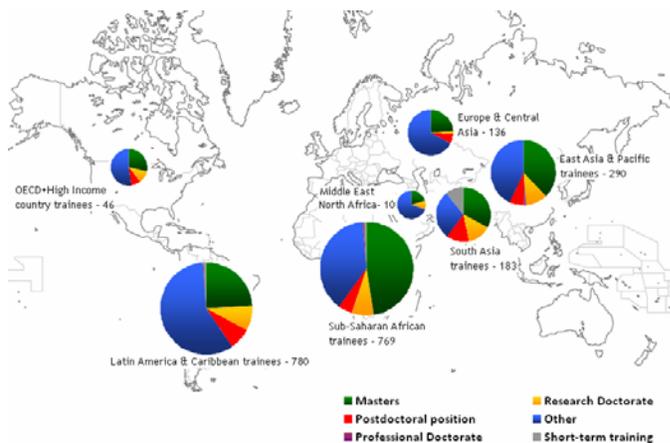


Fig 2: Number of trainees in each region by their degree earned. The size of the pie chart provides a perception of number of trainees from that region

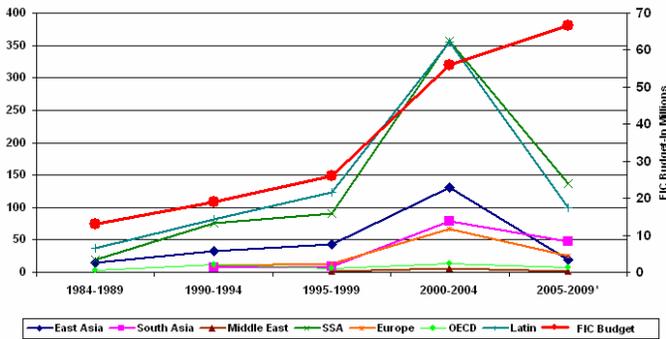


Fig 3: Trends in FIC budget and number of students trained by region by year

The above chart shows the trends in FIC budget (the total of research and training program investments) and number of FIC trainees over the last 25 years. Overall, the FIC funding has been consistent with the number of students trained, except for years 2005-2009. This can be attributed to a multitude of factors including, sparse CareerTrac data for these years, the focus on research funding, or a combination of various other factors that needs further investigation.

Fig 4 demonstrates the percentage of trainee return to their home country after their funding ends. In order to build critical mass of scientists in developing countries, it is important that the scientists return back to their home country after their training abroad. FIC and its grantees use a variety of scientific, political and economic strategies to prevent brain drain including – repayment agreements, re-entry grants, equipment support, strategic in-country trainee selection, to name a few [5]. A trainee’s return home status is captured by CareerTrac and this helps FIC to gauge the extent of brain drain in each region/country. In a study conducted by Kupfer et al., on the return home rate of FIC’s AIDS International Training and Research Program (AITRP) trainees, it was found that on an average 80% of trainees from returned to their home country [5]. Recent data from CareerTrac however shows that the average return home rate of FIC trainees across all the programs is above 85% for most regions.

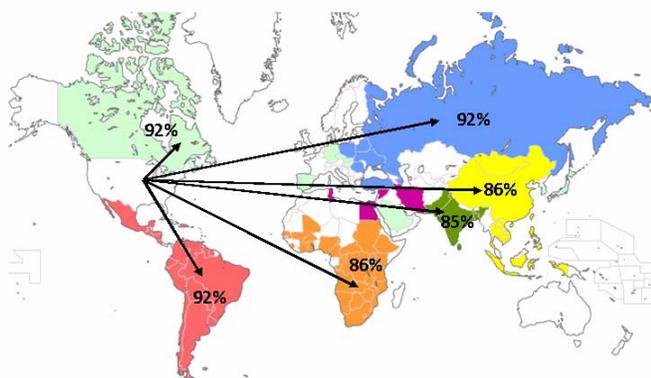


Fig 4: Percentage of trainees that returned home, by region

Qualitative data is as important as quantitative data in demonstrating the full impact of FIC’s training program. In

addition to quantitative data, CareerTrac collects qualitative information on the trainees that are otherwise hard to collect. The qualitative data that CareerTrac gathers include- Career highlights, leadership, post-training competitive funding, presentations and consultations at scientific meeting, publications and mentoring. Few of the qualitative data metrics are discussed below -

#### A. Publications

Publications in peer-reviewed journals are important measure of academic productivity [6]. Bibliometric indicators have been widely used as parameters in objectively measuring the scientific productivity of a researcher. CareerTrac is interested in tracking publications related to FIC funding and so far, the trainees have produced 1200 FIC-funding related publications in peer-reviewed journals.

#### B. Career Highlights

Trainee success stories often help FIC to understand its role in a trainee’s accomplishment. The following excerpt from one of the trainees in CareerTrac sheds light on how the FIC program has helped this trainee’s career – “*The Fogarty training program gave me the opportunity to learn and acquire the necessary skills to conduct basic scientific research in my home country. After this training took place, I have received research funding from the institution I worked for, which has resulted in the publication of three scientific articles and research collaboration with a group of great expertise.*”

#### C. Mentoring – FIC’s multiplier effect in building critical mass

In addition to being successful scientists, many of the former FIC trainees are contributing to building capacity in their home countries. Several FIC trainees have donned the mantle of trainers and have become actively involved in grooming the next generation of scientists, thereby demonstrating a multiplier effect in building critical mass. CareerTrac data suggests that FIC trained scientists have trained approximately 350 students in the past decade.

### VI. PURPOSE OF CAREERTRAC DATA FOR FIC:

CareerTrac has been serving as a guide to inform FIC leadership for making evidence based strategic and management decisions about FIC programs. Before CareerTrac, FIC management had ball-park estimates and anecdotal evidence for most data and it was hard to make informed decisions. Often, the information needed to examine policy options was unavailable or was not disseminated in a usable format [7]. Ever since CareerTrac was opened to FIC grantees, the information in the application is constantly updated and this allows FIC leadership to have instantaneous access to its latest program data. Recently, FIC’s Deputy Director visited countries in sub-Saharan Africa. While in

Uganda, he contacted the CareerTrac team to know information on Ugandan trainees that FIC has ever trained. CareerTrac had all the data that he requested and the team at FIC was able to generate precise reports on Ugandan trainees within couple of hours, which could have otherwise taken weeks.

FIC Program Officers use CareerTrac data to monitor, evaluate and adjust grants to ensure that desired outcomes are achieved. Although Program Officers annually receive similar trainee data through their progress reports, it is not available to them in a format that can be analyzed or compared. Data from CareerTrac can be obtained through reports and excel spreadsheets that lends itself to easy comparison between and within the program. This equips the Program Officer to closely monitor the program's performance and its outputs.

FIC is routinely asked to provide reports on program progress, training accomplishments and stories of success from program co-sponsors and co-funding partners, other agencies and collaborators. In addition, FIC also needs updated trainee data to respond to congressional inquiries and comply with GPRA, OMB PART and other Congressional and Administrative mandates.

FIC Evaluation Officers have a constant need to access trainee data in order to evaluate FIC programs. The data from CareerTrac is used to assess the success and impact of FIC's training programs and develop metrics and benchmarks for the programs. These metrics and benchmarks will allow FIC to better compare its programs with each other and with other global health training programs.

In the future, it is envisioned that CareerTrac will facilitate implementation of global scientific projects by allowing Program Officers to identify international partnership opportunities, particularly for U.S. based grantees or program alumni who desires collaboration with an individual working in a specific scientific area, international site or institution. In short, FIC hopes that CareerTrac will act as a 'one-stop shop' for a variety of trainee data related information.

## VII. CHALLENGES AND THE ROAD AHEAD:

Although CareerTrac is appreciated for its uniqueness, the system is still in its infancy and only 8 months old. FIC CareerTrac team, composed of 5-6 FIC staff members across divisions, grapples with a variety of issues including user compliance, data quality and integrity, and system performance. Some of the FIC training programs have been operational for 20 years or more and there are several instances of "loss to follow-up." The team is constantly in touch with FIC grantees to capture any issues that they might have regarding the system, as well as provide feedback on the data quality. The team prioritizes and addresses issues as they come-up and constantly strives to enhance the system in order to improve the user experience.

Over the past 8 months, CareerTrac has undergone multiple rounds of enhancements. The short-term goal of the CareerTrac team is to incentivize grantees to enter quality

trainee data. The grantees are encouraged to populate current trainee data into the application and are given up to a years' time to verify and enter historical trainees. Once the initial wave of trainee data entry and verification is completed, it will be a matter of annually updating trainee information. Since CareerTrac can be used for the grantees' progress report and for renewing their grants, the grantees have a reason to update trainee information every year. Most of the FIC grantees repeatedly apply for other FIC grants or NIH grants. Grantees can attach reports from CareerTrac to their grant application to showcase their training success. In the future, it is envisioned that the system will be opened to the trainees themselves, so that they can periodically update their information and retrieve trainee profile.

## VIII. CONCLUSION:

FIC is a forerunner in developing a robust and functional system for tracking its trainees. CareerTrac has generated great interest within and outside NIH. The National Institutes of Environmental Health Sciences (NIEHS) is currently working with FIC to modify and adapt CareerTrac to suit its needs. Developing and implementing CareerTrac has been a steep learning curve and in the process FIC has learnt a lot and mastered the process of tracking trainees across the world. Moving forward, FIC can capitalize on CareerTrac's reliable data to perform whole array of data analysis including developing standard metrics and benchmarks to determine the success of FIC programs.

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