

# **The Hispanic Health Workforce Gap: Creating Fellowship Programs to Achieve Health Equity**

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## **ABSTRACT**

The nation faces a shortage of Hispanic health professionals that can provide quality and culturally competent healthcare to their community, the largest ethnic group in the United States (US). By 2050, Hispanics will comprise 29 percent of the US population. Yet, minorities only constitute less than 18 percent of physicians, nurses, and dentists. To meet the challenge of providing access and better care to Hispanics, the Hispanic-Serving Health Professions Schools (HSHPS) developed and implemented a Graduate Fellowship Training Program (GFTP) to increase the number of Hispanic students going into health professions careers through enhancing their research and professional development skills and provide networking opportunities. The evaluation of the GFTP assessed the extent to which the program met its objectives under the cooperative agreement with the Department of Health and Human Services, Centers for Disease Control and Prevention (CDC). The evaluation revealed several lessons learned and best practices in student recruitment, retention, and supportive services that resulted in a high rate of completion of the GFTP and students pursuing advance degrees or careers in health professions. An overview of the importance of increasing the Hispanic health professions workforce, key findings of the GFTP and the role that other national STEM organizations like HSHPS can play to diversify the health professions workforce are presented.

Keywords: STEM, Conference Proceedings, Student Support

## **INTRODUCTION**

The nation faces a shortage of Hispanic health professionals that can provide quality and culturally competent healthcare to their community, the largest ethnic group in the United States (US). By 2050, Hispanics will comprise 29 percent of the US population (Pew, 2012). Yet, minorities only constitute less than 18 percent of physicians, nurses, and dentists (Sullivan Commission on Diversity in the Workforce, 2007). It is important to note this disproportion of minority health professionals to minority populations because the Sullivan Commission on Diversity in the Healthcare Workforce noted that increasing the number of minority health professionals is essential to achieving health equity (Sullivan Commission, 2007). Several articles have documented the value of providing opportunities for underserved, undergraduate students in the “STEM pipeline” and the challenges associated with coordinating these opportunities. For example, research experiences during the year as well as a summer bridge program and summer research opportunities were found to be rated as important to increasing

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students' excitement about pursuing STEM PhDs ((Maton, Sto. Domingo, Stolle-McAllister, Zimmerman & Hrabowski, 2009); summer research experiences were positively associated with undergraduates students' interest in and motivation to pursue STEM research careers (Russell, Hancock, & McCullough, 2007); and active participation in research experiences (on or off-campus, during the summer or within the academic year) have been reported to increase the likelihood of undergraduate students pursuing graduate-level STEM degrees (Pender, Marcotte, Sto. Domingo, & Maton, 2010). The challenges of these programs have been documented, and include the lack of readiness on the part of mentors, placement sites or institutions to facilitate student learning and mentoring; lack of research infrastructure; and underestimation of the time involved for students and mentors (Cregler, 1993). Pipeline programs are also important to developing the healthcare workforce and reducing professional shortages (Smith, Nsiah-Kumi, Jones, & Pamies, 2009). Much of this research is focused on underserved, undergraduate minorities entering STEM graduate study; however, little research was found that specifically addresses the extent to which pipeline programs are effective among Hispanic/Latino students and their pursuit of STEM careers, particularly in health-related fields. To meet the challenge of providing access and better care to Hispanics, Hispanic-Serving Health Professions Schools (HSHPS) developed and implemented a Graduate Fellowship Training Program (GFTP) to increase the number of Hispanic health professionals, enhance research and professional development skills, increase knowledge about Hispanic and other minority health issues, and provide networking opportunities.

### BACKGROUND

In 2012, the organization conducted an evaluation of its GFTP from 2006-2011 to assess the extent to which the program met its objectives under its cooperative agreement with the United States Department of Health and Human Services (HHS), Centers for Disease Control and Prevention (CDC). The evaluation was also designed to reveal several lessons learned and best practices in student recruitment, retention, and supportive services that might result in a high rate of completion of the GFTP. An external evaluation partner, an applied public health research firm that served Federal state and local governmental health agencies, conducted the evaluation and co-authored the final evaluation report and this presentation. This presentation provides an overview of the importance of increasing the Hispanic health professions workforce, key findings of the GFTP and the role that other national STEM organizations can play to diversify the health professions workforce.

#### About the Training Program

The organization is a 501(c)3 non-profit organization, established in 1996 and created as part of the U.S. Department of Health and Human Services' "Hispanic Agenda for Action" initiative, with the intention of addressing the mounting public health issue of providing quality and culturally competent healthcare to Hispanics living in the United States. By supplying essential academic and career development resources to students, faculty, and other health professionals, the organization addresses the health inequities that exist among the Hispanic community. To that end, the organization provides programs and activities for aspiring health professions students interested in Hispanic health, and targets primarily Hispanic and other minority public health, medical, nursing, and allied health students with the ultimate goal of increasing the

number of minorities in health professions. The organization's cooperative agreements (past and current) to deliver training programs with CDC, the Office of Minority Health, Veterans Administration, and National Institutes of Health play important roles in achieving its mission and goals and diversifying the healthcare workforce. This presentation focuses on the training program and assessment of that program completed under a cooperative agreement with the CDC.

Over the five-year cooperative agreement period, trainees participated in an orientation with an overview of public health, Hispanic health issues, careers in public health, and the organizational infrastructure of the United States Department of Health and Human Services (HHS). After orientation, students were placed at their respective program sites where they worked on a project with a selected mentor and attended workshops (typically 8 weeks for internships and 6 months or more for fellowships). The sponsoring organization partnered with the CDC to identify placements for each trainee at the CDC, other Federal agencies, or its member institutions. At the completion of the training program, trainees reported on their: 1) awareness of public health issues; 2) awareness of Hispanic health issues; 3) awareness of career opportunities in public health (Federal and state) and academia; 4) awareness of Federal agencies involved in public health issues; 5) knowledge and skills in public health professional development activities (*e.g.*, scientific writing); 6) intentions to complete graduate training in public-health related fields; and 7) intentions to pursue public health-related careers. Trainees who were "Fellows" (and some interns) also provided the sponsoring organization with copies of their scientific writings and other materials that resulted from their placements. The evaluation for the Training Program was conducted by The MayaTech Corporation in Silver Spring, MD. MayaTech was retained by HSHPS in the last year of the project; thus, MayaTech prepared the evaluation plan in collaboration with HSHPS late in the project.

### **About the Evaluation**

The external evaluator retained by the organization during the last year of the program conducted document reviews of reports of past fellows, an online retrospective survey with fellows and interns of previous cohorts, and an interview with the Executive Director. This report summarizes data and observations collected from various sources for cohorts of trainees (fellows and interns) who participated in the organization's CDC-funded training programs over the period 2006-2011. "Fellows" and "interns" are distinguished in this report as follows. Fellows were typically graduate students who were placed in 6 months or longer placements to conduct research under the supervision of a mentor. Interns refer to undergraduate and graduate students placed for a shorter term (typically 10 weeks in one of these settings) under supervision of a mentor. Fellows and some interns completed end-of-placement reports and a research paper.

## **EVALUATION PURPOSE, CONCEPTUAL FRAMEWORK AND RESEARCH QUESTIONS**

### **Purpose**

The purpose of this evaluation was to assess the extent to which the organization's training program met its objectives for the internship and fellowship programs under the cooperative agreement with the CDC.

## Conceptual Framework

The guiding framework for this evaluation is the Centers for Disease Control and Prevention's (CDC) *Framework for Program Evaluation in Public Health* (Centers for Disease Control and Prevention, 1999). The CDC framework is composed of: 1) six iterative steps; and 2) the 30 standards adopted by the American Evaluation Association (AEA) which are incorporated throughout the six steps and organized under four principles: utility, feasibility, propriety (ethics), and accuracy. Our plans for implementing the six steps were as follows. *Step 1-Engaging Stakeholders* involved use of CDC's *Community Engagement Principles* to engage project staff in each of the other steps. In *Step 2-Describing the Program* the external evaluator in collaboration with the organization refined the program logic model (only short-term outcomes were monitored for this evaluation). In *Step 3-Focusing the Evaluation Design*, the evaluator assumed responsibility for the evaluation when the project was in full implementation (in year 5). We implemented a process evaluation and applied the AEA standards and cultural competency principles to ensure that the design was useful, feasible, ethical, and accurate. We used a one-group, retrospective design to "look" back and gather perspectives about the training and its effects on trainees' awareness, knowledge, skill development, and interest in public health careers. For trainees, we stated some outcome indicator items that related to pre-placements as, "Prior to your placement..."; and compared those responses to post-placement items on the same outcome indicator that were stated as, "As a result of your placement, ...." In *Step 4-Gathering Credible Evidence*, we used evidence-based literature on STEM training and other career development/training programs to select *indicators* for the short-term outcomes and relied on organizational staff to identify factors that might have affected or influenced conditions beyond the program's or staff's control (*i.e.*, the barriers and facilitators in the logic model). The evaluator used *SurveyMonkey* to gather trainees' perspectives and feedback. In *Step 5-Justifying Conclusions*, we judged the evidence we collected against core *values* set collaboratively between the organization and the evaluator (e.g., cultural competency, connectedness of measures to public health, confidentiality of responses, etc.). We used triangulation (cross-checking of data from multiple sources—trainees and organizational staff) to produce the synthesis report. We conducted an interview discussion with the organization's Executive Director to produce our *Interpretations*; and looked for practical (rather than statistical) significance in making *Judgments. Recommendations* were guided by organizational staff's input on practicality, feasibility, political and fiscal realities, and cultural sensitivities. In *Step 6-Ensuring Use and Sharing Lessons Learned*, we generated a Dissemination Matrix to assist in identifying strategies and outlets to share results with the public health community.

Also, two theory-/evidence-based approaches for evaluation of innovations were used to guide evaluation planning: the structure-process-outcome model, and diffusion of innovation theory. Over the past several decades, Donabedian's (1996) classic model of structure-process-outcomes (s-p-o) has guided research on healthcare interventions designed to improve best practices in quality of care. Researchers have also adapted this model for use within public health training, social policy and accountability contexts (Dewan, Daniels, Zieman, & Kramer, 2000). For example, using an adapted s-p-o framework, we expected to identify how components of the training program worked together, specifically assessing whether: 1) *structures* (the organization's administrative core, mentors, and placement agreements), and 2) *processes* (orientation, organizational training, placement experiences) resulted in 3) expected

*outcomes* (e.g., increased awareness, knowledge and skills on the part of trainees in terms of public health in general and Hispanic health in particular).

We used Rogers' (2003) theory of diffusion of innovations to identify contextual factors that might have influenced the success of the program. Diffusion is the process by which an innovation (in this case, various components of the organization's CDC training program) is communicated through certain channels (programs and activities) over time among members of the innovation system. Key variables in diffusion theory that could help explain the effectiveness of innovations (e.g., the organization's training programs) include a set of five factors referred to as "perceived attributes of an innovation:" 1) *relative advantage*—the training is perceived as better than other existing approaches; 2) *compatibility*—the training has perceived consistency with existing values and long-term goals, experiences, and needs of trainees; 3) *complexity*—the degree to which the activities and other offerings of the program (training, mentoring, other activities) are perceived as difficult or easy to understand or participate in; 4) *trialability*—perceptions that components of the program can be experimented with/tried out on a limited basis; and 5) *observability*—effects of the training experience on the trainee are perceived as visible to others. Innovations perceived as having more relative advantage, compatibility, trialability, and observability and less complexity are hypothesized to be more readily adopted by intended users (and would appeal to future trainees). Thus, together with the structures-process-outcomes approach and diffusion of innovation theory, the six collaborative steps in the CDC's Evaluation Framework ensured that evaluation plans were responsive to the organization's needs and funder's evaluation requirements.

### Evaluation Questions

The following questions, based on the logic model and conceptual framework, were addressed. For the process evaluation, questions were: What resources were available to implement the program? What activities were implemented? Was the Training Program implemented as planned? What were the major outputs of the program (number of enrollees, number of mentors, number of participants in activities, training materials, etc.)? What were the demographic and background characteristics of trainees? How many students enrolled were at each level (e.g., undergraduate, masters, doctoral)? How many students completed their placements? Where were students placed? What was the nature of the placement sites? What was the nature of the placement experiences? What worked? What did not work? How well did administrative, management, and advisory systems work together? How were the diffusion of innovation attributes of the training program perceived by trainees?

The outcome monitoring questions included: What percentage of students reported increased awareness of public health-related issues? What percentage of students reported increased awareness of Hispanic health issues? What percentage of students reported increased interest in public health-related educational training? What percentage of students reported increased knowledge of Federal agencies involved in public health issues? What percentage of students reported intentions to pursue public health-related educational or research careers? As applicable (e.g., for trainees with research placements): What percentage of students reported increased skills in public-health related research? What percentage of students reported increased development of professional skills (e.g., scientific writing, oral communications, etc.)? What diffusion of innovation attributes were associated with the trainee outcomes? What trainee characteristics were associated with trainee outcomes?

## METHODOLOGY

### Design

This evaluation was a one-group design using document reviews, and retrospective quantitative and qualitative survey and interview items with the student trainees and Executive Director. We employed a single-case study approach using a combination of qualitative and quantitative methods to capture data on the resources, activities, outputs, processes, structures, outcomes, and advisory and management systems. The aggregated group was its own comparison group (pretest to posttest).

### Sample/Data Sources

Of 148 placements in the organization's database for 2006-2011, the program provided the evaluator with 132 email addresses for former trainees, of which 56 students returned completed surveys (42% response rate). Student materials were received from 33 trainees from 2007-2011. The key informant sample included only the Executive Director.

### Measures and Procedures

An online *Trainee Survey* was administered via *SurveyMonkey*. The *Trainees' Materials and Documents for Review* were content analyzed by a bicultural (Latina), bilingual (English/Spanish) researcher on the evaluation team. She extracted qualitative data from the sample of 33 fellows' progress reports using a rubric. A *Key Informant Interview Guide* was used with the Executive Director. The guide included questions to assess the extent to which the program logic model was implemented or revised and to gather the Executive Director's suggestions for program improvement. The Lead Evaluator administered the guide to the Executive Director by telephone interview.

### Analysis Plans

Descriptive statistics and content analyses were used in the analyses. Due to the small survey sample, cross-tabulations and statistical tests were not conducted.

## RESULTS

### Process Evaluation

Resources and Activities. In addition to the CDC grant, the organization also benefitted from the institutional resources of its member organizations (institutions of higher education primarily) and the cooperative agreement with CDC. Its location in the Washington, DC metropolitan area in close proximity to many Federal agencies also afforded the opportunity to expose some trainees to the resources (e.g., facilities and speakers) of these agencies and health organizations in the region. The major activities for trainees were designed by their placement sites, and for

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trainees that could attend, there was a lecture series to introduce students to Hispanic/Latino health issues, Federal agencies and health organizations and to build their skills in research and professional development. An online cultural competency and Spanish language course offered by a university in the DC area was implemented with mixed satisfaction ratings from trainees (some found it useful; others did not). To support trainees in their transitions to their placements, resources were available to assist with travel and lodging/housing; and a stipend was provided. Trainees were expected to produce a reflection paper, oral presentation, and written paper about their experiences at the end of their placement. They were also expected to participate in the evaluation activities. At sites outside of the Washington, DC area, member institutions provided a liaison that assisted with logistics and settled the trainees. Federal agency sites varied with respect to the extent to which they were successful in settling trainees outside of the DC area. In the last two years of the project, the organization was able to obtain funding from additional Federal sources to complement the CDC program and launch additional training programs in STEM- and health-related fields.

Number and Types of Placements. Table 1 shows the number of placements by type (fellowship or internship) for each cohort year. There were eight Federally-sponsored placement/program sites and 10 member-sponsored sites (institutions of higher education in medical schools, public health schools, allied health schools, and allied health agencies and organizations). Over the course of the 5-year project, 148 students were placed—125 in internships (of 10-week duration) and 23 in fellowships (6 months in duration). Of these 148 placements, 82 were at government sites and 65 were at the organization’s member sites, and one trainee was selected but withdrew before placement. The placement sites were across the nation in various states and Puerto Rico, and one site was in Quito, Ecuador hosted by an institutional member for the study of tropical diseases. Students were exposed to various health topics including medical, environmental, social and behavioral, economic, and communications fields.

Table 1. Number of Placements by Type (Fellowship or Internship) and Cohort Year

Type Placement	Cohort Year					
	2006	2007	2008	2009	2010	2011
Fellowships (N=23)	4	6	2	6	5	0
Internships (N=125)	14	15	29	25	27	15
Totals	18	21	31	31	32	15

Trainees Backgrounds. Tables 2 and 3 below show the distributions by cohort of trainees by gender and race/ethnicity, respectively. In some cases, data were available for only 147 of the 148. For the trainees in the program database, on which the tables below are based, there were 117 women (79.5%) and 30 men (20.3%). Approximately 51 percent (n=75) of the trainees were of Hispanic descent/not Puerto Rican (primarily of Mexican heritage, with some of mixed Hispanic heritage and other races/ethnicities); approximately 13 percent (n=19) of the trainees were Puerto Rican; and approximately 37 percent (n=54) were of non-Hispanic/Latino background.

Table 2. Distribution of Gender for Trainees in the Program Database

Gender	2006	2007	2008	2009	2010	2011	Totals*
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	n	N	n	n	N	n	N (%)
Male	9	6	6	1	5	3	30 (20.3%)
Female	9	15	15	30	27	11	117(79.5%)

*\*Missing data for one trainee*

Table 3. Race/Ethnicity of Trainees in Program Database

Race/Ethnicity	2006 n	2007 n	2008 n	2009 n	2010 n	2011 n	Totals N
Hispanic (not including Puerto Rico)	6	12	14	19	13	2	66
Hispanic Mix	4	1	0	0	3	1	9
Hispanic subtotal	10	13	14	19	16	3	63
Puerto Rico subtotal	0	3	6	2	3	5	19
Non-Hispanic:							
African American	1	2	2	1	4	0	10
Caucasian	3	3	6	3	6	2	23
Asian	0	0	2	0	1	1	4
Other Non-Hispanic	4	0	1	6	3	3	17
Non-Hispanic subtotal	8	5	11	10	14	6	54

Table 4 displays the frequency distribution for the number and percentage of trainees at each level of academic study when they enrolled in the program. Most students in each cohort either held the Masters of Public Health (MPH) or were MPH candidates. The distribution of other masters degrees/candidates and doctoral or medical degrees was similar with fewer than six trainees in any cohort.

Table 4. Distribution of Educational Background for Trainees in the HSHPS Database

Characteristic	2006 n	2007 n	2008 n	2009 n	2010*/** n	2011 N	Totals N
BA/BS	2	0	2	2	5	2	13
MPH	13	13	20	19	23	10	98
MS, MA	2	2	3	4	2	0	13
PhD	0	3	0	2	0	1	6
MD	2	4	6	6	4	1	23

*\*1 Trainee has 2 degrees/\*\*2 Trainees have 2 degrees*

Trainee Retention. Attrition was very low, with only one trainee leaving in each of the years 2007 and 2009-2011; none left in 2006 or 2008; for a total of four (4) students who left early (97.3 % retention rate). The reasons for leaving the program included: personal medical issues; an unsafe housing location; and an ill family member. Retention was facilitated by mentor training, social and financial support for life needs, and providing networking opportunities for students.

### Online Survey

A smaller sample of trainees responded to the online survey for former trainees. The survey was administered in the last year of the project.

Trainee Experiences. The nature of the experiences varied, and for some trainees were uneven, in that some trainees had hands-on, on-the-job, formal research training whereas others were assigned to support conference planning or materials development for events. For the most part, trainees were pleased with their experiences and offered a number of accolades for the mentors, the teams they worked with at their placements sites, and the logistical arrangements for the training program.

Barriers and Facilitators. The most frequently reported challenges for trainees were related to their housing situations—roommate interpersonal conflicts, long distance of housing from the placement site, cleanliness, and expense; some lack of structure in the placement and on the part of the program overall; and lack of meaningful experiences in some sites. Facilitators of progress and success were mentors who were well regarded, support received from the program staff, opportunities to network with the other trainees, and the relevancy of the topics and activities to addressing health disparities and inequities. Trainees also appreciated the stipend although there were some administrative glitches occasionally. The Executive Director reported challenges due to inadequate staffing during the early part of her tenure and not having a liaison at Federal agencies such as member institutions had for their placements. Liaisons from the Executive Director's perspective were the funder's project officers who assisted with navigating paperwork and systems and preparing the sponsoring organization to do sustainability planning, and the development of an electronic database to store data and track trainees.

Advisory and Management Systems. As mentioned, students were largely very favorable in their reports of their mentors, although some trainees had poor quality experiences due to lack of structure or a very busy mentor. Many also reported on the positive support received from program staff in their surveys and reflection papers, but some also experienced administrative glitches in getting advanced information about their placements, a check occasionally, and assistance with resolving some of the barriers noted.

### Outcome Monitoring

New knowledge and skills for trainees. Trainees reported increased awareness of public health-related issues in general and of Hispanic health issues; increased knowledge of Federal agencies involved in public health issues; increased skills in public-health related research; and increased development of professional skills such as scientific writing, oral and written communications, and project management. In addition, some trainees also reported increased interpersonal skills and personal growth as a result of networking with other trainees and staff on the projects where they were assigned.

Changes in trainees' educational and career aspirations. Trainees participating in the online survey reported that their interest in public health-related educational training either increased or

was at a high level initially and had been “deepened” or “strengthened” as a result of their placement. All trainees reported intentions to pursue public health-related educational or research careers. Several trainees have already completed master’s level training and were in doctoral programs or had completed medical school or were in health-related positions in the Federal government, at universities or in other health settings.

Diffusion of innovation attributes of training program. Although the size of the sample that responded to the survey was too small to permit cross-tabulated analyses by demographic characteristics or placement types, the descriptive data indicated for these aspects of the program suggests that trainees overwhelmingly would recommend their placement to others, reported that it fit well with their life circumstances, and perceived the requirements as easy to fill. Trainees were less favorable toward the other diffusion of innovation aspects of the training program: *relative advantage* (i.e., whether it was better than other internships) and *observability* (i.e., whether others could see positive changes in them after their placement).

### RECOMMENDATIONS FOR IMPROVING TRAINING PROGRAMS

Based on the findings, the following recommendations are made to improve health careers training programs.

Pay close attention to administrative and management systems at the outset. Implementers should review processes to improve pre-placement experiences of trainees. For example, trainees noted that they needed more timely information about their placement prior to arriving at the site. Housing logistics were also a problem for some students. It is recommended that programs that are national in scope (i.e., require students to travel away from their home or host institutions) should provide a logistics coordinator who can ensure students’ success upon entry and during the program. Implementers should also review all administrative systems to improve communication with trainees before, during and after their placements. Consider assigning a staff member other than the Program Director to each trainee and having contingency staff that can assist in the designated staff member’s absence. In this training program, Federal agency sites varied with respect to the extent to which they were successful in settling trainees when placements were outside of the Washington, DC area. We recommend that at sites outside of the sponsoring organization’s area, host institutions should designate a liaison that can assist students with entering and exiting the satellite location, logistics, emergencies, and getting familiar with the host site’s resources.

Ensure even quality in the internship experiences. Students were largely very favorable in their reports of their mentors, although some trainees had poor quality experiences due to lack of structure or a very busy mentor. Some students also reported a lack of meaningful internship/fellowship experiences in some sites. Provide orientation and written guidance to mentors to equalize the experiences of future trainees and maintain these in a Web-based space where they are easily accessible for use throughout the trainee’s placement. To even the quality of their experiences, all trainees should be provided, at a minimum, the opportunities (e.g., through a lecture series or hands-on experiences) to learn how to: prepare a PowerPoint or other technology-assisted presentations; deliver an effective oral presentation or poster presentation of research results; write a research paper; update their resume/curriculum vitae; and conduct systematic literature searches and reviews. Also, provide guidelines that include a minimum set of structured or focused components/activities or rubrics to assess performance for all

placements. Provide lecture series via the Web, social media or other technology; if not possible real time, videotape and make available as a download on the Web or social media technology.

Adopt proactive strategies to ensure retention. Only two students were lost to attrition. Retention was facilitated by mentor training, social and financial support for students' life needs, and providing networking opportunities for students. Therefore, we recommend that other programs provide opportunities for students to interact with others in the program in the host site (e.g., all students in one location get together for social events); provide housing allowances and a livable stipend based on the cost of living in the host site; and provide avenues for networking with other students regardless of where they are based (e.g., through social media or one all-students present event in a central location such as a national or regional conference).

Build in opportunities to make students' and the program's accomplishments visible to others. Trainees rated the observability aspect of their placement experience (i.e., whether others could see positive changes in them after their placement) as relatively low. To enhance the individual as well as programmatic visibility of positive results, we recommend utilizing a variety of recognition and promotional strategies—e.g., certificates of accomplishment with an email transmittal to the administrator of the student's host department as well as home institution; a student recognition ceremony, as appropriate to the location; press releases to the students' home institutions of their successful completion of the program; and dissemination of program results at professional meetings and in peer-reviewed outlets.

Monitor and evaluate programs from the outset. This evaluation was conducted in the last year of the program; and, thus, had to rely on retrospective accounts of trainees' experiences and program records. We recommend that programs include evaluators in proposal development and, at least quarterly, monitor the extent to which resources and activities are aligned with outputs and outcomes; and proposed plans are being implemented or need to be revised. Utilize technology (social media, Web surveys, existing recordkeeping databases, etc.) to improve the process for trainee follow up and collecting performance and outcome indicators (e.g., career progress). Indicators could include an assessment of whether trainees published papers stemming from their placements; presented at a scientific meeting; attained their health-related degree; pursued other health-related education and training; and are working in a public health research career or setting.

Even though this CDC-funded effort has ended, these recommendations can be applied to other training programs such as those that this organization has been successful in funding through other sources, and programs others might propose to STEM and health research funders.

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