

Needs Assessment of Environmental Health Professionals in Montana: A Post-COVID-19 Perspective

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Abstract We designed a cross-sectional study for environmental health (EH) professionals in Montana as a follow-up to a needs assessment conducted in 2020 by the Montana Public Health Workforce Development Group. A 57-question survey was developed to deepen the understanding of the profession regarding demographics, work status and position, education and licensure, work prior to and during the COVID-19 pandemic, professional preparation and continuing education, job satisfaction, recruitment and retention, and emerging issues. The survey was administered electronically in 2022 to all health departments in Montana and had a 74% response rate. The results revealed that most EH professionals in Montana are predominately White. Respondents reported being adequately trained but highlighted that additional training would be beneficial. Job-related stress, staffing levels, and salary levels were identified as areas of concern. Furthermore, respondents reported that they are otherwise fulfilled by the purposeful nature of their jobs. Our study was successful in capturing an updated view of the challenges facing EH professionals in Montana. Using these findings, the Montana Environmental Health Association and the Montana Public Health Training Center are developing training solutions for these professionals.

Introduction

The field of environmental health (EH) has advanced considerably, evolving from practices rooted in ancient civilizations such as the Egyptians, Minoans, Greeks, and Romans (Duffy, 1992; see Supplemental for a background of the profession at www.neha.org/jeh-supplementals). While many of the duties and expectations remain the same today, EH has become more complex and specialized, which has resulted in a struggle to define and categorize this workforce as job responsibili-

ties can be vastly encompassing (McCormick, 2020). Today, the EH professional must possess expertise in multiple areas including drinking water quality, wastewater management, healthy homes, food safety, vectors and public health pests, and emerging issues (Brooks et al., 2019; National Environmental Health Science and Protection Accreditation Council [EHAC], 2019). Moreover, the evolution of technology and information dissemination has led to ever-expanding responsibilities (Gerding et al., 2020).

The COVID-19 pandemic created additional demands and significantly exacerbated the stresses and strains on the profession in unforeseen ways. Two rapid national needs assessment surveys were administered by the National Environmental Health Association (NEHA, 2020a, 2020b) during the pandemic. Despite efforts to begin the process of developing a deeper understanding of the changing landscape for EH professionals, there remains a lack of research to comprehensively identify and characterize the scope, impact, conditions, and current and future needs of the profession (McCormick, 2020).

The last comprehensive national study of EH professionals was completed more than 50 years ago (Brooks et al., 2019). While EH professionals in Montana (also referred to as sanitarians) face challenges and concerns similar to those reported nationally, they are faced with responsibilities for a vast geographic area that includes 147,000 mi². The remote and rural characteristics of towns, cities, and residents across the state are further complicated by the decentralized nature of public health in Montana.

Similar to their national counterparts, EH professionals in Montana in rural areas commonly face a lack of public health personnel, resources, and training; some EH employees have no specific public health training or experience and must learn on the job (Denison, 2020; Rosenblatt et al., 2002). Health departments are hampered by staffing shortages, unexpected retirements brought on by the COVID-19 pandemic, low pay, and

increased workload. With the backlash from the public and a perceived increase in political involvement in public health, many EH professionals feel more stress and thus have an increased desire to leave the workforce (Montana Public Health Workforce Development Group, 2020). In addition, there exists a short supply of graduates who choose to enter the field. Montana State University (MSU) recently developed a bachelor's level environmental health program that is accredited by the National Environmental Health Sciences and Protection Accreditation Council (EHAC, 2020).

In 2020, a public health workforce assessment survey was completed by the Montana Public Health Workforce Development Group (MPHWDG, 2020), which is made up of professionals from the Montana Public Health Association (MPHA), Montana Public Health Training Center, Montana Department of Public Health and Human Services, and Montana Environmental Health Association (MEHA). The assessment classified needs into three tiers of general categories: 1) policy development and program management, 2) communication skills, and 3) cultural competency. The assessment was designed to obtain a deeper understanding of the current conditions and needs of EH professionals practicing in Montana, with the hope of addressing current needs and future challenges while learning what recruiting and retention strategies are preferred to grow the workforce.

EH respondents reported feeling that their level of skill and familiarity with public health concepts were between “not much” and “a little” for tiers 1–3. This finding suggests that the EH workforce could benefit from various trainings and continuing education efforts to fill gaps in needed knowledge, skills, and abilities. Results also suggest that education and recruitment to the profession should begin at the high school level (MPHWDG, 2020), which would provide an introduction and early exposure to the field of public health for college-bound students. MSU and the University of Montana School of Public Health are working to develop ways to increase the number of students entering the public health field.

In April and October 2020, a national needs assessment of EH professionals was conducted in response to the ongoing COVID-19 pandemic (NEHA, 2020a, 2020b).

Results from the initial assessment revealed that 60% of EH professionals at local health departments were involved with COVID-19 responses in addition to their usual responsibilities. Respondents prioritized needs for COVID-19 cleaning and disinfection, personal protective equipment (PPE), and safe food guidance (NEHA, 2020a). The follow-up assessment in October (NEHA, 2020b) revealed that high-priority needs included increased staffing and personnel, more PPE, more consistent and high-quality COVID-19 information, and more technical support and guidance from the Centers for Disease Control and Prevention.

Based on a subset of data from the 2020 workforce study survey conducted by MPHWDG, it was determined that a separate survey that focused on the needs of EH professionals in Montana would be useful to identify the effect of COVID-19 on the workforce. This separate survey would also garner ideas for sustaining and growing the profession given recent challenges such as the COVID-19 pandemic. Our effort included a needs assessment survey developed to identify and characterize needs and gaps in information associated with EH practice, conditions, concerns, priorities, influences of the pandemic, and strategies for growing the workforce.

We sought to answer the following questions through the needs assessment:

- What are the key characteristics of the current workforce?
- Is the workforce adequately trained, staffed, and paid?
- How has the COVID-19 pandemic affected the workforce?
- Are current social and political forces affecting the workforce?
- What are the recommendations to support growth of the workforce?
- What strategies might improve working conditions for the workforce?

Methods

The needs assessment survey was designed to focus on the needs, circumstances, internal and external forces, and conditions of the EH workforce in Montana, with an emphasis on improving recruitment and retention. A 57-question survey was developed. Questions were designed to identify and classify the work-related duties prior to COVID-19, levels of satisfaction, and how these duties

changed because of COVID-19. Another area of interest was the qualification and training methods preferred by EH professionals, as well as projected needs for the future.

Survey domains included demographics, work status and position, education and licensure, work prior to COVID-19, practice in times of COVID-19, professional preparation and continuing education, job satisfaction, recruitment and retention, and emerging issues. Of the 57 questions, 36 were quantitative and 21 were qualitative. Question structures included single or multiple choice, completion, and open-ended questions (see Supplemental Survey).

The completed survey was approved by the institutional review board (IRB) of the University of Montana under the exempt category in accordance with federal regulations. After IRB review, a Qualtrics link to the survey was sent in 2022 to all public health departments across Montana for distribution to EH employees. The invitation and survey instructions informed participants of the purpose of the needs assessment and that participation was voluntary. It also stated that anonymity would be assured and results would be aggregated.

Completed surveys were downloaded from Qualtrics into an Excel spreadsheet for coding and analysis. The analysis was carried out using Minitab 20 and included frequencies, descriptive statistics, and correlations. Comparison of proportions was carried out using chi-square goodness of fit test when suitable sample counts and proportions were available.

Results

There were 100 completed or partially completed surveys received from 135 respondents (74% response rate). We propose that variability in the number of responses to each question occurred based on the comfort level of participants, perceived anonymity, time, and personal choice.

Demographics

Of the 100 participants surveyed, 58% self-identified as female. The largest age groups were 30–39 years and 50–59 years, at approximately 25% each. Only 1% of respondents identified as younger than 25 years and 7% identified as younger than 30 years. The majority of participants self-identified as

White (92%). The next largest self-identified race was Native American (4%; Table 1).

Most respondents reported their employment as full-time (84%), with 10% reporting part-time status. Further, 3% reported being retired, 2% provided contract services, and 1% indicated they were temporary employees. Over one half (54%) were field staff, close to one third (29%) were supervisors or managers, and 6% were directors or chiefs (Table 2).

Workforce Makeup

Close to one half of respondents (45%) had the title of sanitarian, while 37% were classified as EH specialists (EHS), 3% were EH technicians, and 1% were laboratory technicians or analysts (Table 2). Approximately 13% fell into the “other” category, which included lead sanitarian, teen pregnancy prevention, safety/security officer, emergency management, EH director, manager, EH and GIS specialist, deputy EHS director, professor, and administrator. Furthermore, approximately 35% of respondents reported that they held more than one title or position at the same organization. Of the respondents, 40% reported being in their current position <5 years and 7% reported being in their current position for >30 years.

Salary Range and Satisfaction

There was a wide range of salary distribution, with 45% of respondents reporting annual salaries between \$45,000 and \$65,000. Approximately 6% earned <\$25,000, while only 1% earned between \$95,000 and \$100,000. A total of 30% of respondents reported being satisfied with their current salary. A larger proportion (49%) reported that they were not satisfied with their current salary (Table 3). One respondent reported that they would have preferred annual pay increases that matched inflation. Overall, nearly 60% reported that they were not paid enough (Table 3).

Education and Licensure

Most respondents (52%) had earned a bachelor’s degree, 30% had earned a master’s degree, and 9% had earned a doctorate degree. Overall, one third (33%) studied sciences such as biology or chemistry; 21% studied environmental sciences; and 15% studied public health, community health, and/or health promotion (Table 4).

TABLE 1

Demographics of Environmental Health Professionals in Montana (N = 100)

Demographic	# (%)
Gender	
Female	58 (58)
Male	42 (42)
Race	
Native American or Alaska Natives	4 (4)
Asian	2 (2)
Black or African American	0
Hawaiian Native or other Pacific Islander	1 (1)
White, not Hispanic	92 (92)
Mixed race	0
Prefer not to say	1 (1)
Other	0
Age (years)	
<25	1 (1)
25–29	6 (6)
30–39	24 (24)
40–49	16 (16)
50–59	25 (25)
60–65	15 (15)
>65	13 (13)

Of the respondents earning post-secondary degrees or certificates, 23% earned degrees from MSU and 7% earned degrees from the University of Montana, Missoula. Of the respondents, 9% were graduates of an EHAC-accredited program (Table 4). Furthermore, 93% of respondents were professionally licensed, with 61% reporting being registered sanitarians and 20% being registered EH specialists (Table 4).

Scope of Work

Most respondents (86%) worked in public health departments. Only 3% worked in emergency preparedness. Within the EH field, the primary activities performed included commercial and school food safety (35%), land use/subdivisions (15%), wastewater (14%), and drinking water (6%). Further, <2% dealt with solid and hazardous waste, pools/spas/

TABLE 2

Workforce Makeup of Environmental Health Professionals in Montana (n = 91)

Demographic	# (%)
Employee status	
Full-time	76 (84)
Part-time	9 (10)
Seasonal	0
Temporary	1 (1)
Contract service	2 (2)
Prefer not to say	0
Other	3 (3)
Position level	
Field staff	49 (54)
Supervisor or manager	26 (29)
Director or chief	6 (6)
Prefer not to say	0
Other	10 (11)
Job title	
Environmental health specialist	34 (37)
Environmental health technician	3 (3)
Environmental scientist	1 (1)
Epidemiologist	0
Inspector	0
Laboratory technician or analyst	1 (1)
Sanitarian	41 (45)
Other	12 (13)

recreational waters, communicable diseases, and body art/tattoos/body piercings. Of the respondents, one quarter (25%) reported that they were assigned to practice in multiple areas, while 94% reported that they were involved in many EH-related activities and areas within the organization (Table 5).

Familiarity With Public Health Concepts

In response to questions about familiarity with various public health concepts, most respondents reported having “a little” in almost all categories. For cross-jurisdictional sharing of public health services, 71% of respondents reported having a little or not

TABLE 3

Salary Range and Level of Satisfaction With Salary for Environmental Health Professionals in Montana (n = 91)

	# (%)
Salary range (\$)	
25,000–30,000	5 (6)
30,000–35,000	4 (4)
35,000–40,000	3 (3)
40,000–45,000	8 (9)
45,000–50,000	13 (14)
50,000–55,000	12 (13)
55,000–60,000	7 (8)
60,000–65,000	10 (11)
65,000–70,000	6 (7)
70,000–75,000	8 (9)
75,000–80,000	3 (3)
80,000–85,000	2 (2)
85,000–90,000	4 (4)
90,000–95,000	1 (1)
95,000–100,000	5 (6)
100,000–110,000	0
110,000–120,000	0
120,000–130,000	0
>130,000	0
Satisfied with salary	
No	45 (49)
Yes	27 (30)
Prefer not to say	10 (11)
Other	9 (10)

much familiarity, while 10% reported no familiarity. For the category of fostering a culture of quality improvement, 81% of respondents reported that they were very familiar or had a little familiarity and 3% reported no familiarity. For public health and primary care integration, only 5% of respondents were very familiar, 77% had a little or not much familiarity, and 18% had no familiarity. For performance management, most respondents (65%) seemed to have a little or not much familiarity and 30% reported a lot of familiarity (Table 6).

For evidenced-based public health practices, 16% of respondents reported that they

TABLE 4

Education and Licensure of Environmental Health Professionals in Montana

	# (%)
Highest level of education (n = 86)	
High school diploma/GED	4 (5)
Associate degree	3 (3)
Bachelor's degree	46 (54)
Master's degree	25 (29)
Doctoral degree	8 (9)
Other	0
Subject area studied (n = 202)	
Business or business administration	12 (6)
Environmental science	43 (21)
Mathematics	16 (8)
Nursing	2 (1)
Nutrition	11 (5)
Public health, community health, health promotion	31 (15)
Science (biology, chemistry, etc.)	67 (33)
Social work	5 (2)
Other	15 (7)
Program accredited by the National Environmental Health Science and Protection Accreditation Council (n = 88)	
No	46 (52)
Yes	8 (9)
Not sure	34 (39)
Professionally licensed (n = 88)	
No	6 (7)
Yes	82 (93)
Type of professional license (n = 116)	
Dietician/nutritionist	1 (1)
Doctor	0
Nursing	1 (1)
Registered environmental health specialist	23 (20)
Registered sanitarian	71 (61)
Other	20 (17)

had a lot of familiarity, 74% reported a little or not much familiarity, and 10% reported no familiarity. Concerning Health in All Policies concepts, 63% of respondents reported having not much or no familiarity, only 10% were

TABLE 5

Workforce Identification of Environmental Health Professionals in Montana

	# (%)
Current public health department (n = 73)	
Administration/support staff	0
Chronic disease prevention	0
Communicable disease/immunization	0
Environmental health	63 (86)
Emergency preparedness	2 (3)
Epidemiology	0
Finance (including grant writing or grant reporting)	0
Home visits	0
Maternal and child health (non-nutrition)	0
Nutrition/WIC/breastfeeding support	0
Other	8 (11)
Primary environmental health activity practice area (n = 72)	
Body art/tattoos/body piercing	0
Commercial and school food safety	25 (35)
Drinking water	4 (6)
Emergency response	0
Infectious disease	1 (1)
Land use/subdivision	11 (15)
Pools/spas/recreational waters	1 (1)
Public lodging	0
Public nuisance complaint response	1 (1)
Solid/hazardous waste	1 (1)
Trailer courts/campgrounds	0
Wastewater (sewage)	10 (14)
Other	18 (25)
Practice in multiple environmental health areas (n = 72)	
No	2 (3)
Not very often	3 (4)
Sometimes	5 (7)
Yes	60 (83)
Prefer not to say	2 (3)
Other	0
<i>Note.</i> WIC = Special Supplemental Nutrition Program for Women, Infants, and Children.	

very familiar, and 27% had little familiarity. Multisectoral collaboration was almost evenly divided, with slightly more than one half (54%) of respondents having a little or a lot of familiarity and 47% reporting not much or no familiarity. Lastly, the Public Health 5.0 Principles were also almost evenly split, with under one half (44%) of respondents having a little or a lot of familiarity, whereas 56% reported not much or no familiarity (Table 6).

Duties

The job duties routinely performed by respondents were often broad, encompassing, and crossed specialty areas. Of the 73 responses to duties routinely performed, 22% had duties concentrated in a single area. All others (88%) had duties that spanned more than one specialty within the EH field. Some respondents made qualifying statements such as, “Almost too many to name. The breadth of the EH fields and tasks in my daily/weekly [schedule] are stunning,” and “All of those mentioned.” In addition to the routinely performed tasks, a similar number of respondents (84%) reported doing tasks not considered routine, including tasks related to COVID-19.

When asked about the aspects of their job they found difficult, responses included being overworked or feeling symptoms of burnout (19%), being understaffed or having high turnover (15%), difficulties dealing with the public (19%), issues related to COVID-19 (12%), people being unaware of what EH professionals do (10%), dealing with managers (9%), low pay (7%), regulations and the lack of consistency and enforcement (8%), being constantly interrupted and lack of private working areas (5%), and a general lack of support (3%).

Over one half of respondents (53%) reported feeling moderately stressed and 31% reported feeling severely stressed. Approximately one half (47%) of respondents reported the availability of work-related stress relief programs, while 44% said none existed. Further, 34% of respondents reported being helped by stress-reducing interventions, although most did not report being helped (53%).

Practice During the COVID-19 Pandemic

In response to how their duties changed due to COVID-19, 17% of respondents reported that their routine duties were pushed aside

TABLE 6

Familiarity of Environmental Health Professionals in Montana With Public Health Concepts (n = 73)

Public Health Concept	None # (%)	Not Much # (%)	A Little # (%)	A Lot # (%)
Cross-jurisdictional sharing of public health services	7 (10)	14 (19)	38 (52)	14 (19)
Evidence-based public health practice	7 (10)	21 (29)	33 (45)	12 (16)
Fostering a culture of quality improvement	2 (3)	12 (17)	35 (48)	24 (33)
Health in All Policies	20 (27)	26 (36)	20 (27)	7 (10)
Multisectoral collaboration	16 (22)	18 (25)	29 (40)	10 (14)
Performance management	4 (5)	13 (18)	34 (47)	22 (30)
Public Health 5.0 Principles	19 (26)	22 (30)	24 (33)	8 (11)
Public health and primary care integration	13 (18)	30 (41)	26 (36)	4 (5)

Note. Bolded values indicate the highest number and percentage for each concept.

to address issues related to the pandemic. A similar number reported that they became contact tracers, with an equal amount (15%) responsible for compliance, plan reviews, inspection, complaints, and enforcement related to COVID-19. Some respondents were transitioned to virtual inspections (8%) or remote work (11%), while others enforced mask mandates (9%), operated vaccine clinics (6%), reviewed social distance and viral reduction plans for businesses (8%), and/or were liaisons to the fire authority (1%). Some respondents noted an increase in conflict with the public (5%), loss of staff (5%), and pandemic-related complaints particularly from food establishments (3%). When asked if their department prepared them for these changes, 45% of respondents said yes, whereas 43% said they had no preparation. Further, one quarter of the respondents (25%) felt that the added duties were distributed unevenly.

More than one half of respondents (52%) were still able to complete their job duties, while 39% reported that stress from the COVID-19 pandemic limited their ability to complete their job duties. Some factors that increased stress were the volume of work and feeling symptoms of burnout (40%), being short-staffed (16%), hostility coming from the public (16%), personal and economic stress (16%), and limited time in the field to do work and the political environment (4% each). Of particular concern was the fallout from the

pandemic and the backlash against public health employees and scientists from the public and the legislature. One respondent stated that “COVID-19 has destroyed public health,” and another added that, “the profession lost respect, employees, and public confidence.”

Professional Preparation and Continuing Education

Less than one half of respondents (43%) reported that their education prepared or mostly prepared them for their position. Conversely, 9% said their education did not prepare them for their position. Most respondents (83%) reported receiving on-the-job training and 85% reported taking classes and/or earning certifications related to their position.

While most respondents (92%) said they were aware of professional organizations related to their work, almost all (89%) were already members of ≥1 professional organizations: 62% in MEHA and 28% in NEHA, with the remaining percentage in other organizations. Except for contractors and retirees, all respondents reported that their department supported professional development in some way and the majority (97%) reported that the organizations were at least somewhat helpful as it related to their position.

Job Satisfaction

Despite the challenges associated with the COVID-19 pandemic, 92% of respondents reported being satisfied or somewhat satisfied

in their current position. Only 8% said they were not satisfied. Of the changes they would like to see, 37% of the respondents stated an increase in pay would be desired; 18% would like to see an increase in staff to help with their workloads and that of their coworkers; 14% would like to see improvements in management or administration, human resources, and elected officials; and 8% would prefer a more defined or focused job description, as they felt their duties were too broad and encompassing.

Most respondents (66%) felt they were able to meet their personal or family obligations. In comparison, one third (33%) noted they were experiencing stress in the form of feeling worn out, mentally and physically exhausted, financially stressed, needing a more balanced lifestyle, feeling guilty if they contemplated retirement or leaving, and relying on other family members to fill in when they could not meet family needs.

Most respondents (77%) felt their organization was not adequately staffed and a similar number (73%) said they were aware of hiring needs within their organization. To make their position more satisfying, respondents indicated they would like an increase in pay (37%) and indicated they needed more help (25%), flexibility (16%), and support (13%). Furthermore, respondents indicated a need for better interaction with management (6%), more input from county attorneys (5%), and more time off (5%). Other suggestions included affordable housing; advancement opportunities; company transportation; reduction of the negativity associated with the field; better recordkeeping systems, computers, and resources; proper office space; in-person meetings; and more outreach events.

Despite the stress associated with their jobs and the highlighted needs, almost all respondents (97%) expressed positive feelings about their position. Most expressed a love for their job outright, feeling satisfied as they work with and help the public, businesses, and coworkers. They enjoyed the outcome of their work and being challenged and reported feeling fulfilled by their jobs. They also reported enjoying working in the field and protecting the public. Only a few respondents cited autonomy or flexibility related to their jobs as positive attributes of their work.

Some negative feelings related to the job that respondents reported included low pay (14%), conflicts with the public (14%), hav-

ing to defend their jobs from attacks (20%), and a hostile office environment (13%). Other concerns that respondents mentioned were dealing with unclear and unenforced regulations (10%), lacking support or feeling undervalued and underappreciated (10%), feeling overworked (10%), experiencing conflicts with management and lawmakers (4%), dealing with too much politics in public health (8%), and feeling stressed (10%). A few respondents reported negative feelings stemming from insecurity, inexperience, and the dangers associated with their job (1%); that they could not afford to live where they worked (1%), and that their work of reporting and compiling cases was not followed through by the county attorney's office (5%).

Retention and Recruitment

Of the respondents, 23% indicated that they were not planning to retire; however, 60% reported thinking about it. Some were unsure when they might retire (23%), 9% said they may retire in 1–2 years, 14% in 2–5 years, and 11% thought they would retire within 6–10 years.

Having the option to retire was one of the major reasons people contemplated leaving (30%). Other factors included better pay (29%), the desire for reduced stress or to meet family needs (13%), to leave a hostile and unsupportive environment (13%), to have more flexibility (5%), or out of general frustration (2%). Additional reasons (3%) reported included poor management, current workload, career advancement, or job change. Currently, 91% of respondents say their employer offers retirement benefits and most (89%) participate in the plans.

When asked about recruitment, 18% of respondents thought that websites such as Indeed.com were effective at reaching qualified candidates. Others reported that they thought social media and word of mouth (13% each) were effective, while websites operated by EH organizations such as MEHA (10%) and NEHA (8%) were thought to be helpful. A few respondents thought that job boards of other organizations or job postings in journals were good options for recruitment.

Consistent with previous responses, 21% of respondents felt higher salaries would be effective tools for retention within the EH profession. Other suggestions included more

flexible work schedules (15%), increased support from management (15%), respect and support from the public (15%), improved state funding for the department (12%), more comprehensive insurance plans (10%), and better retirement benefits (9%).

Emerging Issues

Respondents felt the EH databases (17%) and ArcGIS (14%) were key areas where EH professionals need skills to meet future needs in EH and public health. Additionally, addressing racial equity, cultural competence, and social justice issues were priority areas for 17% of respondents. Learning data apps and change management were reported as important by 11% of respondents. Big data was identified by 8% of respondents as a future issue. Other future areas identified included emotional intelligence (8%), using remote sensors (5%), and wearable technology (2%).

Across the board, respondents were open to various methods for training and education. They cited online classes (22%) and in-person workshops (20%) as the preferred methods for training and education on emerging issues. Others reported attending MEHA annual conferences (19%), in-person seminars (18%), in-office service learning (13%), and NEHA (6%) as other forums for training.

Discussion

Due to the high response rate (74%), our needs assessment represents the opinions held by many EH professionals across Montana, and the results provide additional insight into the practices and challenges associated with the COVID-19 pandemic in Montana. The results also provide information about characteristics, concerns, and perceptions of the EH workforce in Montana. Modern EH professionals must practice in considerably more complex conditions, environments, and expectations than in past times (Gerding et al., 2020; McCormick, 2020). Results reveal that while most EH professionals in Montana self-identify as White, the balance of self-identified gender is comparable to national numbers. While professionals report being adequately trained, there is a need for more training. Consistent throughout our results are concerns about low staffing levels and low salaries, even though many EH professionals report some level of satisfaction with their job.

Stress Within the Profession

Stress levels are of concern: we found that 84% of EH professionals reported feeling moderately or severely stressed. This finding is consistent, with a significantly higher proportion (p -value $< .05$), compared with prior findings in the NEHA (2020b) needs assessment that found 74% of respondents were emotionally exhausted and 54% felt symptoms of burnout. Global stress levels were elevated due to the pandemic. Gamonal-Limcaoco et al. (2022) evaluated 1,091 adults in 41 countries using the Perceived Stress Scale (PSS-10) and found that 76% of those surveyed experienced increased worry due to the pandemic. Stress levels were reported at 19.1 on the scale of 0–40, which indicates moderate stress due to perceived susceptibility to COVID-19. Women had higher levels of stress compared with men: 18.3 and 15.6, respectively. The highest stress levels of 20.4 and 20.7 were among younger age groups of people <30 years and students, respectively.

Prasad et al. (2021) conducted a cross-sectional study of healthcare workers in the U.S. and found that 60% were afraid of exposure to COVID-19, 38% reported anxiety and depression, 43% experienced work overload, and 49% reported feeling symptoms of burnout. Approximately 30% of these healthcare workers reported high stress due to at least one factor related to COVID-19 using a stress scale of 4–16. The average overall stress score was 9.52, with the highest score of 10.51 among nursing assistants. Social workers and medical assistants were next highest at 10.04 and 10.11, respectively. While no additional studies evaluating stress levels were identified, it is clear that the COVID-19 pandemic adversely affected professionals working in the health and allied health fields.

Educational Background and Needs

We found that 46% of EH professionals in Montana have a bachelor's degree, 27% have a master's degree, and 8% have a doctoral degree. In contrast, Gerding et al. (2019) reported that 72% of EH professionals nationally have a bachelor's degree, 31% have a master's degree, and only 2% have a doctoral degree. In a national needs assessment of public health professionals, Sellers et al. (2015) found that 75% have a bachelor's degree, 38% have a master's degree, and 9% have a doctoral degree. In Montana, the dif-

ferences in proportions of EH professionals who have a bachelor's degree were significantly lower (p -value $< .05$) compared with the other two studies.

The lower percentages of EH professionals in Montana who have bachelor's and master's degrees might be directly related to the shortage of qualified personnel. Furthermore, Gerding et al. (2019) reported that 22% of EH professionals with a bachelor's degree in EH had graduated from EHAC-accredited programs. Our study found a significantly lower proportion (p -value $< .05$) in Montana, with only 8% of respondents having matriculated from an EHAC-accredited program. Moreover, Gerding et al. (2019) found that only 17% of respondents who held a bachelor's degree studied EH; an equal amount had studied environmental science. By comparison, our study found that 31% of EH professionals in Montana had studied environmental health, environmental science, community health, or health promotion.

We found that slightly less than one half (43%) of EH professionals reported feeling that their education prepared or mostly prepared them for their jobs, with 83% reporting that they continued to learn on the job. A prior survey of 51 EH professionals nationally indicated that respondents felt an estimated 10% of new hire candidates were not qualified for the job (Environmental Health & Equity Collaborative [EHEC], 2021). Furthermore, 80% also felt there was a low-level supply of qualified EH candidates.

Specifically, 50% of those surveyed reported that new hires were somewhat competent in emergency preparedness, disease prevention, and indoor air quality. Their results also reported, however, that new hires were not prepared to manage onsite sewage systems, public swimming pools, lead prevention, day care and early child development facilities, body art, campgrounds, recreational vehicles, soils, public drinking water systems, recreational waters, and healthy homes. Additionally, 40% reported that many new hires were not proficient in assessment and analysis, community engagement, conflict resolution, cross-sector resolution, ArcGIS, organizational behavior, risk communication, systems thinking, and toxicology.

The study by EHEC (2021) also found that EH professionals need to be competent in climate change, customer service, data man-

agement, epidemiology, statistics, health risk assessment, hotel and tourist establishment inspections, outbreak investigations, public accommodations, septic tank pumping contractors, jails and prisons, cosmetics manufacturing, and migrant labor camp inspections. Our sample reported 12 primary areas of practice that included food safety, drinking water quality, wastewater, solid and hazardous waste, pools/spas/recreational waters, body art/tattoo/body piercing, public lodging, trailer courts and campgrounds, land use/subdivisions, infectious disease, emergency response, and public nuisance complaint response. We also identified emerging areas that included database management, big data, data apps, ArcGIS, racial equity and cultural competence, social justice, emotional intelligence, remote sensing, and wearable technology. Thus, the evolution of EH practice requires an ever-expanding skill set (Gerding et al., 2020).

Demographics of the Profession

Our survey results indicate that salaries ranged from \$25,000–\$100,000, with 45% earning between \$45,000 and \$65,000 and only 7% earning $> \$80,000$. In comparison, Gerding et al. (2019) found the salary range for EH professionals to be from $< \$25,000$ to $> \$145,000$. Nonsupervisory personnel salaries ranged between \$35,000 and \$54,999. Our findings show that EH professionals in Montana earn less for the same services provided compared with EH professionals nationally.

Self-identified gender is more balanced in Montana, with 58% self-identifying as female. This finding is significantly lower (p -value $> .05$) than the 72% reported by Gerding et al. (2019). The racial makeup of EH professionals in Montana appears to be significantly more homogeneous (p -value $< .05$), though, with 94% self-identifying as White. Nationally, Gerding et al. (2019) reported that 86% of EH professional self-identified as White. Similarly, Sellers et al. (2015) found that 70% of their study sample self-identified as White. Further, a study of rural locations in Alabama found that 45% of EH professional self-identify as White (Wu et al., 2017). This comparison is a rural setting that is similar to Montana; however, the U.S. Census Bureau (2022) reports that the population of Alabama is 69% White, and the population of Montana is 89% White.

Overall, our findings show that EH professionals in Montana are slightly older than their national counterparts. In Montana, EH professionals have a similar but different age distribution than those reported nationally by Gerding et al. (2019). Our findings indicate that 64% of EH professionals are between 30 and 59 years and only 7% are <30 years. Conversely, Gerding et al. (2019) reported that 23% of national EH professionals are <26 years. We also had 13% of respondents report being >65 years, compared with 3% for the same nationally reported age group (Gerding et al., 2019). These proportions are significantly different (p -value < .05).

Challenges Faced by the Profession

The COVID-19 pandemic has significantly affected public health overall. EH professionals, like all of public health, have been tested by this crisis over the past few years. The U.S. public health system has suffered for some time with chronic underfunding, workforce shortages, and outdated infrastructure (DeSalvo et al., 2021). The pandemic exacerbated longstanding challenges and brought attention to racial and socioeconomic inequities such as lack of access to healthcare, lack of quality care, and adverse health outcomes for disadvantaged groups (DeSalvo et al., 2021). Between 2008 and 2016, it is estimated that more than 2,000 EH positions were lost due to the Great Recession and associated budget cutbacks (Gerding et al., 2019) and 56,000 positions overall were lost in public health (Gadarian et al., 2021). The EH profession has never recovered despite the ever-increasing need. The pandemic precipitated gaps in quality information; distrust in public health leaders; and politicization of resources, guidance, operations, and leadership (DeSalvo et al., 2021).

Nearly one fifth of EH professionals in Montana reported that their routine duties were subordinated to COVID-19 priorities, and 84% reported performing nonroutine job duties. Most respondents (77%) reported their organization being understaffed to meet current needs. Similarly, the needs assessment conducted by NEHA (2020b) found that EH professionals were fully engaged in the pandemic response and reported being emotionally exhausted by feeling understaffed.

In Montana, EH professionals reported that they conducted contact tracing, enforced mask mandates, operated vaccine clinics,

reviewed social distancing and viral reduction plans, carried out public education, participated in conflict resolution, and performed their usual work duties. Nearly 40% reported that their stress level was so high that they could not complete all the duties of their job and they were feeling symptoms of burnout. Key factors that created increased stress included hostility from the public, being short-staffed, unmet personal and economic needs, working remotely, having limited time in the field, and the politicization of the public health response. Furthermore, EH professionals felt that there was a significant backlash from the state legislature against public health during the pandemic, which resulted in less authority and support for local health department operations.

Political Challenges

The Montana legislature passed a law in April 2021 that prohibits health departments from closing establishments or creating mandates that are perceived to hurt business (Houghton, 2022). Mask mandates could no longer be enforced, and businesses could not be closed due to public health threats (Montana Public Radio, 2021). House Bill 121 effectively removed 100 years of basic, preventive public health measures that were aimed at stopping the spread of disease in public places during times of crisis (An Act Revising Laws Related to Local Boards of Health, 2021; Montana Public Radio, 2021).

House Bill 121 created increased control over local health departments. Now, local health departments are governed by community boards that can block or amend informed recommendations from health departments for managing public health emergencies. Montana was 1 of 26 states that moved to roll back powers of local health departments (Houghton, 2022). Furthermore, House Bill 702 blocks business owners from restricting service to those without proof of vaccination and does not allow discrimination against those who chose not to get vaccinated (An Act Prohibiting Discrimination, 2021; Houghton, 2022).

Social and political forces have strained public health to new limits in recent years and were acutely exacerbated by the COVID-19 pandemic. DeSalvo et al. (2021) reported that 50 states and 9 territories delivered public health services through a variety of struc-

tural models with highly variable funding levels. For example, New Mexico provided funding at \$140 per capita, compared with Missouri at \$7 per capita. Alaska spends the most for public health, at \$449 per person (United Health Foundation, 2023).

Gadarian et al. (2021) found that partisanship played a central role in individual and community responses to the pandemic. Nearly one third of all health departments had opted out of accreditation because of a lack of adequate funding and personnel (DeSalvo et al., 2021). The lack of funding at the state and local level, aging infrastructure, partisanship, and conflicting messages amounted to an uneven response to the pandemic across communities (DeSalvo et al., 2021; Gadarian et al., 2021).

Two of the greatest challenges in public health during the pandemic were the misinformation and partisanship that led to community distrust of science and public health, which resulted in loss of authority through revised public health policy. More than one half of U.S. states, including Montana, have passed legislation that diminished powers of public health departments (Montana Public Radio, 2021). We found that EH professionals in Montana wanted more support from the public, community leadership, and the state legislature.

Job Conditions and Satisfaction

Improving the work conditions and experiences for EH professionals in Montana would have a positive impact on the workforce and the delivery of services. Recommendations for improvement include greater funding for public health, higher salaries, increased staff, reasonable workloads, narrower job descriptions, more flexibility, technical and non-technical training, professional development, career advancement opportunities, improved management and leadership, and greater support from elected officials. These recommendations could have a positive effect on public health in Montana.

Despite the stresses and strains on EH professionals in Montana, we found that 97% reported they loved their jobs and felt their work was meaningful. Furthermore, 92% reported that they were satisfied or somewhat satisfied in their current position, even though 60% were thinking about leaving public health for a variety of reasons. Nationally, Sellers et al. (2015) reported that 79% of public health

workers were satisfied or somewhat satisfied with their position, 65% were satisfied or somewhat satisfied with their organization or agency, and 48% were satisfied or somewhat satisfied with salaries. There is an overwhelming call for more training in a wide variety of areas to improve the knowledge, skills, and abilities of EH professionals, as well as training for stress reduction and coping (Gerding et al., 2020; MPHWDG, 2020; NEHA, 2020a, 2020b; Sellers et al., 2015). Many of the concerns seen in the greater public health profession (DeSalvo et al., 2021) echo concerns shared by EH professionals in Montana.

Recommendations for the Profession

DeSalvo et al. (2021) recommended major restructuring and redesigning of public health delivery in the U.S. Some areas needing change include transforming funding to increase flexibility and adaptation to crisis, affirming the mandate for public health that residents expect, promoting structural alignment among all public health agencies, investing in leadership and workforce development, modernizing technology capabilities, and supporting public and private partnerships and community engagement. Likewise, Gerding et al. (2020) provided a similar list of recommendations that included improving effective leadership, workforce development, equipment and technology, information systems and data, and garnering support through partnerships and collaborations. Additionally, Frieden (2013) identified the role of the government in public health as being responsive to the needs of the people; to free, open, and promote truthful information; to protect the people from harm of injury, illness, and disease; and to implement societal interventions when individuals are unable to protect themselves. We support the recommendations of DeSalvo et al. (2021) and Gerding et al. (2020), and we agree with the stated role of government by Frieden (2013).

To grow the EH profession in Montana, respondents recommended nothing particularly novel. On the national stage, the Understanding the Needs, Challenges, Opportunities, Vision, and Emerging Roles in Environmental Health (UNCOVER EH) initiative (Brooks et al., 2019; Gerding et al., 2019) provided more specific recommendations and direction. Experts continue to assert that EH is poorly understood among the public and lacks the visibility that much of public health enjoys (Brooks et al., 2019). Further, Brooks et al. (2019) identified three essential needs to grow the EH profession: 1) uniform training such as academic preparation, professional credentialing, and strategic national training; 2) partnerships such as nontraditional partnerships, joint leadership programs, and translational science partnerships; and 3) research such as strategic research initiatives and integration of existing programs.

Limitations

Our study has a number of limitations. First, self-report surveys can be influenced by recall and response bias. Such biases can have a differential effect toward or away from our ability to answer research questions. Secondly, we chose to deliver the survey to EH professionals using local health departments as the major way to disseminate and invite participation in the study. While the majority of EH professionals in Montana work in local health departments or at the state level, we may have excluded those EH professional who work in other fields. Lastly, our approach to survey completion was dependent on the access to and use of electronic tools including the internet, computers, and Qualtrics. We assumed that that all EH professionals in Montana had access to the internet and computers and were capable of completing an online survey, which might not have been the case for all EH professionals.

Conclusion

Our needs assessment was successful in capturing an updated view of the challenges facing EH professionals in Montana. The workforce self-identifies as mostly White and is somewhat gender balanced, a little older, and underpaid compared with their national counterparts. It is also clear that stress levels are very high among EH professionals. There exists a workforce shortage of well-trained EH professionals to fill open positions in Montana. More broadly, many of the same challenges and needs identified in Montana are reported nationally.

EH is a complex and broad specialty within public health and training is urgently needed in many areas to address current needs and evolving threats. The COVID-19 pandemic has exacerbated existing issues and stressed health departments and agencies, which has hindered their ability to deliver effective services.

The politicization around the pandemic has further damaged the credibility of science and public health leaders and led to new policies restricting the powers of public health professionals to protect the communities they serve. EH professionals worked on the front lines of the pandemic and many experienced backlash from the public. The rapidly changing economic, political, social, and environmental forces and conditions in the U.S. and across the globe make it difficult to create uniform practices and sustainable funding to consistently meet public health needs. These changes are redefining the scope and depth of public health and the work provided by EH professionals. ❁

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