

## ▶ GUEST COMMENTARY

# Supporting Students and Young Professionals in Environmental and Occupational Health, Safety, Science, and Policy-Related Graduate Programs

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**Abstract** This 2017–2019 project started with a systematic assessment of three independent environmental and occupational health-related doctoral (PhD) programs, which are sponsored by different agencies, institutes, and schools within Rutgers Biomedical and Health Sciences at Rutgers, The State University of New Jersey: Exposure Science, Toxicology, and Environmental Health. In addition, we examined other graduate and undergraduate environment-related schools, departments, divisions, and institutes with degree programs (majors and minors) and certificate programs at Rutgers. Then, we conducted a survey of students. Data collected can result in enhancements to connections between entities, with multiple potential benefits. For example, for Rutgers School of Public Health, data can inform efforts to increase student applications to both master's and doctoral programs, as well as increase faculty participation in teaching and student advising. The project should result in more qualified student applications from students in their final year of master's programs. Subsequently, acceptances into and matriculations from PhD programs should also increase. Overall, this approach should provide more continuity of scholarship at schools, institutes and/or other environmental programs at Rutgers. In summary, this project's data can help support positive yet complex relationships across engaged entities at Rutgers and inform other U.S. environmental health programs.

## Introduction

In 2003, following publication and release of Healthy People 2010 public health objectives, which included aspects of environmental health (EH), a revitalization strategy for essential EH services was published by the Centers for Disease Control and Prevention (CDC), National Center for Environmental

Health, Division of Emergency and Environmental Health Services (CDC, 2003). This 10-part framework included support of research and enhanced workforce development (i.e., training and continuing education). In addition, the Uniformed Services environmental health officers receive guidance for their transition out of the mili-

tary and into civilian careers (CDC, n.d.). These documents, and many others since then (Heidari, Chapple-McGruder, Whitehead, Castrucci, & Dyjack, 2019; Resnick, Zablotsky, & Burke, 2009), have noted substantial challenges facing the EH profession. These challenges include recruitment and retention, including high turnover and movement between agencies or from public agencies to the private sector because of higher salaries.

In addition, there are many older practitioners retiring or approaching traditional retirement age. At the same time, jobs available in EH for specialists, sanitarians, and scientists (including various types of technicians) are predicted to grow about 11% between 2016 and 2026, which is faster than the national average across industries and sectors (U.S. Department of Labor, 2019). In other words, challenges and opportunities exist.

U.S. federal agencies, national laboratories, and research institutes provide funded opportunities for individuals with recently completed undergraduate, graduate, and doctoral-level degrees in environmental public health (PH) sciences as well as environmental engineering and related policy studies (CDC, 2019; Food and Drug Administration, 2018; USAJobs, 2019; U.S. Environmental Protection Agency, 2016; U.S. Department of the Interior, n.d.; U.S. Geological Survey, n.d.). Furthermore, U.S. federal agencies, some national-level nonprofit organizations, and research institutes provide information on EH careers and various scholarship opportunities for varying amounts of annual or one-time

funding. Students can be in undergraduate and graduate programs involving EH and PH sciences, engineering, technology, statistics, and/or policy (Association of Environmental Health Academic Programs, n.d.; National Environmental Health Association, 2020a, 2020b; National Environmental Health Science and Protection Accreditation Council, 2019; National Science Foundation, n.d.; U.S. Department of Energy, Oak Ridge Institute for Science and Education, 2015, n.d.).

In summary, these EH workforce realities bring renewed attention to the need for engaging young people at the end of high school or early in their undergraduate careers in EH, as well as generally in PH and related allied health careers through their sciences, math, or statistics courses (Shendell, Gourdine, & Yuan, 2017). Students and young professionals need to know there are substantial entry-level employment opportunities with promotion potential in the science, technology, engineering, and mathematics (STEM) fields beyond traditional career pathways such as the health professions and laboratory-based research for EH professionals (Ahonen & Lacey, 2017; Resnick et al., 2009). Also, students and young professionals need to know environmental education and training for EH work, including in interpersonal soft skills, are related but separate (Knechtges & Kelly, 2015; Thomas, 2003).

Furthermore, there are employment opportunities in EH for students and young professionals who have earned a bachelor's degree and a certification in an area such as food safety/food sciences, industrial hygiene/worker safety, general EH, and emergency preparedness and response (Marion, Murphy, & Zimeri, 2017). Moreover, STEM and EH employments need more representation by students and young professionals from racial and ethnic minority groups, who have perceived barriers to EH and have been discouraged by perceived or relatively lower EH job salaries (Haynes & Jacobson, 2015; Quimby, Seyala, & Wolfson, 2007). Overall, EH needs improved marketing toward and visibility among students and young professionals in U.S. universities and colleges in support of urban, suburban, and rural EH. These modern communications efforts must be online for mobile-friendly platforms.

This commentary shares the key lessons learned from an EH project conducted as part

of requirements of the lead author for the Rutgers Leadership Academy (RLA) 2017–2019 cohort. Data from anonymously surveyed undergraduate and graduate students in the 2018–2019 academic year can inform public and private universities and colleges with students in STEM and EH.

## Methods

Initially, in winter to summer 2018, contents of Rutgers websites, informational brochures, and fact sheets produced were examined and summarized to better understand the breadth, depth, and geographic scope (across Rutgers campuses and across NJ) of the various schools, departments, and institutes with EH, science, engineering, policy, or sustainability programs (majors, minors, and/or certificates or continuing education courses) available at Rutgers. Students in PH (master's and certificate programs) are eligible to take courses throughout Rutgers (see supplemental figure at [www.neha.org/jeh/supplemental](http://www.neha.org/jeh/supplemental)).

In spring–summer 2018, an online, 12-question survey with single answer or “choose all that apply” responses was developed with input from Rutgers faculty and staff, a beta-tester (federal work study student), and a pilot tester (Master of Public Health core course assistant from 2017–2018) (Table 1). This survey was conducted anonymously in late November to late January 2018–2019 using PsychData. This project was exempt from institutional review board/human subjects approval because the survey was conducted as part of normal educational classroom-type assessment activities and practices.

Participation was voluntary and was done with consent without written documentation because it was an online activity. Students were invited via their Rutgers student e-mail address to complete the survey as part of an extra credit opportunity: for 5 points in a 1,000-point course with 10 bonus points per semester for the EH required core course at Rutgers School of Public Health (SPH). A screenshot of the final screen or automated e-mail sent to a student's Rutgers account (other part of bonus opportunity led by another part of Rutgers SPH) proved completion.

## Results and Discussion

In December 2018 and late January 2019, 73/73 (100%) and 31/53 (58%), respectively,

or 104/126 (83%) total Master of Public Health students and 12/40 (30%) undergraduate sustainability minor students completed the survey. Two undergraduate students were excluded because they did not finish the survey. The initial goal was survey completion in <10 min. The actual mean completion time for 116 students was about 6 min (364 s). Table 2 presents key results from the online survey conducted late fall 2018 to early winter 2019, including the sample population of responding students.

The key findings to inform recommendations from the RLA project to Rutgers administration regarding online/web-based promotion of EH and PH to students are:

- The majority of students (66%) wanted a new website and 49% stated this new website, as one website or a set of pages hosted by the Rutgers School of Graduate Studies or a Rutgers Institute, could be titled “Rutgers and Our Environment.”
- Most participants (92%) stated faculty and professional staff should have their own focused web page and reported feeling similarly about undergraduate students and master's students (versus approximately 90% for PhD students and 81% for postdoctoral research fellows).
- For potential layout of matrixed web page design (slightly preferred over bullet points), which was proposed as 2–3 rows and 2–3 columns of cells where each cell would have an identifying word or phrase and visual/photo to be clicked on to lead to a page listing information and student/team profiles (see examples at [www.njsafe-schools.org](http://www.njsafe-schools.org) currently hosted by Rutgers SPH), no option presented had a majority vote. Some participants provided text comments. The top three, with approximately 30% of students liking each of these orders, had EH/PH as first:
  - » Human Health, Ecological Health, Safety, Sustainability
  - » Human Health, Safety, Ecological Health, Sustainability
  - » Human Health, Safety, Sustainability, Ecological Health
- For the potential options for a relative ranking for links to subpages, no option had a majority vote, but one was liked by 32%: undergraduate students, graduate (master's) students, doctoral students; faculty, staff, postdoctoral fellows.

TABLE 1

**Student Survey Questions and Response Options**

Question Number	Response Options Provided
<b>Question 1</b>	
Do you think one Rutgers-hosted website unifying the various environmental and occupational health, safety, science, and policy-related programs here at Rutgers University–New Brunswick, including Rutgers Biomedical and Health Sciences (RBHS) schools, is a good idea?	<ul style="list-style-type: none"> <li>• Yes</li> <li>• No</li> <li>• I would consider it after receiving more information</li> <li>• I do not know</li> </ul>
<b>Question 2</b>	
For such a website unifying the various environmental and occupational health, safety, science, and policy-related programs here at Rutgers University–New Brunswick, including RBHS schools, which potential titles do you like?	<ul style="list-style-type: none"> <li>• Rutgers and the Environment</li> <li>• Rutgers and Our Environment</li> <li>• Rutgers and Study of the Environment</li> <li>• Studying the Environment at Rutgers</li> <li>• Studying Impacts on the Environment at Rutgers</li> <li>• Studying Impacts on Our Environment at Rutgers</li> </ul>
<b>Questions 3–7</b>	
Do you think separate pages on faculty/staff members (3), undergraduate students (4), master’s level graduate students (5), doctoral students (6), and postdoctoral students (7) on the proposed website is a good idea?	<ul style="list-style-type: none"> <li>• Yes</li> <li>• No</li> <li>• I would consider it after receiving more information</li> <li>• I do not know</li> </ul>
<b>Question 8</b>	
For such a website unifying the various environmental and occupational health, safety, science, and policy-related programs here at Rutgers University–New Brunswick, including RBHS schools, the aforementioned stakeholder-level pages could each be organized into categories (as a bulleted list or a 2 x 2 matrix) of the primary areas of research and/or practice of the individuals. Which option(s) do you prefer?	<ul style="list-style-type: none"> <li>• Human health, ecological health, safety, sustainability</li> <li>• Ecological health, sustainability, human health, safety</li> <li>• Human health, safety, ecological health, sustainability</li> <li>• Human health, safety, sustainability, ecological health</li> <li>• Sustainability, ecological health, human health, safety</li> <li>• Ecological health, sustainability, human health, safety</li> </ul>
<b>Question 9</b>	
In your opinion, who should be the points of contact (e-mail and/or phone) present on the proposed website pages? Please note: Some Rutgers schools, departments/units, and programs may list contact information for prospective student applicants and/or currently enrolled students on a separate page or at the bottom of their main website.	<ul style="list-style-type: none"> <li>• Administrative manager/assistants</li> <li>• Chair/director/program manager</li> <li>• Vice-chair/associate or assistant director</li> <li>• I believe each individual listed should also have his/her/their Rutgers e-mail address listed</li> </ul>
<b>Question 10</b>	
For the proposed website’s home page/primary page organization to secondary pages (category-level) and tertiary (individual-level) pages, would you prefer a modern matrix design (think two rows with three columns) or a bulleted list of the various groups previously noted?	<ul style="list-style-type: none"> <li>• Matrix design</li> <li>• Bulleted list</li> <li>• Either design would be fine/I have no strong preference</li> <li>• I do not know</li> </ul>
<b>Question 11 and 12 (per question 10)</b>	
<p>Since you prefer the modern matrix design, which of these options do you most prefer (11)/least prefer (12)? At present, for illustrative purposes, each of the six potential stakeholder groups are included in this question’s answer options.</p> <p>Note, the options below have two rows, separated by a semicolon, and within each row one would read from left-to-right across the screen on any mobile-friendly device (smartphone, tablet, laptop, desktop computer).</p>	<ul style="list-style-type: none"> <li>• Undergraduate students, graduate (master’s) students, doctoral students; faculty, staff, postdoctoral fellows</li> <li>• Graduate (master’s) students, doctoral students, undergraduate students; faculty, staff, postdoctoral fellows</li> <li>• Doctoral students, graduate (master’s) students, undergraduate students; faculty, staff, postdoctoral fellows</li> <li>• Undergraduate students, graduate (master’s) students, doctoral students; faculty, postdoctoral fellows, staff</li> <li>• Graduate (master’s) students, doctoral students, undergraduate students; faculty, postdoctoral fellows, staff</li> <li>• Doctoral students, graduate (master’s) students, undergraduate students; faculty, postdoctoral fellows, staff</li> <li>• Any of the options are fine/I do not have a preference</li> <li>• I do not know</li> </ul>
<p><i>Note.</i> Survey participants had choice of “other” with a free text response for questions 2, 8, and 9.</p>	

TABLE 2

## Student Survey Results

Question	Master of Public Health (MPH) and Undergraduate Student Response (n = 114)		Undergraduate Student Response (n = 10)	
	#	%	#	%
<b>Question 1</b>	114	100	10	100
Yes	75	65.8	5	50.0
No	2	1.8	0	0
I would consider it after receiving more information	35	30.7	4	40.0
I do not know	2	1.8	1	10.0
<b>Question 2<sup>a</sup></b>	114	100	10	100
Rutgers and the Environment	25	21.9	3	30.0
Rutgers and Our Environment	56	49.1	5	50.0
Rutgers and Study of the Environment	10	8.8	0	0
Studying the Environment at Rutgers	12	10.5	1	10.0
Studying Impacts on the Environment at Rutgers	19	16.7	1	10.0
Studying Impacts on Our Environment at Rutgers	18	15.8	3	30.0
Other	10	8.8	2	20.0
<b>Question 3</b>	112	98.2	9	90.0
Yes	103	90.4	8	80.0
No	1	0.9	0	0
I would consider it after receiving more information	4	3.5	0	0
I do not know	4	3.5	1	10.0
<b>Question 4</b>	112	98.2	9	90.0
Yes	103	90.4	8	80.0
No	3	2.6	0	0
I would consider it after receiving more information	6	5.3	1	10.0
<b>Question 5</b>	112	98.2	9	90.0
Yes	104	91.2	6	60.0
No	3	2.6	1	10.0
I would consider it after receiving more information	5	4.4	2	20.0
<b>Question 6<sup>b</sup></b>	112	98.2	9	90.0
Yes	100	87.7	6	60.0
No	2	1.8	1	10.0
I would consider it after receiving more information	9	7.9	2	20.0
<b>Question 7</b>	112	98.2	9	90.0
Yes	93	81.6	6	60.0
No	5	4.4	1	10.0
I would consider it after receiving more information	11	9.6	1	10.0
I do not know	3	2.6	1	10.0

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TABLE 2 continued from page 31

**Student Survey Results**

Question	Master of Public Health (MPH) and Undergraduate Student Response (n = 114)		Undergraduate Student Response (n = 10)	
<b>Question 8<sup>a,c</sup></b>	112	98.2	9	90.0
Human health, ecological health, safety, sustainability	31	27.2	9	90.0
Ecological health, sustainability, human health, safety	9	7.9	1	10.0
Human health, safety, ecological health, sustainability	37	32.5	2	20.0
Human health, safety, sustainability, ecological health	34	29.8	1	10.0
Sustainability, ecological health, human health, safety	20	17.5	6	60.0
Ecological health, sustainability, human health, safety	13	11.4	3	30.0
<b>Question 10</b>	112	98.2	9	90.0
Matrix design	30	26.3	2	20.0
Bulleted list	33	28.9	2	20.0
Either design would be fine/I have no strong preference	41	36	4	40.0
I do not know	8	7	1	10.0
<b>Question 11</b>	71	62.3	6	60.0
Undergraduate students, graduate (master's) students, doctoral students; faculty, staff, postdoctoral fellows	36	31.6	3	30.0
Graduate (master's) students, doctoral students, undergraduate students; faculty, staff, postdoctoral fellows	2	1.8	0	0
Doctoral students, graduate (master's) students, undergraduate students; faculty, staff, postdoctoral fellows	3	2.6	0	0
Undergraduate students, graduate (master's) students, doctoral students; faculty, postdoctoral fellows, staff	14	12.3	2	20.0
Graduate (master's) students, doctoral students, undergraduate students; faculty, postdoctoral fellows, staff	2	1.8	0	0
Doctoral students, graduate (master's) students, undergraduate students; faculty, postdoctoral fellows, staff	1	0.9	0	0
Any of the options are fine/I do not have a preference	11	9.6	0	0
I do not know	2	1.8	1	10.0

Note. Mean time elapsed/students active in survey was 364 s.

<sup>a</sup>Multiple responses could be selected.

<sup>b</sup>One MPH student (0.9%) selected the "I do not know" response.

<sup>c</sup>Three MPH students (2.7%) selected the "other" response.

In summary, this project highlighted the complex relationships across entities engaged in EH. Furthermore, data on current student thinking can inform other EH programs in the U.S. 🌐

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## Did You Know?

NEHA has gathered resources to help students through their college years and in the transition into the workforce. Visit [www.neha.org/students](http://www.neha.org/students) to find information on NEHA memberships tailored to students and emerging professionals, internships, scholarships, and employment opportunities.

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