National Library of Medicine
Environmental Health Information Partnership (EnHIP)

EnHIP and NLM: A Shared Purpose and Mission
Environmental Health Information Partnership Strategic Plan

INTRODUCTION

The main agenda for the annual meeting in April 2019 was to develop the EnHIP strategic work plan. To prepare for this meeting, three executive teleconferences were held over the course of 11 months. These teleconferences included the EnHIP chair, the scientific advisor, contractors from Oak Ridge Associated Universities (ORAU), the interim deputy associate director, and the program officer for the EnHIP. These discussions produced a comprehensive approach for developing the working sessions for constructing a new l0-year strategic plan for EnHIP. The results of the meetings provided for the following:

- Forming three working groups from the EnHIP members present at the meeting;
- Convening a block of eight on-site hours to develop the framework and process for delivering the report;
- Producing a working outline to guide the planning sessions;
- Charging each member with the review of the new National Library of Medicine (NLM) strategic plan prior to arrival at the annual meeting to ensure successful work groups; and
- Reporting out oral and written results from each group to the EnHIP of its deliberations by goals and objectives aligned with the NLM 2017–2027 strategic plan.

Structure of EnHIP Strategic Plan 2017–2027 Report

The EnHIP strategic plan presented in this report is aligned by goals and objectives with the NLM strategic plan 2017–2027. The report provides the context with a discussion of the history of EnHIP to frame its past work and current status, and ends with its strategic plan for the next decade. It offers the mission, vision, objectives, and reports of each of the groups, and summarizes the role in tabular format that EnHIP will take in aligning the EnHIP strategic plan with the current NLM strategic plan. EnHIP accomplishments from 2008 to 2019 are listed in Attachment I.

An Historical Perspective of the EnHIP

The NLM has a long-standing program of outreach involving historically black colleges and universities (HBCUs), Hispanic-serving institutions (HSIs), Tribal colleges and universities

(TCUs), one Alaska Native-serving institution, and one community college, collectively referred to as minority serving institutions (MSI). The shared purpose has been disseminating information, using data resources, sharing technology, contributing to bioinformatics, improving and enhancing curriculum, and promoting community-based services linked to environmental health, health disparities, and public health. The shared purpose includes core values, diverse contributions, and communication under which the EnHIP operates. It is through this shared purpose that the organizational commitment has developed.

The EnHIP was established in 1991 as the Toxicology Information Outreach Panel by Melvin Spann, PhD, Associate Director of the Division of Specialized Information Services, NLM. This panel was started when the issue of racial and ethnic health disparities and a myriad of conditions had been elevated into the national discourse. Among the founders, there were also concerns about potential and real exposures to environmental toxicants and their contribution to health disparities in morbidity and mortality and environmental justice. At the same time, there was an increase in the complex literature of toxicological science.

The Toxicology Information Outreach Panel was renamed the Environmental Health Information Outreach Program, led by Bailus Walker, PhD, MPH Professor at Howard College of Medicine, and Henry Lewis III, PharmD, Professor and Dean of the College of Pharmacy and Pharmaceutical Sciences, Florida A&M University, Tallahassee, Florida. Ms. Cynthia Gaines was appointed the group's program officer. Her foundational work as an internal NLM employee, as well as her knowledge of the MSI network established the standards and outcomes for the group's focus on toxins and raising academic awareness at HBCUs about environmental issues facing the communities in which the campuses existed. Drs. Walker and Lewis recruited other HBCUs, TCUs, and HSIs to form the Environmental Health Information Outreach Program. The name changed in November 2008 to the Environmental Health Information Partnership (EnHIP). Ann Barbre, PhD, and Pat Matthews-Juarez, PhD, have followed as chairs of the EnHIP.

The intent was to introduce, frame, and provide consistent and trustable information and scientific data about environmental health and health disparities among member academic institutions. The goal of EnHIP was to increase the opportunities to provide access to data and to share data, information technology and related pedagogical and research resources in a barrier-free environment. While the goals and objectives evolved over 20 years, the intent has remained the same. Over the last decade, the objectives were (1) to establish and maintain the partnership with NLM at the highest level in the director's office to ensure that MSIs had a voice in the character and national scope of the work of the NLM; (2) to invite academic officers, presidents, deans, and senior faculty members to serve on the inaugurated partnership; (3) to

meet twice a year, once in the field and once on the campus of NIH at NLM headquarters; and (4) to create and maintain an awareness campaign about the resources available at NLM through the Small Award Program. The above objectives were met and the outcomes listed in Attachment 1.

Strategic Planning: A Joint Pathway Forward

At its November 2008 meeting, EnHIP approved a strategic plan for the partnership that was based upon the NLM plan: "*Charting the Course for the 21st Century.*" The vision statement for the plan is, "EnHIP will be a strong, stable, and effective partner of NLM as the Library becomes even more central to scientific discovery and treatment and prevention of disease." In December 2017, NLM implemented its new long-range plan for 2017-2027. The new plan is NLM platform for biomedical discovery and data-powered health. It emphasizes data-driven discovery requiring sophisticated library resources to improve the public's health, with greater use of informatics, open science, and data science.

In April 2019, the EnHIP, as a partner, aligned its strategic efforts with NLM to achieve the new goals of reaching more people in more and varied ways through engagement and dissemination of trusted, reliable health information; promoting data literacy; and helping to create a diverse, data-driven research workforce. Through this partnership, NLM programs and services will be strengthened and its programs and resources will further strengthen the capacity of minority-serving academic institutions to perform three important and fundamental functions within the public health and health care system: (1) educate and train health professionals and data scientists, (2) conduct basic and applied research in disciplines pertinent to biomedicine, health services, health care, and health disparities, and (3) engage in community, public, and professional services. Based on these three functions, EnHIP and NLM will continue to align their mission and purpose for working together on a full range of topics of interest to the academician and to the citizen scientist communities alike. These topics may include data and health information, disaster/emergency management information, toxicology, environmental health, public health, open science, data science, and more, as trends change over the next decade.

The EnHIP has made substantial progress during the past decade in achieving its initial objectives. A prominent feature of this progress has been information sharing, including regular NLM staff reports on the continuous expansion of the NLM databases and programs, as well as presentations from other National Institutes of Health (NIH) institutes and centers on development in related areas of the NIH. These support research and discovery that ultimately will lead to improvements in public health services and personal health care methods and

outcomes. The discussions have added to the substrate of information that academicians need to implement the core functions of academic health centers.

The challenge for EnHIP is not only to maintain its role as a progressive component of NLM's outreach efforts, but also to align its work with the NLM strategic plan for 2017–2027. That plan includes four pillars that serve as the framework for the EnHIP strategic planning process.

The Strategic Plan presented by EnHIP is intended to be a guide for both NLM and EnHIP in their complementary roles of partnering to achieve the goals and objectives as outlined in the NLM strategic plan over the next 10 years. Details of the EnHIP Strategic Plan follow below. **Clink on the enclosed link for the NLM Strategic Plan 2017–2027.**
(https://www.nlm.nih.gov/pubs/plan/lrp17/NLM_StrategicReport2017_2027.html**)**

The current EnHIP mission statement[1] is written with a focus on environmental science. The group agreed to broaden the scope of the mission to be more reflective of the NLM strategic plan. For this transformational change, EnHIP contemplated the three pillars of the NLM (as written in the NLM Strategic Plan) and offers the following as its 2017–2027 vision and mission statements for EnHIP:

Vision: Capacity building of minority-serving institutions to promote data-driven education while fostering health equity in all communities through partnership with NLM; and

Mission: Enhance the capacity of minority-serving academic institutions to acquire, use, and disseminate environmental health information and to promote and expand data driven science to facilitate health equities and to reduce health disparities in all communities.

Objectives: The five EnHIP objectives as currently written were agreed to as still relevant by the EnHIP. A sixth objective was proposed to reflect the new data science theme of the NLM Strategic Plan 2017–2027.

The objectives for the EnHIP 2017–2027 Strategic Plan are:

1. **Institutionalize** the NLM resources through incorporation of resources in the curriculum, seminars, and special events at each institution with high-level administrative and academic involvement;

2. **Strengthen** institutional partnerships with libraries and other entities such as environmental justice centers, poison control centers, drug information centers, and centers of excellence;

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[1] The mission of the Environmental Health Information Partnership is to enhance the capacity of minority-serving academic institutions to reduce health disparities through the access, use, and delivery of environmental health information on their campuses and in their communities.

3. **Develop** and strengthen relations with local agencies and community-based and faith-based organizations to extend health-related outreach to communities surrounding the participating institutions;

4. **Increase** participation in professional meetings and public forums through presentations, posters, and panel discussions, and seek opportunities for publication in major journals;

5. **Serve** as NLM local and regional resources for training, exhibiting, and community outreach in order to promote the awareness and utilization of NLM resources; and

6. **Capacity** building for data driven science on minority-serving institution campuses and in their communities with new partners.

Strategies for Investing in the Future: New Membership

The EnHIP currently has 22 participating institutions, with representation from HBCUs, TCUs, and HSIs. The EnHIP would like to expand its membership by inviting Fisk University, North Carolina Central University and Mississippi Valley State University, which have environmental health programs, and are embarking upon programs in environmental health, public health, and data science. Other potential members that were identified include Tugaloo College and Talladega College, Tennessee State University, Northeastern State University in Oklahoma, and the University of Alaska–Fairbanks. **Other suggestions** include the following: (1) Create an online presence for EnHIP; (2) Write a blog or use EnHIP participants' websites to highlight the EnHIP-related work being done on MSI campuses and in their communities. For example, for National Library Week, members could ask their institutional marketing departments to highlight an EnHIP-funded program and related NLM resources; (3) Establish a single, central Web page featuring a description of EnHIP, plus project highlights and links to the EnHIP partners and their work; and (4) Use social media and technology more effectively to reach the next generation by building capacity and infrastructure through shared use of technology.

Reports from Groups 1, 2, and 3:

- **Accelerate discovery and advance health through data-driven research**

  Group 1:   Dr. Robert Valdez (facilitator)
  Dr. Robert L. Copeland, Jr.
  Dr. Kim Sydnor
  Dr. Syreeta Tilghman

Group 1 addressed the first goal of the NLM Strategic Plan and chose to reprioritize the four objectives to reflect what they felt was most important. The group envisioned EnHIP advising

NLM with respect to ensuring accessibility of digital resources to a wide spectrum of audiences, and they also believed EnHIP could serve as a conduit for NLM to develop institutional capacity for research at MSIs. They suggested that EnHIP could identify the principles and values that shape open science policies and could develop a broad-based framework for achieving open science policies and practices. The group also identified two action items: (1) request NLM funding to support additional meetings necessary to build relationships and networks, and (2) request NLM funding to allow EnHIP members to pool data and determine future research needs as well as a research agenda to meet those needs.

- **Reach more people in more ways through enhanced dissemination and engagement**

Group 2:   Dr. Sandra Harris-Hooker (facilitator)
                 Ms. Dolores E. Caffey-Fleming
                 Dr. Betty Damask Bembenek
                 Dr. João Ferreira-Pinto
                 Ms. Judith Mazique
                 Dr. Milton A. Morris
                 Dr. Constance Smith-Hendricks

Many creative ideas were presented for connecting with people "where they are" by Group 2. Having fun and tapping into natural curiosity, familiarity, trust relationships, and rewards systems undergirded many of the suggestions that were identified to engage NLM users. The group noted the importance of identifying what the target audience *needs* to know and then finding the intersection with what they want to know. They proposed methods of engagement ranging from public service announcements, social marketing, and intentional micro messaging. They also emphasized the importance of using trusted intermediaries, such as popular opinion leaders or community health workers to convey health information to a community. Their ideas for enhancing information delivery included updating science-based games on the NLM Web site, exploring a partnership with Google, and assembling an NLM junior board to evaluate NLM Web sites. These ideas could serve as recruitment strategies for new EnHIP representatives and a means of obtaining support for the work of EnHIP and NLM.

- **Build a workforce for data-driven research and health**

Group 3   Dr. Daniel Sarpong (facilitator)
                 Dr. Stephanie Bauer
                 Ms. Ann Krejci
                 Ms. Maletta Payne
                 Dr. Paul B. Tchounwou
                 Dr. Doris Withers

The third goal of the NLM Strategic Plan was addressed by Group 3. The group examined issues across the four objectives under this goal rather than approaching the objectives individually. The group indicated that data science still is somewhat of an unknown, prompting the suggestion of a catalog that explains what data science means, and the requirements, training and/or education needed to enter the field. Training programs for faculty, counselors, librarians, and leaders at all grade levels, as well as mentoring and infrastructure support were deemed to be important. In the same way that writing skills span across all subjects, data science is multidisciplinary and transdisciplinary, and the group felt that EnHIP partner institutions should intentionally integrate data science across the curriculum. A competitive process for scholarships, either through government agencies or perhaps industry, and more loan repayment plans and terms that are less burdensome, were suggested to increase workforce development in STEM. Group 3 also observed that many STEM graduates end up working in fields unrelated to STEM, including students who are pre-med, who may not go to medical school. The group noted that these were strong candidates for redirecting to library science master's degrees. Group 3 recommended that the retention of students in STEM majors could make a big impact towards increasing a diverse workforce.

Goal 1: Accelerate discovery and advance health through data-driven research		
1.3	**Foster open science policies and practices**	**COMMENTS**
	EnHIP will identify the principles and values around open science policies and will provide guidance in the form of a broad-based framework that can be tailored to each institution's principles	Group 1 reprioritized the objectives: 1.3, 1.4, 1.1, and 1.2
1.4	**Create a sustainable institutional, physical, and computational infrastructure**	
	EnHIP will position itself to serve as a conduit for NLM to develop institutional capacity among MSIs in support of the advancement of research.	Need additional funding for convening to discuss how to implement this and build relationships across the EnHIP network
1.1	**Connect the resources of a digital research enterprise**	
	EnHIP will serve in an advisory role to ensure NLM increases accessibility of digital resources to a wide spectrum of audiences at the individual and institutional level.	Resources may be digital, but the translation may not be; increase data uptake by translating digital information into a useful form for the user
1.2	**Advance research and development in biomedical informatics and data science**	
	EnHIP will promote the use of both big data and small data sets to facilitate collaborative research.	Need additional funding for EnHIP to create and pool data to assess where future research needs are and develop a common research agenda

Goal 2: Reach more people in more ways through enhanced dissemination and engagement	
2.1	**Know NLM users and engage with persistence**
Use a broad range of communication strategies: • public service announcements, such as the radio, bus placards, billboards, park benches • social media — tweets, texts; brief and to the point • online games and videos • social marketing – target specific groups and vary the approach/delivery depending on the user's age and other characteristics • intentional micro messaging	Identify what the target audience *needs* to know—not all the things we want them to know—and find where it intersects with what they want to know
2.2	**Foster distinctiveness of NLM as a reliable, trustable source of health information and biomedical data**
Use trusted intermediaries to engender confidence in the message: • trusted community persons and leaders – use train-the-trainer and peer trainers to train them • popular opinion leaders – train them to be agents of change • our community connections – teach them about NLM • community health workers, especially those working in middle or high schools – youth who are interested in health and in becoming health advocates for their friends and families Use TED talks or YouTube-type formats Place the NLM link on MSI Web sites; research libraries should reach out to local or K-12 libraries to make sure the NLM link is on their Web sites	The key is to foster trust
2.3	**Support research in biomedical and health information access methods and information dissemination strategies**
Train middle school and high school students in basic research skills, such as literature reviews – tailor to their grade level	Need funding to support and promote research

	Use evidence-based practice or STEM results to pique curiosity and spark interest in research Use a reward/recognition program to encourage use of resources Create a loyalty program for kids so they can redeem earned points	
2.4	**Enhance information delivery**	
	Update/revise science-based games on the NLM Web site Solicit feedback on programs at related sources (NIH, CDC) and connect the good ones with the NLM Web site Entice university professors to use NLM as their 1st resource Conduct a survey to determine the benefits of using NLM vs. Google Search Explore a partnership with Google and get them to disseminate information Use an NLM junior board to evaluate NLM Web sites; rotate membership among high school students and develop a recognition program with T-shirts and certificates; reward the best evaluators with a trip to the NLM facility in Bethesda	
Goal 3: Build a workforce for data-driven research and health		
3.1	Expand and enhance research training for biomedical informatics and data science	
3.2	Assure data science and open science proficiency	
3.3	Increase workforce diversity	
3.4	Engage the next generation and promote data literacy	
	Build infrastructure for all of the objectives Train the faculty, counselors, and teachers (train-the-trainer model) at college and K-12 levels to redirect the pipeline toward data-driven science Promote partnerships between colleges and K-12 schools	Group 3 did not separate tasks by objective because many of the tasks span several objectives

ATTACHMENT 1: EnHIP ACCOMPLISHMENTS 2008-2019

Infrastructure
- Name was changed to the Environmental Health Information Partnership (EnHIP)
- Small award funding to connect local libraries and the lay community to NLM resources
- ORISE provided training to faculty and staff at MSIs
- Collaboration with ORISE to promote and expand information on opioids in rural and urban communities
- Accreditation of environmental science programs at Benedict College and Howard were inspired by member schools participation in EnHIP
- MSIs have transformed academic structure to respond to information from participation in EnHIP and NLM
- Creation and establishment of the Health Disparities Research Center at Meharry Medical College was a direct result of member school participation in EnHIP.

Curriculum Enhancement and Changes
- Created divisions, departments, and courses in environmental health science focusing on MSIs
- Established environmental health research centers on campuses
- New offerings of college degrees in data science and bioinformatics, computer science, and information technology at MSIs
- Use of NLM databases to update and include in courses
- NLM genetics resources and clinical trials for nursing
- Leverage small award funding to develop environmental health curriculum included TOXNET/ HSDB and GIS for asthma tracking
- Support international symposium – pre-workshop on NLM environmental and toxicology resources by NLM personnel to promote research, and publish the proceedings in an international journal in PubMed Central
- Editors of Journal of Environmental Health and Frontiers in Oncology
- Use PubMed for systematic reviews for Health Resources and Service Administration (HRSA) grants
- Moved toxins and environmental health to the top transforming departments, divisions, centers, and courses

Pipeline Education: Elementary to College
- Community outreach and engagement through small award projects
- Assist and increase capacity of elementary, high school, and college students to use NLM resources by adding services of regional libraries and librarians
- Working with high school students to understand what resources are available at NLM and learning how to conduct research
- Symposia and webinars for faculty, students, high school – research environmental health in community, the use of social media such as blogging, web pages, and Twitter
- EnHIP small grants used to teach high school students genetics and how to use environmental resources
- Provide in Spanish and English resources for students obtaining GEDs in Alaska
- Elementary students' citizen science projects
- Leveraging grant programs in alignment with work of the NLM

- Masters-level students use disaster information
- Use the process of data sharing among schools

Community Outreach and Engagement
- Reframing and redefining the role of the librarian in medical schools and STEM programs
- Providing computers and computer training for local communities to embrace technology
- Engaging faith-based organizations and agencies in health awareness campaign
- Funding for kiosks in community organizations to support families and to incorporate into libraries for classes and students
- Online resources for genetics with public library and high school students to use NLM resources – community engagement
- Offer collaborations between undergraduate students in community organizations and high schools to train and to engage in large discussions of health disparities and other issues in Alaska
- Participation on EnHIP helped with accreditation of environmental science programs
- Projects on opioids, chronic pain, and disaster management
- Partnering with local public libraries and regional medical library (NLM)
- Partnering with industry to address societal problems such as smoking, cancer, housing and its relationship to health

ATTACHMENT 2: 2019 EnHIP PARTICIPANTS

Dr. Patricia Matthews-Juarez, Meharry Medical College, Chair
Dr. Rueben C. Warren, Tuskegee University, Scientific Advisor

Dr. Stephanie Bauer, University of Alaska Anchorage
Ms. Dolores E. Caffey-Fleming, Charles R. Drew University of Medicine and Science
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