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From Assessment to Action: A Road Map to Becoming an Environmental Health Science Professional

Editor's Note: In an effort to promote the growth of the environmental health profession and the academic programs that fuel that growth, the National Environmental Health Association has teamed up with the Association of Environmental Health Academic Programs (AEHAP) to publish two columns a year in the *Journal*. AEHAP's mission is to support environmental health education to ensure the optimal health of people and the environment. The organization works hand in hand with the National Environmental Health Science and Protection Accreditation Council (EHAC) to accredit, market, and promote EHAC-accredited environmental health degree programs.

This column provides AEHAP with the opportunity to share current trends within undergraduate and graduate environmental health programs, as well as efforts to further the environmental health field and available resources.

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Introduction

Is the air safe to breathe? Is the water safe to drink? Can I feed my child the apple I bought at the grocery store? Is my house safe from toxic substances? How will climate change-related flooding and drought impact food security? These are some of the questions environmental health science professionals are trained to counter. From the time John Snow removed the pump handle and Rachel Carson described the origin of a *Silent Spring*, environmental health professionals consistently provided the evidence that the

health of the environment is inextricably linked to that of people.

Never before has the profession been in such need of bolstering its workforce. Over the last few decades many communities have taken for granted the ability to control disease outbreaks and have access to safe food, clean water, healthy homes, and reliable sanitation (Brooks & Ryan, 2021). This trend has been combined with a realization that the traditional definition of environment is no longer relevant. For example, when Saharan dust increases the risk of childhood

asthma in Puerto Rico, it is clear that geographical boundaries to assess the impact of environmental insults on human health are obsolete. Similarly, exposures to nonchemical stressors often related to social determinants of health, such as financial distress and poor housing, can result in stress and other adverse health consequences, and can potentially synergistically exacerbate contaminant exposures resulting in worse health and well-being (Gokoel et al., 2021; Lichtveld et al., 2018; Nilsen et al., 2020; Tulve et al., 2016). This indirect relationship has contributed to reduced investments in environmental health services, resulting in system weaknesses and vulnerabilities, which were highlighted by the COVID-19 pandemic (Brooks & Ryan, 2021).

Attributes of the Environmental Health Professional

There are many attributes that make the environmental health profession unique. Key among those attributes are the following three: 1) the profession is by design transdisciplinary in nature; 2) to be effective, an environmental health professional must engage a wide-ranging set of stakeholders from corporations to communities; and 3) career opportunities are multisectoral—from local to global and from worker health to water quality—making environmental health science professionals highly in demand. Our job now is to let the communities we serve understand how important this discipline is to ensure they can thrive every day of their lives. Future professionals also need to know the myriad of environmental health needs and career options within this degree. This awareness needs to be done early in their

FIGURE 1

Complete Environmental Exposure Pathway



Note. The infographic was designed by the European Environment Agency and depicts the pathway from source of contamination—through environmental media—to the points of exposure, their routes, and subsequently those individuals who are exposed and affected (European Environment Agency, 2019).

career decision-making process (i.e., middle and high school years) to ensure the growth and continued impact environmental health science has on this ever-changing landscape.

Transdisciplinary by Design

Knowledge of each step of the environmental exposure pathway is pivotal (Figure 1). This understanding is vital to master the characterization of the contamination source(s) and human health risks—how chemicals move through the exposure media (e.g., water, soil, air); where exposure can occur (e.g., play-

ground, water tap); how chemicals enter into the body and how metabolism occurs (e.g., exposure routes, inhalation, ingestion, dermal contact, breast milk); and most importantly, who is exposed, especially those individuals most vulnerable.

Expertise in environmental sciences and those disciplines targeting human health and social services have been artificially separated in many educational systems, yet both are pivotal to achieve community protection. Environmental health science programs need to focus on a pedagogical approach to integrate these

disciplinary approaches. Illustrative examples of the benefit of this approach are evident in addressing airflow requirements to mitigate transmission of infectious agents in indoor environments (e.g., the SARS-CoV-2 pandemic) (Mbow et al., 2019), and the impact on food security related to biodiversity loss resulting from climate change (Lichtveld, 2022).

Wide-Ranging Stakeholder Portfolio

From communities to companies—the public and private sectors—successful environmental health science professionals engage with a diverse set of stakeholders. Similarly, they are active in many different professional organizations. Among those are the environmental and occupational health sections of the American Public Health Association, Society of Toxicology, Association of Schools and Programs in Public Health, National Environmental Health Association, and Association of Environmental Health Academic Programs (EHAC). Stakeholders also include both academic unit-wide and discipline-specific accrediting bodies such as the Council on Education for Public Health, National Environmental Health Science and Protection Accreditation Council, and Board for Global EHS Credentialing. Together, these stakeholders represent a nurturing environment for emerging and senior environmental health professionals alike.

Career Opportunities

So, who are we? The list is limitless: environmental health specialists, public health practitioners, academicians and scientists, disease control professionals, disaster management officials, occupational health and safety specialists, industrial hygienists, food safety specialists, chief resilience officers, water quality specialists, climate and human health scientists, and environmental health policy experts. Employment opportunities are equally diverse: health and environmental protection; academia; federal, state, and local health and environmental agencies; manufacturing companies; worker protection; and disaster preparedness and management. Noteworthy is the versatility of our profession. Given the heightened attention to the COVID-19 pandemic and climate-related risks to communities, we are now more visible as experts in infectious disease control, mitigating toxic exposures, and allowing communities to thrive in the safest possible way.

Helpful Resources

Professional Organizations

- American Public Health Association (www.apha.org)
- Association of Environmental Health Academic Programs (www.aehap.org)
- Association of Schools and Programs of Public Health (<https://aspgh.org>)
- Association of State and Territorial Health Officials (www.astho.org)
- National Association of County and City Health Officials (www.naccho.org)
- National Environmental Health Association (www.neha.org)
- National Environmental Health Science and Protection Accreditation Council (www.nehspac.org)
- Society of Toxicology (www.toxicology.org)

Employment Organizations

- Academia, foundations, not-for-profit organizations, advocacy organizations, nongovernmental organizations
- Private sector: energy, industry, pharmaceuticals, environmental consulting, insurance, health and safety
- Public sector: Centers for Disease Control and Prevention, U.S. Environmental Protection Agency, Occupational Safety and Health Administration, National Institute for Occupational Safety and Health, state and local health departments

Pathways to Becoming an Environmental Health Professional

The road map towards environmental health science can start in primary school by consciously cultivating an awareness how the health of the environment is inextricably linked to that of people. Environmental health educators can play an important role in exposing high school science teachers and their students to environmental health. Examples include the Emerging Scholars Environmental Health Sciences Academy, Environmental Health Science Education, and Teen Research and Education in Environmental Science for High School Students (Covert et al., 2019; National Institute of

Environmental Health Sciences, 2019; Rocha et al., 2023; University of Pennsylvania, n.d.). These programs target disadvantaged juniors and rising seniors in public schools and are designed to promote college attendance in general and environmental health disciplines specifically.

The portfolio of environmental health degrees spans the undergraduate and graduate levels. Bachelor of science (BS) degrees are offered through many programs that often also offer specialty tracks such as health and safety management. At the graduate level, master of science (MS) and master of science in public health (MSPH) degrees provide opportunities to specialize in a wide variety of environmental health subspecialties as described in the career opportunities. A key aspect of this education are the mechanisms provided by programs accredited by EHAC, which provides the foundations required to translate science into practice to protect human health across multiple settings. Also, graduates are able to join the ranks of the registered environmental health specialists or registered sanitarians.

The doctor of philosophy degree (PhD) in environmental health sciences often focuses on in-depth assessments of the impact on exposures to contaminants throughout the research continuum. This research can range from basic mechanistic inquiries to organ system damage and environmental epidemiologic cohort studies. The PhD can also offer specialization in several toxicological subspecialties including ecotoxicology, genetic toxicology, and organ-specific endpoint (e.g., reproductive, pulmonary, and renal toxicology). Within medicine, specialization and board certification in environmental and occupational medicine focus on the clinical aspects such as organ system damage and function. Depending on prerequisite coursework, graduates with environmental health science degrees can also pursue certification in industrial hygiene, a coveted professional certification. Several academic institutions offer some of these specialty tracks online, creating greater access for those already practicing who want to augment their practical skills into a formal degree.

Career Advancement

Career advancement is both degree and employment sector specific. At the BS and

MS professional levels, employment often follows successful internships or co-ops. A benefit for the employer is that the newly hired environmental health professional can “hit the ground running,” decreasing the onboarding time and learning curve. Another advantage is that graduates of EHAC programs, who have often received support from the Association of Environmental Health Academic Programs, will be trained in the benchmark qualification for government and military sectors (Ryan & Hall, 2022). Graduates have the ability to capitalize on their education and effectively protect the health and well-being of others.

The newly employed professional starts a career in a familiar setting without having to go through an extensive job search. This scenario is often the case in industry where hiring systems are more flexible than the public sector. Private sector career opportunities include pharmaceutical, oil, and mining industries; health and safety companies; manufacturing; engineering; healthcare; and a range of other industries. In the public sector, many opportunities exist within federal, state, tribal, local, and city governments and communities. Most career opportunities are in public health or environmental agencies. For those pursuing an academic career, the trajectory traditionally involves obtaining a postdoctoral fellowship, followed by a faculty position and the opportunity to ascend in rank from assistant to full professor and over time in higher administrative positions. Given the plethora of options, environmental health science professionals can pursue multiple careers across different subspecialty areas and employment sectors. ✨

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