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Assessment of One Health Knowledge, Animal Welfare Implications, and Emergency Preparedness Considerations for Effective Public Health Response

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Abstract

Objectives: Information on knowledge of public health professionals about health aspects of the human–animal interface, referred to as One Health, is limited. The objective of this study was to identify factors associated with animal welfare attitudes, practices, and One Health awareness among US Public Health Service (USPHS) officers to assess preparedness for public health response.

Methods: USPHS officers participated in an online, self-administered survey from February 15 through March 2, 2018. A total of 1133 of 6474 (17.5%) USPHS officers responded. We collected information on officers' demographic characteristics, animal welfare attitudes and practices, volunteer and work exposure to animals, and One Health knowledge. We compared (1) One Health knowledge and animal work exposure (deployment, regular assignment, or none) and (2) animal welfare importance and animal work exposure. To adjust for demographic characteristics associated with One Health knowledge, we used multivariable logistic regression.

Results: One-third of nonveterinary officers reported encountering animals during deployment, and 65% reported that animal welfare was very or extremely important. We found no difference in One Health knowledge between nonveterinary officers who participated in deployments involving animals and nonveterinary officers who had no work exposure to animals (adjusted odds ratio [aOR] = 1.11; 95% CI, 0.71-1.75). Nonveterinary officers who participated in animal-related public health activities during regular assignment were more likely to have One Health knowledge than nonveterinary officers who had no work exposure to animals (aOR = 7.88; 95% CI, 5.36-11.59).

Conclusions: One Health knowledge and awareness should be further explored in the current US public health workforce to identify training needs for emergency preparedness and other collaborative opportunities.

Keywords

public health practice, veterinary public health, emergency preparedness, mental health and well-being, training

In public health, consideration of animal welfare is important to prevent disease in animals and people.[1] However, veterinarians cannot ensure good welfare without collegial support and professional partnerships. Public health professionals are called to collaborate with veterinarians and the animal health sector in an interdisciplinary, coordinated approach termed "One Health" when responding to public health threats such as zoonotic diseases (eg, rabies),[2-4] food safety issues,[3-5] and COVID-19 (eg, transmission between workers and mink on mink farms).[6] The One Health approach aids in disease control and better health outcomes in people and animals.[3-5]

Moreover, in recent years, Pinillos et al[7] supplemented the foundational concept of One Health with One Welfare, a concept describing the fundamental link between animal welfare and human well-being, which enhances traditional One Health by promoting the health and welfare of animals

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and people. These One Health and One Welfare concepts are particularly relevant in emergency response situations and serve to enhance partnerships between veterinarians and human health care workers.[8] In turn, owners assured of their animals' welfare and safety reduce evacuation risks to owners, their animals, and first responders.[9-11] Consideration of pets to strengthen evacuation response was a principal motivator for the establishment of the Pets Evacuation and Transportation Standards (PETS) Act (2006) post–Hurricane Katrina,[12] which required shelter and care for pets of evacuees during a disaster.[13]

The primary objective of this study was to examine animal welfare attitudes and practices of public health professionals across 11 health disciplines in the Commissioned Corps of the US Public Health Service (USPHS): dental officers, dietitian officers, engineer officers, environmental health officers, health services officers, medical officers (physicians), nurse officers, pharmacy officers, scientist officers, therapist officers, and veterinary officers. A secondary objective was to identify potential training needs and opportunities for cross-collaboration with veterinarians. Lastly, although US schools and programs of public health have begun One Health training,[14] a lack of public health professionals who are knowledgeable about One Health can have implications for effective public health response.[15,16] Therefore, we also assessed One Health awareness among USPHS public health professionals.

Methods

This cross-sectional study used an online, self-administered survey (SurveyMonkey) to identify animal welfare attitudes and practices among professional categories of USPHS officers. We also assessed awareness and professional participation in One Health–related activities. A small group of USPHS officers pilot tested the survey before distribution. The survey included definitions of animal welfare, One Health, and One Welfare and consisted of 15 questions on the following:

- the importance of animal welfare to officers;
- officer participation in public health activities involving animals while on deployment for a natural disaster or public health emergency;
- officer knowledge of One Health;
- officer participation in public health activities involving animals as part of their regular assignment (at their duty station) in One Health or One Welfare topics, such as zoonotic outbreaks and surveillance, quarantine of animals, antimicrobial resistance, food safety, and vector control;
- officer participation in volunteer activities involving animals, either on personal time or through the USPHS. Officers may volunteer to do an activity outside their regular duties, business hours, or duty station that is sponsored by USPHS;
- collaboration needs between veterinarians and other health professionals during public health emergencies involving animals and if cross-training and additional contacts for animal welfare concerns were also needed; and
- information on demographic characteristics, including sex, age, professional category, and rank.

The full questionnaire is available as online-only supplementary material.

Officers from all 11 professional categories of the USPHS were eligible to participate in the survey. We sent an email that described the study objectives and study rationale and included a web link for the survey to the chief professional officer of each professional category, who then approved survey administration and dissemination via the web link to their distribution lists. We distributed the survey on February 15, 2018, and it remained open until March 2, 2018. We sent a reminder email to all participants 1 week after the initial recruitment notice. Participation in this survey was voluntary and anonymous. The Centers for Disease Control and Prevention determined this study did not meet the definition of human subjects research; as such, institutional review board review was waived.

Data Analysis

We first summarized data collected on the importance of animal welfare, deployment experiences involving animals, public health activities involving animals as part of officers' regular assignments, and One Health knowledge among nonveterinary officers. We used veterinary officer responses as a reference category and calculated veterinary responses separately from the other professional categories.

We assessed the importance of animal welfare to officers by using a 5-point Likert scale where 1 = not at all important and 5 = extremely important, and we combined responses into "very or extremely important" and "not at all, somewhat, or moderately important" categories for analysis. We

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also assessed One Health knowledge by using a 5-point Likert scale where 1 = never heard of it and 5 = proficient on topic/could teach others, and we combined responses into categories of "yes, have at least a basic knowledge of One Health" (ie, understand the basic concept, have additional training/experience, or proficient) and "no" (ie, never heard of it or minimal knowledge) to denote awareness of One Health.

We used 3 mutually exclusive categories (deployment only, regular assignment, and none) to assess exposure to animal work, and we considered this variable to reflect officers' experience with animals. We first calculated the percentage of USPHS officers who had ever participated in a deployment involving animals (yes/no) in either a natural disaster deployment involving animals or in a public health emergency involving animals. Because of the potential for misclassification between natural disaster and public health emergency responses, we combined officers' responses into 1 deployment variable for analysis. We next calculated the percentage of USPHS officers who had ever participated in animal-related public health activities as part of their regular assignment (yes/no).

We then categorized responses with overlap (regular assignment and deployment) as regular assignment. Because One Health knowledge might be more strongly associated with longer-term engagements in animal-related public health activities (eg, regular assignment) than short-term assignments (eg, deployment), we categorized deployment only to include officers who had only participated in a deployment involving animals and had never participated in animal-related public health activities on regular assignment.

We analyzed data using SAS version 9.4 (SAS Institute, Inc). We used the Pearson χ^2 test to assess associations between animal work exposure and One Health knowledge as well as animal work exposure and animal welfare importance, with $P < .05$ considered significant.

We examined differences in One Health knowledge by sex, age, professional category, and rank. We calculated odds ratios (ORs) and 95% CIs using logistic regression; ORs with 95% CIs not including 1 were considered significant. To determine the association between One Health knowledge and animal work exposure, we considered variables with $P \leq .10$ in the univariable analysis as possible confounders for inclusion in a multivariable analysis. We used forward selection of variables and model fit criterion of lowest Akaike information criterion in the multivariable analysis to determine the best initial logistic regression models. We reported adjusted ORs (aORs) and 95% CIs for the final model.

In a secondary analysis, we examined One Health experiences and perceived animal welfare training needs. We calculated an overall frequency of the nonveterinary officers interested in enhancing collaborations with veterinarians during public health emergencies. Then, within that subset of officers, we calculated the percentage of officers who were interested in cross-training with veterinarians to improve emergency response and identification of contacts to provide animal welfare support.

Table 1. Respondents to a survey on animal welfare attitudes, practices, and One Health knowledge among Commissioned Corps officers of the USPHS, by professional category, February 15–March 2, 2018[a]

USPHS category	Total no. of officers in USPHS	No. (%) of respondents
Dental officer	221	77 (34.8)
Environmental health officer	348	114 (32.8)
Health services officer	1251	203 (16.2)
Medical officer	744	177 (23.8)
Nurse officer	1513	140 (9.3)
Pharmacy officer	1319	170 (12.9)
Scientist officer	334	73 (21.9)
Therapist officer	160	22 (13.8)
Veterinarian officer	80	53 (66.3)
Dietitian officer[b]	97	2 (2.1)
Engineer officer[b]	407	15 (3.7)
Category not selected[b]	—	87
Total	6474	1133[c] (17.5)

Abbreviation: USPHS, US Public Health Service.
[a]One Health is the collaboration between human health and veterinary professionals about health aspects of the human–animal interface.
[b]Dietitian officers and engineer officers were excluded from analysis because of low response rate; officers who did not select a category were also excluded.
[c]Data from 1029 respondents were used in the final analysis.

Results

Of 6474 USPHS officers who received the survey, 1133 (17.5%) responded (Table 1). Of the 1133 responding officers, we excluded 87 officers because they did not select a category, and we excluded participants from 2 categories (dietitian officers and engineer officers, n = 17) because of small sample size. We used data from the remaining 1029 respondents in the analysis.

Among nonveterinary officers, health services officers, medical officers, pharmacy officers, and nurse officers comprised the highest percentage of survey respondents (20.8%, 18.1%, 17.4%, and 14.3%, respectively) compared with percentages of <12% of respondents in the other categories (Table 2). Compared with nonveterinary officers, a higher percentage of veterinary officers were female (69.8% vs 57.4%), older (ie, aged ≥55 [26.4% vs 17.3%]), and had a higher rank of ≥O-6 (37.7% vs 28.3%). Overall, we found collinearity with age and rank across categories.

As confirmed by preliminary descriptive analyses, veterinary officers had the most involvement in animal welfare and

Table 2. Characteristics of respondents to a survey on animal welfare attitudes, practices, and One Health knowledge among Commissioned Corps officers of the USPHS, by professional category, February 15–March 2, 2018 (N = 1029)[a]

Characteristic	All professional categories (nonveterinary officers; n = 976)[b]	Veterinary officers (n = 53)[b]
Sex		
Female	552 (57.4)	37 (69.8)
Male	410 (42.6)	16 (30.2)
Age range, y		
25-34	125 (12.9)	5 (9.4)
35-44	374 (38.6)	20 (37.7)
45-54	303 (31.2)	14 (26.4)
≥55[c]	168 (17.3)	14 (26.4)
Professional category		
Dental officer	77 (7.9)	NA
Environmental health officer	114 (11.7)	NA
Health services officer	203 (20.8)	NA
Medical officer	177 (18.1)	NA
Nurse officer	140 (14.3)	NA
Pharmacy officer	170 (17.4)	NA
Scientist officer	73 (7.5)	NA
Therapist officer	22 (2.3)	NA
Rank[d]		
O-1, O-2, O-3	115 (11.9)	10 (18.9)
O-4	302 (31.2)	8 (15.1)
O-5	278 (28.7)	15 (28.3)
≥O-6	274 (28.3)	20 (37.7)

Abbreviations: NA, not applicable; USPHS, US Public Health Service.
[a]One Health is the collaboration between human health and veterinary professionals about health aspects of the human–animal interface.
[b]Some respondents did not answer all questions. All values are number (percentage).
[c]The age groups 55-64 and ≥65 were combined into ≥55 because of a small number of respondents (n = 13) in age group ≥65.
[d]USPHS officers follow a military ranking structure comparable to Navy and Coast Guard officer ranking. Higher numbers indicate higher rank.

knowledge of One Health among all the professional categories.

Animal Welfare Considerations

Most nonveterinary officers reported that animal welfare was very or extremely important to them personally (64.5%; 629 of 975). We found no significant association between importance of animal welfare to the officer and animal work exposure (P = .60 [deployment only, regular assignment, or none]). Nearly all veterinary officers (96.2%; 51 of 53) reported that animal welfare was very or extremely important to them personally.

Nearly one-quarter of nonveterinary officers (23.7%; 231 of 976) reported participating in natural disaster shelter work that considered the welfare of animals and well-being of their owners. Special considerations included provisions for food, water, treatment, or shelter for the pet of a patient/evacuee, as well as pet visitations for the animal owner. Officers also assisted in reuniting owners with displaced animals, helped to rescue lost animals, or comforted owners in search of a lost animal. Officers developed policies for temporary shelters to address the care of pets or had an awareness of the need to consider animal welfare in natural disaster shelters. Twenty-four of 53 (45.3%) veterinary officers reported participation in natural disaster shelter work involving animals.

Of 973 nonveterinary officers, 108 (11.1%) volunteered for an activity involving animals that considered the health and welfare of animals and people. Officers reported assisting with animal vaccinations or spay/neuter clinics for underserved populations such as Alaska Native villages or Indian reservations or volunteered at a local shelter, rescue group, or other adoption event. Officers also reported participating in animal-assisted therapies, Commissioned Officer Association–sponsored events involving animals, or race walks/runs involving pets.

One Health Knowledge

Overall, 31.0% (302 of 975) of nonveterinary officers and all 53 veterinary officers reported having at least a basic knowledge of One Health (Table 3). Among nonveterinary officers, knowledge of One Health differed significantly by age, professional category, rank, and animal work exposure. Officers aged ≥55 reported the most One Health knowledge, and we found a significant difference in knowledge between adults aged 45-54 and ≥55 (OR = 0.57; 95% CI, 0.38-0.85). Differences in One Health knowledge across rank were similar to differences in One Health knowledge reported for age, given the observed linear relationship between age and rank.

Of nonveterinary officers, medical officers had the highest percentage of One Health knowledge (56.5%) followed by scientist officers (52.1%; Table 3). We found no significant difference in knowledge between scientist officers and medical officers (OR = 0.84; 95% CI, 0.48-1.45). Dental officers, environmental health officers, health services officers, nurse officers, pharmacy officers, and therapist officers were significantly less likely than medical officers to have One Health knowledge. We found no significant difference in One Health knowledge between nonveterinary officers who participated in a deployment involving animals and nonveterinary officers who had never participated in any public health activities involving animals, either on deployment or on regular assignment (OR = 1.15; 95% CI, 0.76-1.74). Nonveterinary officers who had participated in a public health activity involving animals in their regular assignment were nearly 11

Table 3. Results of univariable analysis of factors associated with knowledge of One Health among nonveterinary Commissioned Corps officers of the USPHS who participated in a survey on animal welfare attitudes, practices, and One Health knowledge, February 15–March 2, 2018 (N = 1029)[a]

	Have at least a basic knowledge of One Health			
Characteristic	**Yes, no. (%)**	**No, no. (%)**	**Odds ratio (95% CI)**	***P* value[b]**
Total reporting	302 (31.0)	673 (69.0)	—	—
Sex				.10
Female	158 (28.7)	393 (71.3)	1 [Reference]	
Male	138 (33.7)	272 (66.3)	1.26 (0.96-1.66)	
Age, y				.048
25-34	37 (29.6)	88 (70.4)	0.68 (0.41-1.11)	
35-44	120 (32.1)	254 (67.9)	0.76 (0.52-1.11)	
45-54	79 (26.1)	224 (73.9)	0.57 (0.38-0.85)	
≥55	64 (38.3)	103 (61.7)	1 [Reference]	
Professional category				<.001
Dental officer	14 (18.2)	63 (81.8)	0.17 (0.09-0.33)	
Environmental health officer	50 (43.9)	64 (56.1)	0.60 (0.37-0.97)	
Health services officer	47 (23.2)	156 (76.8)	0.23 (0.15-0.36)	
Medical officer	100 (56.5)	77 (43.5)	1 [Reference]	
Nurse officer	32 (23.0)	107 (77.0)	0.23 (0.14-0.38)	
Pharmacy officer	15 (8.8)	155 (91.2)	0.08 (0.04-0.14)	
Scientist officer	38 (52.1)	35 (47.9)	0.84 (0.48-1.45)	
Therapist officer	6 (27.3)	16 (72.7)	0.29 (0.11-0.77)	
Rank[c]				.03
O-1, O-2, O-3	31 (27.0)	84 (73.0)	0.63 (0.39-1.02)	
O-4	94 (31.1)	208 (68.9)	0.77 (0.55-1.09)	
O-5	72 (25.9)	206 (74.1)	0.60 (0.41-0.86)	
≥O-6	101 (37.0)	172 (63.0)	1 [Reference]	
Animal work exposure				<.001
Deployment only	38 (20.4)	148 (79.6)	1.15 (0.76-1.74)	
Regular assignment[d]	162 (70.7)	67 (29.3)	10.83 (7.58-15.47)	
None	102 (18.3)	457 (81.8)	1 [Reference]	

Abbreviation: USPHS, US Public Health Service.

[a]Row percentages are presented. Some respondents did not answer all questions. Veterinarians were removed from this dataset to not overestimate results and to examine associations among nonveterinary officers. One Health is the collaboration between human health and veterinary professionals about health aspects of the human–animal interface.

[b]The overall *P* values for each variable were calculated using the Pearson χ^2 test; variables with $P \leq .10$ were considered for inclusion in the multivariable analysis. For comparisons with the reference group, odds ratios with 95% CIs not including 1 were considered significant.

[c]USPHS officers follow a military ranking structure comparable to Navy and Coast Guard officer ranking. Higher numbers indicate higher rank.

[d]Regular assignment may include some respondents who also reported deployment.

times more likely to have One Health knowledge than nonveterinary officers who had never participated in any public health activity involving animals (OR = 10.83; 95% CI, 7.58-15.47).

The model assessing associations between animal work exposure and One Health knowledge with sex, age, and professional category was ranked highest using model fit criterion, and forward selection confirmed this model was the best fit. We found no difference in One Health knowledge between nonveterinary officers who participated in a deployment involving animals and nonveterinary officers who had never participated in any public health activity involving animals (aOR = 1.11; 95% CI, 0.71-1.75; Table 4). Nonveterinary officers who had participated in a public health activity involving animals in their regular assignment were significantly more likely to have One Health knowledge than nonveterinary officers who had never participated in any public health activity involving animals (aOR = 7.88; 95% CI, 5.36-11.59).

One-third (32.7%; 319 of 976) of nonveterinary officers reported encountering animals during deployment (through natural disaster shelter work and public health emergencies).

Table 4. Results of a multivariable analysis of factors associated with knowledge of One Health among nonveterinary Commissioned Corps officers of the USPHS who participated in a survey on animal welfare attitudes, practices, and One Health knowledge, February 15–March 2, 2018 (N = 1029)[a]

Variable	Adjusted odds ratio (95% CI)[a]
Sex	
Female	1 [Reference]
Male	1.17 (0.84-1.64)
Age, y	
25-34	1.28 (0.68-2.43)
35-44	1.02 (0.64-1.65)
45-54	0.67 (0.41-1.10)
≥55	1 [Reference]
Professional category	
Dental officer	0.29 (0.14-0.59)
Environmental health officer	0.52 (0.30-0.92)
Health services officer	0.30 (0.18-0.49)
Medical officer	1 [Reference]
Nurse officer	0.35 (0.20-0.61)
Pharmacy officer	0.12 (0.06-0.23)
Scientist officer	0.98 (0.53-1.84)
Therapist officer	0.41 (0.13-1.25)
Animal work exposure	
Deployment only	1.11 (0.71-1.75)
Regular assignment[b]	7.88 (5.36-11.59)
None	1 [Reference]

Abbreviation: USPHS, US Public Health Service.
[a]Adjusted for sex, age, and professional category to assess the association between animal work exposure and One Health knowledge. 95% CIs not including 1 were considered significant. One Health is the collaboration between human health and veterinary professionals about health aspects of the human–animal interface.
[b]Regular assignment may include some respondents who also reported deployment.

Ninety-five percent (191 of 202) of nonveterinary officers were interested in enhancing collaborations with veterinarians during public health emergencies involving animals. Of those 191 officers, 130 (68%) expressed interest in cross-training with the veterinary officers to improve response time and efficiency, and 137 (72%) were interested in learning whom to contact for animal welfare concerns.

Discussion

This study demonstrated the importance of collaboration among veterinary and nonveterinary public health officers to achieve good animal welfare. One-third of nonveterinary officers who reported encountering animals during deployment encountered animals through natural disaster shelter work and public health emergencies. The level of animal welfare considerations on the job and in volunteer work among nonveterinary officers was notable considering their occupations. Animal welfare attitudes and practices and One Health knowledge were highest among veterinary officers compared with nonveterinary officers, consistent with their professional training and education. Conversely, One Health knowledge was low among nonveterinary officers who participated in deployments involving animals. This finding presents an opportunity for veterinary officers to provide training and share experiential knowledge with nonveterinary officers on this important topic.

USPHS officers deeply cared for animals regardless of their exposure to animals through work. This finding suggests that societal values, rather than work experience, have substantial influence upon animal welfare precepts among all USPHS officers.[17,18] The USPHS community appears to reflect the greater US population. The latest American Veterinary Medical Association survey on pet ownership reported that 71.5 million US households (57% of households) owned a pet.[19]

A notable number of nonveterinary officers participated in volunteer and shelter animal disaster work. Other nonveterinary officers participated in animal-assisted therapies, such as prison dog therapy programs. These types of programs provide shelter and care for dogs in prisons while giving inmates a sense of normalcy or self-worth in taking care of an animal and providing therapeutic benefits.[20,21] Collectively, these programs favorably affect animal welfare and human well-being (ie, One Welfare).[7] Furthermore, nearly one-quarter of nonveterinary officers provided shelter care and developed policies to accommodate animals of evacuees during natural disasters. These actions encouraged good welfare and fostered improved human well-being through psychological support, comfort, and assurance to the owners in knowing their pets were safe and being cared for. Our survey findings on officer participation in animal welfare practices highlight that other public health professionals, in addition to veterinarians, play important roles in animal welfare and public health.

Although respondents considered animal welfare during disaster response, One Health awareness was low (20%) among nonveterinary officers whose work exposure to animals was only through deployment. Using the One Health approach when addressing animals in natural disasters or emergencies is necessary for a coordinated response.[22] Benefits of taking a One Health approach during emergencies include a faster response time[2] and improved efficiency in response.[5] Of note, 68% of nonveterinary officers who had previous work exposure to animals on a public health emergency were interested in doing cross-training with veterinarians (eg, tabletop exercises), and 72% wanted a clearer understanding of whom to contact for animal welfare concerns during public health emergencies. A recent study reported that application-based trainings were highly effective for learning implementation of One Health while building a stronger public health workforce capacity.[23]

Veterinarians with human health professions have an opportunity to raise awareness and hold a collaborative training forum on these animal welfare, One Health, and One Welfare topics at various continuing education venues (eg, American Public Health Association annual meeting, annual USPHS Scientific and Training Symposium). In addition, considerations for pets can be addressed during emergency preparedness planning as documented in the literature[10] or in emergency response policies, as USPHS officers had reported doing.

In contrast, we found a high level of One Health knowledge (>70%) among nonveterinary officers who were involved in animal-related public health activities as part of their regular assignment. Moreover, >50% of scientist officers and medical officers had One Health knowledge. These officers could help veterinary officers train other USPHS officers. In addition, the oldest, highest-ranking nonveterinary officers had the most One Health knowledge. A possible explanation could be that officers in this stage of their career tend to advance to senior leadership and cross-cutting positions, where they would be exposed to broad public health topics such as One Health.

Limitations

This study had several limitations. First, this study consisted of a convenience sample of USPHS officers with an uneven distribution of officers among the professional categories because of the inherent variability in size of professional categories in the USPHS. Categorical skewing was mitigated after we adjusted for professional category in our final model.

Second, to our knowledge, this survey is the first reported in the literature that examined One Health awareness among numerous public health disciplines in the United States. Because of the novelty of our study, we were not able to generalize findings to the broader public health workforce. For nonveterinary officers, particularly for whom participation rates were low (ie, nurse officers and pharmacy officers), lack of generalizability was a limitation. Considering the potential opt-in bias, that officers who have knowledge or interest in this topic would be more likely to respond than officers who do not have knowledge or interest in One Health, an overestimation of One Health knowledge could have occurred. However, if we excluded nurse officers and pharmacy officers from the analysis, the estimate of One Health knowledge would have increased 2-fold, from 31% to 62%. Thus, fuller participation in these groups may have resulted in lower levels of One Health knowledge. Furthermore, we removed veterinary officers (who had the highest knowledge levels and would exhibit an opt-in bias because the topic involved animals) from the final dataset to not overestimate results. We believe this rationale and these mitigations strengthen the validity of our finding that One Health awareness was low in a group of highly trained public health professionals across a wide range of health disciplines, and we expect other public health sectors may also have similar training needs in the One Health approach, especially in emergency preparedness and response.

Third, officers may have had some awareness, training, or experience in One Health but identified this approach by a different name or term, which may have resulted in an underrepresentation of One Health knowledge in this study, previously reported as a limitation in other studies.[24,25] To mitigate this effect, we provided a definition of One Health in our survey.

Finally, by creating 3 categories for animal work exposure, in which regular assignment may include deployment, we may have overestimated an association with One Health awareness. However, any such effect appeared to be negligible because results were similar when we excluded regular assignment with deployment from the analysis. This finding suggests that regular assignment was driving the outcome of awareness of One Health.

Conclusions

This survey documents an important role in animal welfare and public health for nonveterinary professionals. Raising awareness of One Health is needed, especially among human health professionals, because many health professionals reported being unaware of this concept. Promotion of the One Health, One Welfare approach through interdisciplinary, practice-based training forums will allow for more successful implementation of One Health principles in public health practice, leading to optimal human health and animal welfare outcomes.

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Supplemental Material

Supplemental material for this article is available online.

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