

## 2.6

# TRANSFORMING THE GLOBAL WORKFORCE

## for One Health Approaches

### BACKGROUND

Implementing One Health approaches globally requires transformation of the workforce driven by a new pre-service and in-service educational paradigm. The new workforce is exemplified by dynamic, transdisciplinary professionals and paraprofessionals working together to address the systemic determinants of health issues at the human, animal and environment interface. The paradox of One Health capacity development is the need for both depth and breadth of knowledge, skills, aptitude and experience. The critical competencies for the One Health approach include the ability to deal with dynamic challenges through active stakeholder engagement and resiliency. A coalition of traditional and non-traditional partners must be actively involved to shape student learning experiences and in-service training.

### OBJECTIVES

#### MODERATOR

**William HUESTON**

Professor

*Veterinary Medicine and  
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Policy recommendations for transforming global workforce capacity-development by:

- Creating a new educational paradigm for pre-service and in-service training
- Establishing global one health priorities as key drivers for academic curriculum development and continuing educational programs
- Catalyzing cross-sectoral capacity development to implement One Health approaches

## **SPEAKERS**

- Enhanced learning capturing the power of global communications technology  
**Willem Vink**, Senior Research Officer,  
EpiCentre, Massey University, New Zealand
- Experiential field training and active simulations  
**Sopon Iamsirithaworn**, FETP Director,  
Ministry of Public Health, Thailand
- Integrating health priorities and engaging workforce employers  
in curriculum development  
**William Bazeyo**, Dean, School of Public Health,  
Makerere University, Uganda
- Inter-professional education approaches  
**Malika Kachani**, Professor of Parasitology, College of Veterinary Medicine,  
Western University of Health Sciences, USA
- Private sector perspective  
**Narin Romlumduan**, Vice President,  
Bangkok Agro-Industrial Products Public Co.,Ltd, Thailand



Will Hueston, DVM, PhD, directs the Global Initiative for Food Systems Leadership (GIFSL), comprising the leadership and experiential education programs of the Center for Animal Health and Food Safety, University of Minnesota (UMN). He also serves as Director of the University of Minnesota Food Policy Research Center and the World Organisation for Animal Health (OIE) Collaborating Center in Veterinary Services Capacity Building. Dr. Hueston holds faculty appointments in the College of Veterinary Medicine and the School of Public Health at UMN.

Most of Dr. Hueston's work focuses on One Health capacity-building, public policy and risk communication with the ultimate goal of creating integrated and harmonized systems for global food security. He has a long history of creating and delivering professional development programs for mid-career government, industry and academic professionals in collaboration with an international consortium of universities, government agencies, intergovernmental organizations and the private sector. Further, Dr. Hueston has extensive experience facilitating strategic public-private partnerships to address the complex challenges and exciting opportunities of global food system and public health issues.

While at University of Minnesota, Dr. Hueston worked with partners in the School of Public Health and the College of Veterinary Medicine to create a combined DVM/Master of Public Health (MPH) degree program, an Executive MPH program for working health professionals, and a two-year post-graduate residency program in public health for veterinarians. These programs are unique in their focus on experiential learning and their blending of on-line coursework with intensive public health institutes. Together, these educational programs constitute the largest veterinary public health educational program in the world today, with over 200 students enrolled at any given time. Graduates of these programs are now employed in North America, the Caribbean, Africa and Southeast Asia working with regional and national governments, non-governmental organizations, academia and the private sector.

Prior to joining UMN in 2001, Dr. Hueston was Associate Dean for the University of Maryland campus of the Virginia-Maryland Regional College of Veterinary Medicine and Director of the Center for

## **WILLIAM HUESTON**

Professor

*Veterinary Medicine and  
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Government and Corporate Veterinary Medicine. Dr. Hueston worked for the United States Department of Agriculture's Animal and Plant Health Inspection Service from 1987-1996 during which he gained international recognition for his work with the emerging disease, Bovine Spongiform Encephalopathy (BSE). Dr. Hueston advised the British, Canadian and US governments, the World Health Organization and the World Organisation for Animal Health on BSE prevention and control. Earlier experience includes teaching and research as a university faculty member at Ohio State University, serving as a resident veterinarian for a large farmer cooperative, private veterinary practice and community organizing in rural areas. He holds degrees in biology (BA, University of Virginia 1976); veterinary medicine (DVM, Ohio State University 1980), preventive medicine (MS, Ohio State University 1980) and epidemiology (PhD, Ohio State University 1985). Dr. Hueston advises governments, industry and non-governmental organizations on public health and policy issues involving people, animals and the environment. He has published over 55 scientific papers and delivered several hundred presentations nationally and internationally.



William Bazeyo is an Associate Professor of Occupational Medicine at Makerere University College of Health Sciences, School of Public Health and is currently the Dean of the School.

He received an MBChB from Makerere University and M.Med in Occupational Health from University of Singapore, Singapore. He has been teaching in the University for more than 20 years and has done research and Published in several areas including Health Care Financing, Leadership and One Health. He was the among the key pillars of The HEALTH Alliance (Higher Education Alliance for Leadership Training for Health) which was formed in 2005 with funding from USAID that brought together 7 schools of Public Health in Six Countries. An organization that he has lead till now which addressed the Leadership gaps in Health, Health Emergency management Programs for the District first responders that trained and equipped District staff and responded to Emergencies like the Bududa landslides in Uganda, and Post Elections violence in Kenya to mention but a few. He organized the formation of the Summit of 14 Deans of Schools of Public Health and Schools of Veterinary in the Six Alliance Country members. He is the Current Chair of the Summit. The Schools are implementing the One Health activities under the umbrella of OHCEA- One Health Central and Eastern Africa net work funded by USAID in the EPT program through RESPOND. The Project is being implemented in DRC, Kenya, Tanzania, Ethiopia, Rwanda and Uganda with US partner Universities namely University of Minnesota and Tufts University.

He is the Principal Investigator of various projects such as, Strengthening and Expansion of One Health Central and Eastern Africa Net Work, Monitoring and Evaluation Technical Assistance a CDC Program that offers M & E support to CDC supported institutions and also the Director of the newly established Centre for Tobacco Control in Africa which is aiming at reducing the consumption of tobacco by supporting governments in implementing evidence-based tobacco control strategies in Africa, USAID Higher Education Network- Resilient Africa , it's a consortium of 20 African Universities led by Makerere University School of Public Health together with Stanford University, Tulane University and Center for Strategic and International Studies (CSIS) which provides insight in how programming affects the resilience of populations, Strengthening Leadership In Disaster Resilience Program

## **WILLIAM BAZEYO**

Dean

*School of Public Health  
Makerere University  
Uganda*



Sopon Iamsirithaworn is Director of Field Epidemiology Training Program (FETP) in Thailand. He graduated from Ramathibodi Medical School, Mahidol University. Between 1994 and 1997, he served as Director of Laemngob Hospital, a community hospital in a rural province of Eastern Thailand. His interest in public health began during the time he saw a number of patients with infectious diseases, e.g., diarrhea, dengue hemorrhagic fever, HIV in the hospital. During 1997-1999, he received 2-year training in field epidemiology at the Bureau of Epidemiology, Ministry of Public Health. After graduation, he began his public health career as a trainer in the FETP-Thailand that aims to train young medical doctors to be field epidemiologists.

Following the completion of a MPH and a PhD in Epidemiology from University of California at Los Angeles in 2006, Dr. Sopon returned to FETP and started to collaborate with many organizations to expand in-service training in epidemiology to other health professionals including nurses, pharmacists and veterinarians. His areas of technical expertise include infectious diseases modeling, influenza and HIV research. He was appointed to be Director of FETP-Thailand in 2009.

He was Chair of the Drafting Group for “Emerging Infectious Disease Preparedness and Response” resolution in the Thai Health Assembly in late 2009 and incorporated “One Health” concept into the development of the “Thailand National Strategic Plan for Emerging Infectious Diseases Preparedness and Responses 2013-2016”.

Over the last 10 years, Dr. Sopon has supervised several FETP trainees to establish and/or evaluate surveillance systems and investigating many important disease outbreaks around the country. In early 2012, he worked with his collaborators in the Field Epidemiology Training Program for Veterinarians (FETPV) in the Department of Livestock Development, Department of Natural Parks, Wildlife and Plant Conservation and Zoological Park Organization to train “One Health Epidemiology” teams in 5 provinces of Thailand. This combined didactic and on-the-job training course was specially designed for professionals who work for human health, livestock health and wildlife health sectors to utilize “One Health” concept and “Epidemiology” methods to improve surveillance and investigation of infectious diseases at Human-Animal-Ecosystems Interface.

**SOPON  
IAMSIRITHAWORN**

FETP Director

*Ministry of Public Health  
Thailand*



Malika Kachani, DVM, PhD, is a professor of Parasitology at the College of Veterinary Medicine, Western University of Health Sciences, Pomona, California, USA. She is responsible for the Parasitology course. She is the course leader for the 3rd year Global Health course, and the International Veterinary Medicine 4th year course.

Dr. Kachani specializes in parasitic zoonoses and Veterinary Public Health. Her current research focuses on cystic echinococcosis (CE) (*Echinococcus granulosus* infection) in animals and in humans.

She has developed strategies to control CE in an endemic area of Morocco. She has organized extension, education and training programs for the prevention of zoonoses and promotion of animal and public health involving various target audiences. She has conducted various development activities in rural areas of Morocco, such as integrated programs to alleviate poverty, supervision of agricultural and income generating activities of rural women, formal and informal education for rural children, intensive village studies to evaluate the importance and the cost of parasitic zoonosis in humans and animals, public health education programs and control of zoonotic diseases. She was a co-editor of a compendium on CE in Africa and in the Middle-Eastern countries, published in 1997. She was the principal investigator in several projects funded by the European Union on tick-borne and zoonotic diseases.

She works with Intergovernmental organizations such as The Food and Agriculture Organization of the United Nations (FAO), the World Health Organization (WHO). She also has working relationships with the ILRI, IAEA, IFAD, PAHO, CDC, Heifer International and the USDA. She has worked with the FAO on parasitic zoonoses, Veterinary Public Health, Dog Population Management for the Control of Zoonotic Disease, and served as moderator of the FAO VPH network for Francophone Africa.

She is currently a member of the WHO Strategic and Technical Advisory Group (STAG) for Neglected Tropical Diseases and she is the current chair of the STAG working group on Neglected Zoonotic Diseases. She is also currently a member of the Stone Mountain working group on One Health and is the co-chair of the One Health Proof of Concept subgroup.

## **MALIKA KACHANI**

Professor of Parasitology

*College of Veterinary  
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At Western University of Health Sciences, she organizes student exchange programs with Colleges of Veterinary Medicine in Africa and Latin America. She also participates in health interprofessional educational programs. She collaborates with researchers in Peru on CE control. She has been the Principal Investigator in numerous grants funded by the EU, American private foundations, WHO and various NGOs.

Throughout her activities, she has been a strong advocate for the One Health approach in Morocco, Peru, European, North African and Middle Eastern countries and in the USA.





Narin Romlamduan is a veterinary practitioner. He specializes in poultry diseases. In 1988-2001, he had started his career as a veterinarian who taking care of poultry health and diseases monitoring program for CPF integrated farms. During 2002-2004, he had supported CPF key customer farms to set up vaccination and biosecurity management programs to prevent and control diseases outbreak.

His two main interests are Emerging/Re-emerging diseases of livestock animal and Zoonotic diseases especially Avian influenza.

At the present, Dr. Narin Romlamduan is the Senior Vice President of CPF, Head of Animal Health and Veterinary Service. His office is located at 29/2 Moo 9 Suwintawong Road, Lumpakchee, Nongjok, BKK 10530.

**NARIN  
ROMLUMDUAN**

Vice President

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Daan was born in Zambia of Dutch descent, and educated up to university level in Southern Africa. He studied veterinary medicine at Utrecht University, graduating as Doctor of Veterinary Medicine (DVM) in 1999. Realising the socio-cultural and economic importance of livestock in rural livelihoods, he had substantial involvement with the Vétérinaires sans Frontières - Europa (VSF-E) network during his studies, and visited a number of field projects in developing countries incorporating animal health components. In addition, field studies in Egypt (subclinical mastitis under different management systems, 1995) and Mozambique (neurological diseases in smallholder sector goats, 1997 and 1998) instilled a keen interest in epidemiology.

After graduation, Daan was employed by VETAID in Mozambique from 2000 to 2002, initially to implement a livestock disease surveillance system in flood-affected areas, and later in management of community-based animal health service provision projects. This work drew heavily on participatory epidemiological techniques and reinforced the close interrelatedness between human and animal health.

Subsequently, Daan undertook a PhD at the University of Liverpool (2002 – 2006), which gave him the opportunity of formally specialising in veterinary epidemiology, particularly acquiring expertise in statistical and mathematical modelling of infectious livestock diseases. He continued this academic trajectory by performing postdoctoral work at the EpiCentre, Massey University, New Zealand, performing analytic work on a range of livestock disease problems (2007 – 2009).

From 2009 to 2011, Daan managed the establishment of a 'One Health' Master programme at Massey University. This included specification of the curriculum, design of the web-based courses, co-ordination of the course development team, delivery of the courses into six countries across South Asia and assessment of the candidates. It involved working closely with a wide range of people, including instructional designers and educators, veterinary and public health subject experts and of course the 70 candidates – a number of whom are attending this conference! He is passionate about the capacity of emerging information and communication technologies to transform education, information sharing and collaboration, and convinced that the success of the 'One Health' approach will be determined by this.

Daan is a family man, being married with two children. He enjoys outdoor pursuits, and has a tendency to head out for the hills when given the opportunity.

## **WILLEM VINK**

Senior Research Officer

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# INFLUENCE OF INTERPROFESSIONAL EDUCATION

on Student Knowledge, Attitudes and Beliefs  
of One Health. Preliminary results.

**Malika KACHANI<sup>1</sup>, Helen ENGELKE<sup>1</sup>, Sorrel STIELSTRA<sup>1</sup> & Brandon HAYES<sup>2</sup>**

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## INTRODUCTION

Interprofessional education can potentially teach One Health topics in a novel interactive format, bringing together future health professionals in a forum that enables them to understand the importance of interdisciplinary collaboration.

The purpose of this study is to determine the influence of interprofessional education (IPE) on student knowledge, attitudes and beliefs (KAB) of One Health. The rationale behind the research is that while there are multiple studies that promote the importance of interdisciplinary care in human health delivery, less is known about the effectiveness of using IPE to promote cross-disciplinary collaboration that includes veterinary and environmental components. Western University of Health Sciences is in a unique position to conduct such research as its IPE program is comprised of over 900 students from various health professions.

## MATERIALS AND METHODS

Groups of 9 students, 1-2 from each college meet

3 times per IPE case. A facilitator helps guide the students through the case with a cross-disciplinary collaborative approach. Every case is designed with human-animal-environmental interactions that require involvement of multiple health professions. This yields an excellent educational environment, in which students gain a perspective that would not otherwise be present in a traditional, single discipline, classroom.

Out of the 900 first year IPE students, 307 completed an electronically administered anonymous survey. Professions represented were: Veterinary Medicine, Osteopathic Medicine, Dentistry, Allied Health, Graduate Nursing, Pharmacy, Physician Assistant, Podiatric Medicine and Optometry.

The survey sought to assess the students capacity to correctly define One Health. Respondents were then given a definition of One Health: "A collaborative effort of multiple disciplines- working locally, nationally, globally – to attain optimal health for people, animals and the environment". In a separate section of the survey, a 5 point Likert scale was used to identify students level of agreement to statements regarding their knowledge of zoonoses and infectious diseases, biomedical

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**Table 1- Student Respondent Enrollment by College**

College	Frequency	Percent	Valid Percent	Cumulative Percent
Allied Health	27	7.9	8.8	8.8
Dental Medicine	25	7.3	8.1	16.9
Graduate Nursing	7	2.0	2.3	19.2
Nursing	6	1.7	2.0	21.2
Optometry	16	4.7	5.2	26.4
Osteopathic Medicine	133	38.8	43.3	69.7
Pharmacy	27	7.9	8.8	78.5
Podiatric Medicine	10	2.9	3.3	81.8
Veterinary Medicine	55	16.0	17.9	99.7
Physician Assistant	1	.3	.3	100.0
<b>Total</b>	<b>307</b>	<b>89.5</b>	<b>100.0</b>	
<b>Missing System</b>	<b>36</b>	<b>10.5</b>		
<b>Total</b>	<b>343</b>	<b>100.0</b>		

and comparative research, environmental health, human-animal bond and their perceptions of effective health care delivery. Options on the Likert scale included “strongly agree, agree, neither agree nor disagree, disagree and strongly disagree”.

Similarities and differences between health professions were identified and analyzed. For the Likert scale responses, each category was assigned a point value ranging from 1-5 with 5 equivalent to “strongly agree” and 1 equivalent to “strongly disagree”. The T test for comparison of means was utilized to assess whether responses by students at differing health professional colleges were statistically significant.

*Table 1 shows the breakdown of students by college of attendance.*

**RESULTS AND DISCUSSION**

This study involved students from 9 colleges. However, for the purposes of this paper, preliminary

results relating to responses by the students from the colleges of Veterinary Medicine (n=55) and Osteopathic Medicine (n=133) are being reported. Ages ranged from 18-55 with 36% male and 64% female.

**DEFINITION OF ONE HEALTH:**

*Table 2 shows responses to the question “If asked could you define what One Health means?”.*

While 71.3 % of veterinary and osteopathic medical students combined believed they could define one health, only 44.1% adequately

**Table 2: Students’ Self-Assessment of Ability to Define “One Health”**

	Frequency	Percent	Valid Percent	Cumulative Percent
<b>Yes</b>	134	71.3	71.3	71.3
<b>No</b>	54	28.7	28.7	100.0
<b>Total</b>	<b>188</b>	<b>100.0</b>	<b>100.0</b>	

**Table 3. Comparison of Means of Zoonoses and Infectious Diseases Statements**

Zoonoses and Infectious Diseases Statements		N	Mean	Std. Deviation
Animal health can impact human health	Veterinary student	47	4.85	.416
	Medical student	114	4.28	.659
Animals can serve as disease sentinels for human health	Veterinary student	47	4.83	.481
	Medical student	113	4.31	.682
Humans and animals are not susceptible to many of the same chronic diseases	Veterinary student	47	1.66	.700
	Medical student	113	2.69	1.018
Zoonotic diseases do not pose a serious threat to the health of the human population	Veterinary student	47	1.36	.819
	Medical student	113	2.01	.950
It is important to monitor animal populations in order to detect disease outbreaks as soon as they occur	Veterinary student	47	4.57	.580
	Medical student	111	4.07	.583
Many pathogens that get people sick also get animals sick	Veterinary student	47	4.47	.747
	Medical student	110	3.73	.800
Being knowledgeable in One Health will be important to my professional practice	Veterinary student	47	4.36	.673
	Medical student	110	3.68	.918

defined it when asked to write their own definition. A correct definition of one health was fairly leniently assessed. Inclusion criteria included words such as collaborative, integrated approach, multi-professional/intersectoral. At the very least students had to understand that veterinarians and physicians should work together. Based on those criteria 76% of veterinary students (n=42) correctly defined One Health, but only 21% of those (n=9) were aware of an environmental component. Interestingly, fewer medical students successfully defined one health (30.8%, n=41), but for those

correct definitions, 36.5% (n= 15) included an environmental component.

### **ANALYSIS OF LIKERT SCALE RESPONSES**

Tables 3- 8 present comparisons of the means for student responses to statements assessing their knowledge of zoonoses and infectious diseases, biomedical and comparative research, environmental health, human-animal bond and their perceptions of effective health care delivery. All differences in means between

veterinary and medical students were statistically significant to a p value of < 0.01.

Table 3 shows that, compared to medical students, veterinary students were statistically significantly more likely to strongly agree that:

- animal health can impact human health
- animals can serve as disease sentinels for human health
- humans and animals are susceptible to many of the same chronic diseases
- zoonotic diseases pose a serious threat to the health of the human population
- it is important to monitor animal populations in order to detect disease outbreaks as soon as they occur
- many pathogens that get people sick also get animals sick
- being knowledgeable in One Health will be important to their professional practice

Table 4 shows that, compared to medical students, veterinary students were statistically significantly more likely to strongly agree that:

- research into obesity treatment and prevention translates well between animals and people
- collaborative research between human and animal health workers in the field of obesity can result in more rapid research advances.

**Table 5. Comparison of Means for Environmental Health Statements**

Environmental Health		N	Mean	Std. Deviation
Climate change can have direct and indirect effects on human and animal health	Veterinary student	47	4.57	.542
	Medical student	110	4.07	.875
Population encroachment can cause previously isolated diseases to come into contact with naïve human and animal populations	Veterinary student	47	4.55	.653
	Medical student	112	4.12	.732

Table 5 shows that, compared to medical students, veterinary students were statistically significantly more likely to strongly agree that:

- Climate change can have direct and indirect effects on human and animal health
- Population encroachment can cause previously isolated diseases to come into contact with naïve human and animal populations.

**Table 4. Comparison of Means for Biomedical and Comparative Research Statements**

Biomedical and Comparative Research Statements		N	Mean	Std. Deviation
Research into obesity treatment and prevention translates well between animals and people	Veterinary student	47	4.00	.885
	Medical student	111	3.24	.765
Collaborative research between human and animal health workers in the field of obesity can result in more rapid research advances	Veterinary student	47	4.64	.568
	Medical student	111	3.81	.733

**Table 6. Comparison of Means for Human Animal Bond Statements**

Human Animal Bond		N	Mean	Std. Deviation
Statements				
People who own pets tend to be happier than those who do not	Veterinary student	47	4.11	.729
	Medical student	114	3.46	.854
Pets can serve important roles in helping patient recovery and morale	Veterinary student	47	4.66	.522
	Medical student	111	4.20	.685

Table 6 shows that, compared to medical students, veterinary students were statistically significantly more likely to strongly agree that:

- people who own pets tend to be happier than people who do not
- pets can serve important roles in helping patient recovery and morale

Responses for these statements were also stratified based on current ownership of pets. Out of a total of 188 respondents, 52.7% (veterinary and medical students) owned pets.

Table 7 shows that, compared to non pet owners, students who own pets were statistically significantly more likely to agree that:

- people who own pets tend to be happier
- pets can serve important roles in helping patient recovery and morale

Table 8 shows that, compared to medical students, veterinary students were statistically significantly more likely to strongly agree that:

- their role as healthcare providers is not just to maintain health but to improve it and also not just to fight disease but prevent it
- collaboration between human and animal healthcare providers is important for protecting Public Health

## CONCLUSION

This study showed that there were significant differences between veterinary and medical students in their ability to define One Health and in their appreciation of One Health concepts. These results seem to reflect the professional differences that may be impacting the adoption of the One Health approach in the current public

**Table 7. Comparison of Means for Human Animal Bond Statements Stratified by Ownership of Pet(s)**

Do you own any pets?	N	Mean	Std.	
			Deviation	
People who own pets tend to be happier than those who do not	1 Yes	137	3.93	.769
	2 No	114	3.31	1.014
Pets can serve important roles in helping patient recovery and morale	1 Yes	136	4.50	.596
	2 No	113	4.14	.766

**Table 8. Comparison of Means for Perceptions of Effective Health Care Delivery Statements**

		Effective Health Care		
	Delivery Statements	N	Mean	Std. Deviation
<b>Our role as healthcare providers is not just to maintain health, but improve it</b>	Veterinary student	46	4.80	.453
	– Medical student	111	4.40	.704
<b>Collaboration between human and animal health care providers is important for protecting the public health</b>	Veterinary student	47	4.64	.568
	– Medical student	110	4.02	.704
<b>Our role as healthcare providers is not just to fight disease, but prevent it</b>	Veterinary student	46	4.83	.486
	– Medical student	112	4.48	.697

health arena. It suggests that greater emphasis should be paid to medical curricula to further advance and apply the One Health approach.

Strengthening education regarding the environmental component of One Health is also needed.

A limitation of this study was that the student knowledge of One Health was not assessed before taking the IPE course. It is hard to appreciate the educational value of IPE as it relates to One Health and quantify whether students were knowledgeable before the IPE course. A future study should thus include a pre and post test of knowledge, attitudes and beliefs.

Despite this shortcoming, Western University should be commended for taking the step to expose students from all health professions to One Health through the IPE program. It is clear that having students from various professions in the same room and discussing common health issues is already a first step towards greater intersectoral collaboration. In real life, health professionals rarely have the opportunity to interact at conferences and meetings, to collaborate on projects or to communely address health issues.

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# EXPERIENTIAL FIELD TRAINING AND ACTIVE SIMULATIONS

Sopon IAMSIRITHAWORN<sup>1</sup>, Karoon CHANACHAI<sup>2</sup>, Angkana SOMMANUSTWEECHAI<sup>3</sup>

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## INTRODUCTION

In the last decade, high profile infectious disease outbreaks including Severe Acute Respiratory Syndrome (SARS), highly pathogenic avian influenza (HPAI) H5N1, and pandemic H1N1 influenza, have demonstrated the need for prompt epidemiological investigation and response, and the importance of teamwork and improved communications among multiple sectors. Field-based training has demonstrated its effectiveness in response to major epidemics worldwide, and has become a key strategy to strengthen disease prevention and control capacity in many countries.

In 1980, the Thai Ministry of Public Health's Department of Disease Control (DDC) established Thailand's Field Epidemiology Training Program (FETP) in response to the country's need for competent field epidemiologists with disease outbreak and surveillance experience capable of responding promptly and effectively to public health emergencies. FETP-Thailand is modeled after the US CDC's Epidemic Intelligence Service (EIS) program with support from the World Health Organization (WHO). In the past 3

decades, the program has graduated over 200 field epidemiologists. Although initially only physicians were enrolled in the FETP's 2 years for field-based training, in 2005 the program was expanded to include other health professionals (including veterinarians) who focus on public health work.

During the SARS crisis in Asia in 2003, Thailand's DDC proposed a novel disease prevention and control strategy by having every province set up at least two operational teams consisting of a physician, an epidemiologist, a lab technician and a disease control officer, tasked with identifying persons with possible SARS. The teams were on duty 24 hours a day, 7 days a week. Following a notification of a suspected SARS case, a local team was immediately deployed to visit the patient and begin a field investigation. Due to the success of this strategy, the health emergency response team concept was gradually incorporated as an integral component of the national system for disease surveillance and response.

In early 2004, HPAI (H5N1) outbreaks were

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## Surveillance and Rapid Response Team (SRRT)

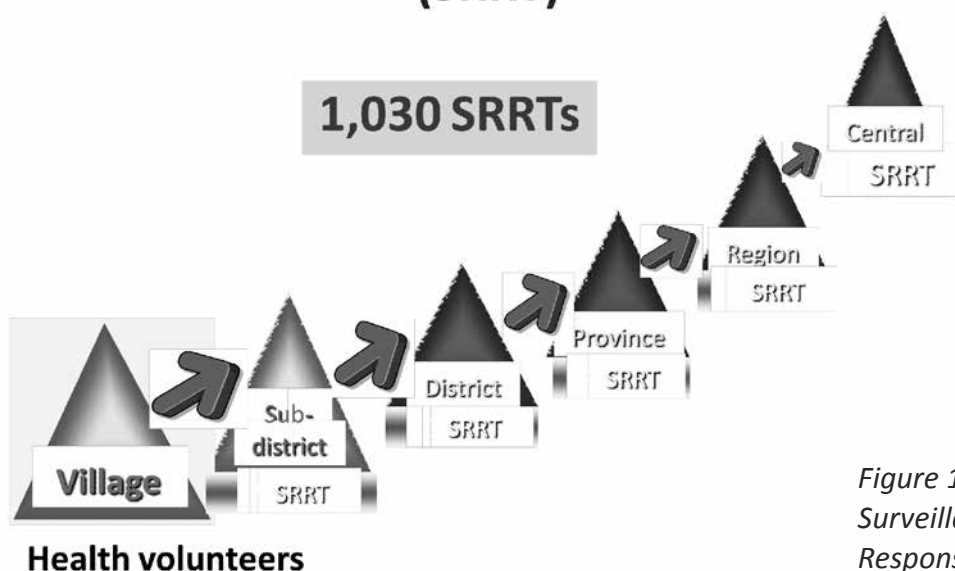


Figure 1. Network of Surveillance and Rapid Response Teams in Thailand

detected in several provinces of Central Thailand. The new crisis stimulated the Thai Ministry of Public Health (MoPH) to launch a policy to establish 1,030 Surveillance and Rapid Response Teams (SRRTs) nationwide (Figure 1). The strategy approved by health authorities was for a team in every district and at least one provincial SRRT in every province, including Bangkok. At the regional level, there is a SRRT in all 12 regional offices of DDC. At the national level, a central SRRT, responsible for coordinating response to all outbreaks of national importance, is staffed by experienced FETP graduates and senior officials from the Bureau of Epidemiology (BoE).

The SRRT members receive training and mentoring from experienced trainers of FETP-Thailand with support from FETP graduates working at different levels of the public health service, both in the Ministry of Public Health and in other ministries. A short-course training called “Field Epidemiology and Management Training” (FEMT) was designed

by faculty members of FETP-Thailand with the objective to provide a 6-month in-service training for SRRT leaders who are physicians and public health professionals. The training assignments include one field outbreak investigation and one surveillance evaluation study.

### COLLABORATION ON TRAINING OF VETERINARIANS

In 2005, the first cohort of veterinarians was enrolled in the FETP-Thailand with strong policy support from the Department of Livestock Development (DLD) of Thailand. Animal doctors and physicians received field-based training and joined hands to investigate disease outbreaks. Furthermore, in 2009 with support from FAO, USAID and U.S. CDC, the collaboration was expanded to establish a Regional FETP for Veterinarians (FETP-V). The program aims to

strengthen animal health personnel and promote multi-disciplinary response capacity for diseases in animals. It is closely linked to FETP and focuses on surveillance and investigation of outbreaks in animal diseases and zoonoses. As of December 2012, a total of 15 veterinarians have graduated from the FETP-V, including eleven Thai and four veterinarians from neighboring countries in Southeast Asia. Currently, five international trainees and two Thai trainees are enrolled in the program. In addition, a total of 38 international and 44 Thai participants were trained during a one-month FETP-V prerequisite course. The program has promoted a number of field-based activities in Thailand. Several surveillance activities and outbreak responses to both zoonotic and non-zoonotic pathogens were conducted by trainees and alumni, including human Streptococcosis caused by Streptococcus type 2 from pigs, human and animal Brucellosis, Rabies, Anthrax and Avian Influenza.

In July 2011, a special meeting among government officers from human health, animal health and wildlife health, university professors and NGOs was held to form the Thai One Health Network. At the end of the meeting, a One Health Declaration was drafted and approved by meeting participants. The goal is to strengthen Thailand's capacity for better preparedness and response to emerging infectious diseases (EIDs) through multi-sectoral and multi-disciplinary collaborations.

## **MOVING TO ONE HEALTH EPIDEMIOLOGY TRAINING**

In 2012, building upon long term experiences

with FETP and SRRT training, a multisectoral project to "Support Training to Strengthen One Health Epidemiological Teams at the Provincial and District Level" was planned based on a collaboration between FETP-Thailand, the Field Epidemiologist Association of Thailand (FEAT), FETP-V, DLD, the Zoological Park Organization (ZPO), the Department of Natural Parks, Wildlife and Plant Conservation (DNP), the USAID's RESPOND project, and U.S. CDC. This applied outbreak response training and capacity building activity was conducted in 5 different regions of Thailand, and involved key medical epidemiologists, veterinarians and wildlife experts. Faculty members from five universities were invited to be project advisor for the field-based projects and the relationship has led to an improvement of government-university collaboration in the country. Subsequently, in late 2012, the Chair of Thailand One Health University Network was invited to co-chair the Thai One Health Network and discussion on continuing activities through additional projects as well as in-service training.

The project goals are to strengthen national capacity in preparedness and response through collaborative work of a multisectoral team of health professionals through:

- Improved mentoring skills of supervisors;
- Strengthened disease surveillance and joint response to public health events of national and international concern;
- Enhanced communication and knowledge among the sectors;
- Education to improve knowledge and technical skills of SRRT members;

- Closer collaboration with university faculty to exchange ideas on enhanced training methods, materials and curricula to improve knowledge and adult learning techniques; and
- Encourage managers in all sectors to improve teamwork and the use of timely and accurate disease and outbreak information to protect the public's health and limit the impact of EIDs, including zoonotic diseases, on national productivity and economic growth.

This One Health-focused training project involved two one-week national workshops, and five provincial-level field projects over six months involving zoonoses which are a priority for Thailand (Q fever, tuberculosis, Melioidosis, Brucellosis, West Nile virus). A final seminar was held to showcase results and lessons learned from the projects completed (Figure 2). Experienced field epidemiology trainers from multiple sectors and a representative of university faculty reviewed and modified the training curriculum based on national priorities. Five pilot provinces, namely, Chiangmai, Chonburi, Nakhon Ratchasima, Songkhla and Kanchanaburi were selected based on the presence of both FETP alumni and health professionals and university faculty interested in strengthening EIDs preparedness and responses through "One Health" approach.

West Nile encephalitis has been listed as one the potential EIDs in Thailand. No human cases have been identified or reported. In preparation for a potential West Nile outbreak in Thailand, an active simulation was initiated with a focus on developing effective surveillance for the disease. A joint investigation was conducted to identify the

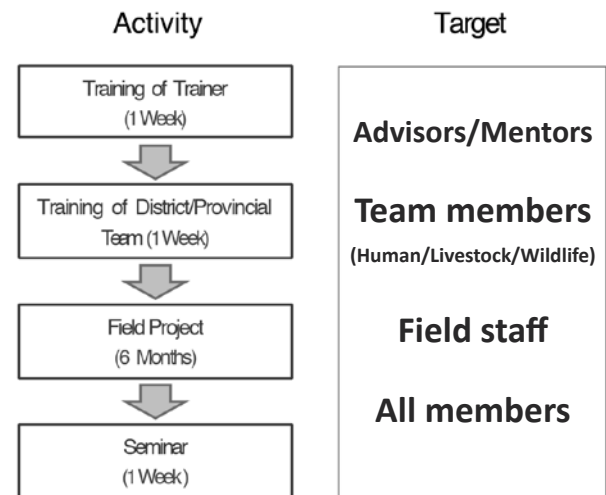


Figure 2. Structure and Stakeholders of "Training of One Health Epidemiological Teams at the

etiology of encephalitis cases with unknown cause. Participating organizations were from different health sectors, including public health, the vector control unit, the livestock office, and wildlife health sectors in the province. Following a notification of a suspected human case of encephalitis of unknown etiology, a multi-disciplinary team will be deployed to investigate the human case, identify possible vectors of disease and animal reservoirs in both livestock and wildlife.

## CONCLUSIONS

Working collaboratively in the design, planning and implementation of applied epidemiology

training at the provincial and district levels has improved teamwork and the capacity among the multiple sectors responsible for disease surveillance and outbreak response. The “One Health”-based curriculum and training experience can serve as a guide for future One Health training workshops in the nation and region. Collaboration between government agencies and universities should be stressed in developing curricula to strengthen One Health knowledge and skills. Trust-based cross-sectoral collaboration will contribute to timely sharing of surveillance information and enhanced emergency response capacity, resulting in improved EID prevention and control. Collective leadership, trust and policy commitment are vital factors for the success and sustainability of the One Health network in the provinces and country.

#### **ACKNOWLEDGEMENTS:**

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# IMPLEMENTING ONE HEALTH APPROACHES

for Private Veterinarians in Livestock

Derived Food Business

**Narin ROMLAMDUAN**

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**A**ccording to FAO-OIE-WHO collaboration report in April 2010, they committed to work together closer for aligning the activities which related to animal-human-ecosystem interface, so called “One Health” in order to support member countries.

In perspective of CPF, as the private company in Thailand, we has provided meat and food products from livestock production more than 80 years. Our company’s vision in 5 years from 2008-2013 is “To provide meat and food products that are nutritious with food safety integrity to satisfy customers in each market region”

The Animal Health and Technical Service Office, CPF (Thailand) co., ltd., provides animal health solutions by specific prevention and control measures for livestock’s diseases, especially for poultry and swine production in order to produce safety food for consumers.

We are focusing on food safety, innovation, traceability, medication, vaccination, animal welfare and environmental concerns. Veterinarians who deal with livestock health in food business have to be trained about the basic issues on one health concept, biosecurity, food safety, emerging and re-emerging diseases, emergency plan for disease outbreak, early warning system and health monitoring program for diseases prevention and elimination from food chain and continuous supporting safety food for the consumers.

# CAPTURING THE POWER OF GLOBAL COMMUNICATIONS TECHNOLOGIES

to Enhance Learning and Capacity Development for One Health

Willem VINK

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## ABSTRACT

*The One Health approach is appealing but highly complex; implementation of relevant activities is influenced by professional competencies, attitudinal factors and institutional support. Transdisciplinary professional education is an essential component of developing a cadre of motivated One Health professionals. This paper illustrates how dynamic developments in the field of education, supported by emerging online information and communications technologies and social media, represent exciting opportunities for synergy with One Health, and discusses how these will have a fundamental and growing impact on its implementation.*

## INTRODUCTION

The field of One Health is, by definition, highly multidisciplinary. Its philosophical foundations are intuitively and inherently compelling: by advocating a holistic approach and counteracting the divergence of the human, animal and environmental health professions arising from increasing specialisation, One Health has the

potential to result in improved effectiveness and efficiency of health-associated outcomes. This has undoubtedly been a contributing factor to the rapid gain in popularity of, and support for, One Health in recent years. However, it is a highly complex concept: its outcomes are impacted by (among others) geographical, economic, political and socio-cultural factors. Consequently, implementing One Health approaches demands a broad understanding of issues which cut across human and animal medicine, environmental, social and other sciences, as well as the intricacies of their interactions and their impacts on each other. The major international human and animal health agencies, World Health Organisation (WHO), Food and Agriculture Organisation (FAO), World Organisation of Animal Health (OIE) and Centers for Disease Control (CDC) have endorsed and promoted inter-agency and inter-sectoral collaboration (Anon., 2008a; Anon., 2008b; Anon., 2010; CDC, 2010). Such high-level leadership is necessary to mobilise opinion and solicit political support. However, it does not create One Health practitioners that are capable of engaging the principles and discussion, integrating these into public health practice at multiple levels, and converting them into meaningful action.

There has recently been substantial discussion of the competencies required, and three broad areas can be identified (Vink et al., in press). A primary requirement is that One Health practitioners are able to draw on a nucleus of shared competencies. While it is neither realistic nor desirable to train people who are 'specialists in all disciplines', successful practice requires relevant ability, knowledge or skills that must extend beyond narrower professional capabilities (Moser, 2008). In addition, the capability of professionals with different backgrounds to operate in a multi-disciplinary context also depends on their ability to communicate and collaborate effectively (Kahn, 2011). Inconsistencies or omissions in technical and scientific terminology can make this problematic. Thirdly, successful implementation demands the willingness and preparedness of One Health practitioners (as well as the institutions they work in) to break out of organizational 'information silos' and initiate collaborations.

Education and collaborative research are key activities to build One Health capacity (Conrad et al., 2009; Osburn et al., 2009). The seminal Centers for Disease Control meeting held in May 2010 at Stone Mountain (CDC, 2010) identified a set of "critical enabling initiatives" and selected training as its top priority. Training is required at multiple levels, including positions related to coordination and decision-making (Anon., 2008b); this was described in the Stone Mountain meeting as creating "One Health leaders" (Rubin, 2011). Although academic curricula have incorporated principles of multidisciplinary health-related teaching, to varying extents, for decades, the emergence of One Health as a credible discipline has led to a sharp increase in the number of courses and degree programmes explicitly marketed as One Health. However, these are frequently operated by North American or European institutions, and

may have limited relevance and applicability in developing countries, where the shortage of capacity is the greatest.

A short section on the global changes in the education sector, driven primarily by the developments in information and communications technologies, is appropriate, as this informs the subsequent discussion.

## **THE CHANGING FACE OF EDUCATION**

In the previous decades, there has been growing emphasis on the pedagogy of problem-based learning (PBL), especially in the medical sciences. As a style of learning, PBL is considered to represent a social constructivist approach: knowledge is actively "constructed" in groups, by flexibly encouraging problem-solving, strategising and collaboration. Crucially, students incorporate their pre-knowledge and experience, are expected to contribute this, and learn from each other as well as the tutor. Consequently, the student's knowledge base is not static, but is constantly being expanded and augmented by information-sharing and incorporation of tacit knowledge. This is an iterative process: learners continuously attempt to "update" meaning (Siemens, 2005) and "learn by doing". The constructivist theory has led to the concept of "communities of practice" consisting of individuals or members who actively contribute to and expand this collective knowledge base (Sandars and Heller, 2006).

As a parallel development, over the past decade or so, there has been an unprecedented rise of distance education. This has been enabled by the spread of the internet, in combination with the development of specialised learning



management systems (LMSs) for course delivery. An LMS is effectively a content-managed website, that is, a website which can be edited, developed and used, primarily via graphical interfaces, by users assigned different levels of access or roles. The functionality of the LMS has been specifically designed for educational purposes. In addition to the presentation of static text-based subject content, this includes features such as discussion boards, messaging, chat facilities, wikis, presentation of audiovisual content etc. A variety of interactive learning resources are available, such as lessons, quizzes, questionnaires etc. Students can be grouped, which enables collective activities and facilitates the implementation of constructivist approaches (sometimes characterised as “computer-supported collaborative learning”). Another strength of the LMS is its functionality to conduct and record student assessment. Typically, course teachers can change settings, upload and create content, while students cannot.

The cross-fertilisation of social constructivism and the burgeoning development of the internet led George Siemens to propose the term “connectivism” in 2005. The underlying idea is that knowledge “exists in the world” rather than being possessed by an individual, and is accessed through a network of information sources (Siemens, 2005). Learning is the process of identifying and linking information from multiple sources into a dynamic personal knowledge base. In this model, learning is fluid and relatively unstructured, adopting a variety of tools such as an LMS, RSS feeds, blog posts, synchronous online meetings etc. Siemens’ work led him to organise the first Massive Open Online Course (MOOC) in 2008, which was freely enrollable by anyone who wished to contribute. The recent emergence of the Open Educational

Resources movement (OER Commons, 2012), and the well-publicised development of leading universities worldwide participating in the establishment of platforms for the delivery of MOOCs (such as Coursera, Udacity and EdX) attests to the fundamental paradigm shift that is taking place in the educational sector.

The rapidity with which these developments have taken place is astonishing. It is clear that many of these exciting ideas and technologies are highly compatible with the principles of One Health, and will have a large bearing on how One Health ideas, collaboration and education will spread in future. A case study which attempts to implement many of these new ideas in Asia will be presented.

#### **MASSEY UNIVERSITY’S ONE HEALTH FOR ASIA PROGRAMME**

This programme, which aims to strengthen the management of current and emerging human and animal diseases, was launched in 2010 and provides formal training of public health doctors and veterinarians through two Masters degrees: a Master of Public Health (Biosecurity) and a Master of Veterinary Medicine (Biosecurity) (Vink et al., in press). The first cohort of students, who commenced their studies in May 2010, consisted of 70 doctors and veterinarians from Afghanistan, Pakistan, India, Bangladesh, Nepal and Sri Lanka (Figure 1). Approximately equal numbers of doctors and veterinarians were enrolled.

The Masters programmes required completion of eight courses, as shown in Figure 2. Seven

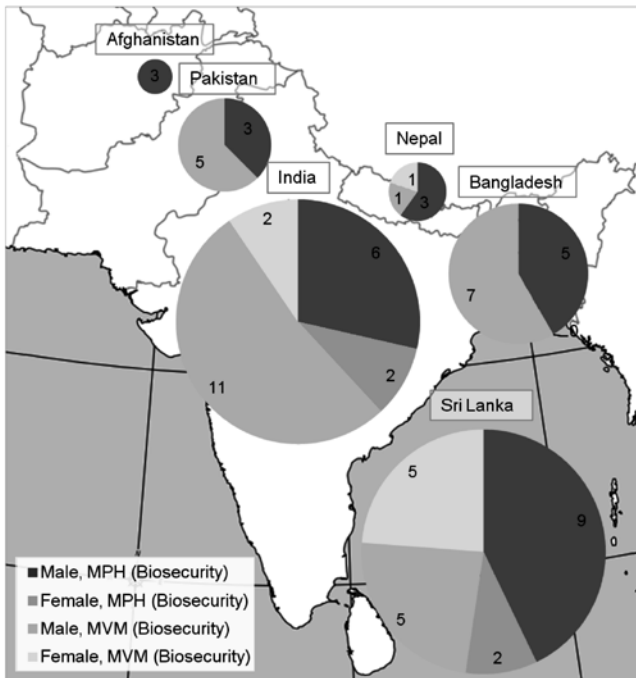


Figure 1: Student demographic of students enrolled into Massey University's One Health Masters programme

of these were taught entirely online, using the Moodle LMS (Moodle, 2012); the remaining course (the fourth of the foundation courses) was a combination of online and face-to-face training. The first four courses provided a foundation in epidemiology and were common to both degrees. The remaining four courses addressed specialised topics related to human or animal health. The courses were delivered online over a six-week period with a study load of about 20 hours per week.

The primary objectives were to establish a consistent lexicon and mastery of relevant technical competencies in epidemiology and public health, and to establish groups of students from a wide range of countries, professional expertise

and experience as One Health “communities of practice”. Key strategies to achieve this were to teach into a common learning space, and to establish effective communication and collaboration between students with different professional backgrounds. A consistent approach for bringing this into practice was to adopt “active” modes of learning, frequently consisting of relevant, engaging and multifaceted case studies which required completion of a set of interactive activities. A secondary benefit of the online delivery was that it improved the candidates’ competence at using information and communication technologies, and bolstered confidence in working in an online environment.

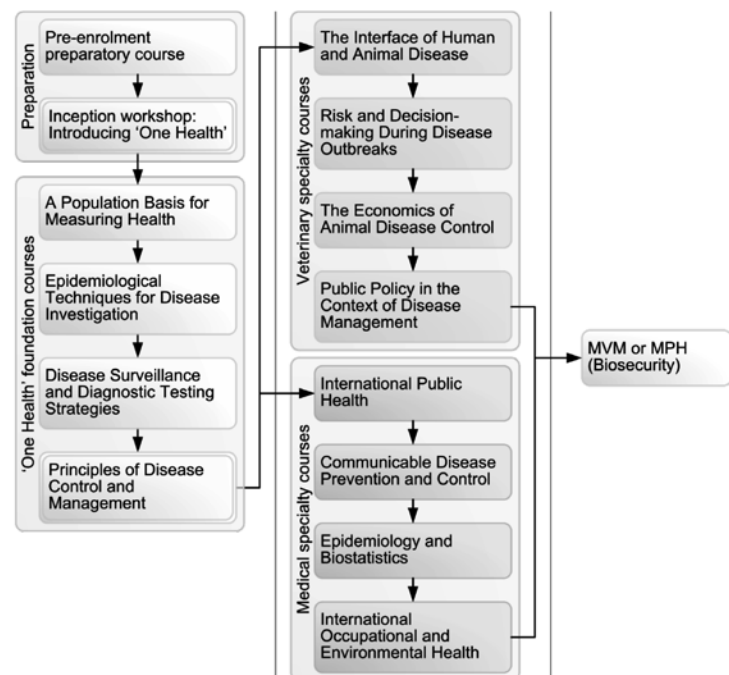


Figure 2: Programme structure of the MVM (Biosecurity) and MPH (Biosecurity) programme.

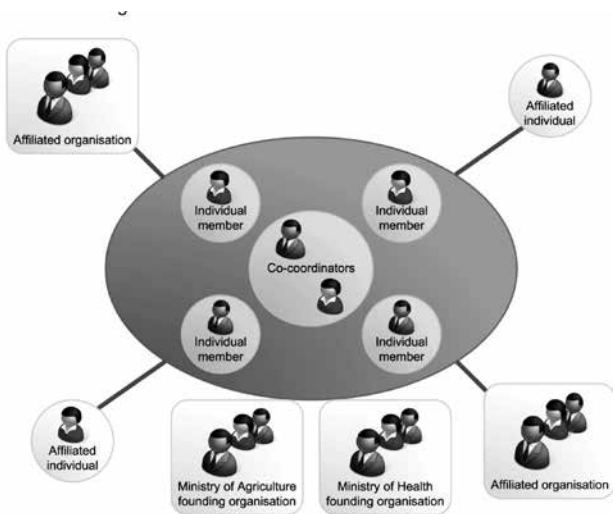


Figure 3: Organizational structure of One Health Hubs

All study materials were made available in the Moodle course, including readings and resources; in addition, all students had full access to the Massey University library. Intensive use was made of native Moodle functionality to perform a combination of individual and group work, including discussion forums, lessons, quizzes and questionnaires. To carry out specific activities related to various courses, use was made of additional software tools which were embedded as seamlessly as possible into the LMS. Assessment consisted of a combination of individual and small-group outputs. Students were encouraged to make the best possible use of various information domains, including traditional sources such as the University library, but extending to the internet as well as the knowledge and experience held by the participating students themselves.

Establishing the degree programme was challenging from a number of perspectives. Firstly, the evolving and fast-developing concept of One Health meant

that the curriculum and the course content necessarily had to be designed and built from the ground up. Secondly, online learning was a new experience for almost all the students, the teaching model was unfamiliar to most, and a large range in the students' pre-knowledge and experience needed to be accommodated. Thirdly, the technical aspects of delivering online distance education into a region with highly variable internet availability required careful consideration. Despite these challenges, our experience has been that online learning lends itself organically to the One Health approach. De Laat et al. (2006) endorse this with the comment that the field of networked learning, too, is increasingly interdisciplinary and draws upon theoretical perspectives from the domains of education, the social sciences, computer sciences and linguistics.

Research has shown that training programmes that focus on application and providing ongoing support, rather than on theoretical knowledge, are more successful (Winthrop and Smith, 2012). Consequently, the Masters-level training is being followed up by a second phase aimed at implementation of collaborative activities and research. Organizationally, this is underpinned by the establishment of One Health Hubs (OHHs), which consist of a consortium of individuals and organisations that are directly or indirectly involved in the management of zoonotic diseases. The OHHs are established with the Ministry of Health and the Ministry of Agriculture or Livestock in each country as founding organizations (see Figure 3). OHHs will be connected to develop an informal regional One Health network. The OHHs are underpinned by HubNet, a web-based platform using state-

of-the-art information technologies to provide tools for communication, collaboration, resource-sharing and professional networking. The use of open-source software will enable HubNet to be hosted and maintained in the region.

## **CONCLUSION: ONE HEALTH IN A NETWORKED WORLD**

The One Health approach aspires to a joint design of disease investigation, control and management systems for emerging and endemic zoonotic diseases (Kahn, 2006), requiring integrated teams of veterinarians and public health professionals, both in operational teams and in leadership roles. Effective collaboration involves building new relationships and respect for the roles and expertise of professionals in different sectors (Anon., 2008b). Structured and relevant education in a common environment represents an effective strategy for achieving these goals, and stands at the basis of fostering a cadre of health professionals that will be the decision-makers of the future.

One Health cannot be considered in isolation from the world in which we live. The developments in the field of education, supported by emerging learning technologies and social media, reflect a paradigm shift that has many parallels with One Health, and hence represent opportunities for synergy. Concepts such as “communities of practice” and “networked learning” resonate to a high degree, and are bound to have a fundamental impact on the operationalization of One Health. Ongoing developments in mobile technologies - for communication as well as education - will undoubtedly influence the way in which One Health will be put into practice over the next decade or so.

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# INTEGRATING HEALTH

## Priorities and Workforce Employers in Curriculum Development

### **William BAZEYO**

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### **INTRODUCTION**

With support of USAID through the RESPOND project, in the year 2010, 14 Institutions of Higher Education (7 Schools of Public Health and 7 Schools of Veterinary Medicine) agreed to establish a university based network to champion One Health Approach in the Central and Eastern Africa region (OHCEA). The network covers six countries; Democratic Republic of Congo, Ethiopia, Kenya, Rwanda, Tanzania, and Uganda. The establishment of the network benefitted from the five years of experiences documented by Health Alliance, a network of 7 Schools of Public Health in the region. During the period 2011-2014, the USAID support will be utilized to Strengthen and Expand the OHCEA network with two main objectives; i. Expand the human resource base needed to detect and respond to potential pandemic disease outbreaks, and ii. Increase integration of animals, wildlife and human disease surveillance and outbreak response systems.

Curriculum Development in institutions of higher education is in practice a preserve of the institutions with insufficient or minimal input from

the potential employers of the graduates from the academic institutions. The extent to which health priorities of the bodies that employ the graduates of the universities are integrated in the development of various curricula requires strengthening. One such priority or challenge is how to address the current complex health problems that may not be resolved by a single sector as has been the traditional practice but rather to use a different approach that enables multi sectoral collaboration to address identified complex problems. Thomas Kuhn (1) in "The Structure of Scientific Revolution" (1962) notes that Paradigms change when old systems and methods don't solve new problems and when events occur that can't be explained by current models.

The Bellagio Working Group (2) adopted a definition of One Health - One Health approach requires working collaboratively across disciplines and professions to address complex contemporary health issues. A One Health approach enables better understanding of the threats and greater innovation for more holistic and integrated intervention strategies.

## **INTEGRATING ONE HEALTH PRIORITIES AND EMPLOYERS IN CURRICULUM DEVELOPMENT IN CENTRAL AND EASTERN AFRICA REGION**

Creating a more sustainable public health human resource base requires not only preparing the workforce, but also enhancing worker performance. OHCEA proposes to address both of these areas by developing and providing pre-service and in-service training, as well as improving communication and collaboration between sectors and stakeholders who traditionally operate in isolation. (3)

Assessment of Training Needs of health related professionals currently in service and in service training

Before developing curricula for in service training the professionals in health related sectors in the Central and Eastern region, OHCEA has developed a Training Needs Assessment tool to be used to determine the training needs that will be addressed through a cascade training model. Each of the six countries will assess the needs in the months of January 2013. The Training needs will be validated by stakeholders that will include the employers of the respective professionals. The training needs assessment will focus on the One Health Core Competencies domains agreed on in a regional OHCEA workshop that drew delegates from Government sector ministries.(4)

The core competencies domains agreed on are:

- Management
- Communication
- Values and Ethics
- Leadership
- Systems Thinking
- Culture, gender and beliefs
- Policy and Advocacy

- Collaboration and Partnership
- Research

A regional workshop will be convened to develop training materials for Training of Trainers(60) who will in turn develop training materials for training health Professionals at country level (600 in two years). The trained personnel will in turn train 3000 first responders in two years (3)

### **Strengthen and Develop University Curricula and Programs**

One of the key activities for OHCEA is to develop a cadre of One Health experts through developing curriculum at both pre-service and in-service level that support the capacity needs of government, countries and the region. Competency-based training programs will be developed and curriculum mapping customized at the country level based on the identified core competencies.

To promote cross-disciplinary collaboration, OHCEA focal persons together with UMN and Tufts faculty will implement inter- and intra-University workshops. Workshops will facilitate cross-disciplinary collaboration through co-teaching, curriculum review and partnership. OHCEA will also foster One Health promotional activities for faculty and students including brown bags, health days, bomas, OH student clubs and seminars. DRC for example, plans to create Scientific Multidisciplinary Groups involving public health veterinary and nursing schools. Each of the OHCEA institutions also plans to foster One Health collaboration and training through OH student internships, field attachments and applied field experiences in partnership with relevant stakeholders (EPT

partners, IGOs, government agencies, private sector).

OHCEA also plans to focus significant effort on strengthening and building pre-service courses, programs and curricula. This will include strengthening existing pre-service courses and programs, reviewing existing curriculum, and creating new courses or new programs at certificate, masters, professional and undergraduate levels. Where appropriate and possible, US and African OHCEA universities will work with OHCEA schools to develop new curricula to be approved, accredited and implemented at the country level in collaboration with stakeholders. Examples of pre-service approaches currently proposed by OHCEA include: 1) strengthening of wildlife curriculum and faculty development in wildlife health across OHCEA institutions; 2) development of One Health pre-service curricula for vet technicians in DRC; 3) review of existing and development of new undergraduate and graduate level degree programs at OHCEA schools; and 4) delivering quality assurance training to OHCEA schools to strengthen curricular development and management approaches. Some OHCEA institutions are interested in developing wildlife and environmental expertise to include Emerging Zoonotic diseases and Wildlife training. (5)

OHCEA plans to develop Regional collaboration sites (One Health Demonstration Sites) for capacity building, outreach, and applied research in One Health where student, faculty and government will work together to address joint complex health problems in long-term research, training and outreach at the human-wildlife-livestock-environmental interface. A situational analysis will be conducted to identify regional One Health sites.

A team of faculty across the region interested in the concept will be identified and this faculty team will review regional commonalities at the OH intersection and identify sites of interest. Specifically, OHCEA and US faculty will review existing field based programs and attachments, identify sites of interest in interested countries, conduct situational analysis and planning/preparation for each site and engage local, regional and national stakeholders to assure that activities align with priorities and existing activities. MOUs will be developed as needed based on local/regional government and institution requirements. A cross disciplinary group of students will be identified and attached to these chosen OH demonstration sites. Once the students have finished their attachment to the field site, they will jointly develop and present field activities and projects. OHCEA and US university faculty will identify and fund research and outreach projects in the sites across the region and disciplines. These sites will be used to foster international faculty and student exchanges and promote communication and collaboration across One Health organizations and projects.

In addition to review and development of health curricula, OHCEA schools in partnership with US universities will develop, implement and support innovative applied One Health education and training programs. The One Health Residency at Makerere University plans to recruit 2 veterinary, nursing and public health professionals as residents to participate in this applied, experience-based training program where students earn a Masters level degree (MPH, MSc) while spending 75% of their time working on practical, real-world projects

with Stakeholders to build skills in identified competencies. Each OHCEA country will send two in-service staff to attend a two year MSc. program in Preventive Veterinary medicine with Field Epidemiology track at Makerere University. Other innovative programs identified include Team Outbreak, One Health curriculum for vet technicians and nurses, and Vet-Nursing-Medical students' joint field practicums. For example, training materials for the vet-nursing-medical joint field practicum will be developed by OHCEA and students will jointly be attached to the field to acquire hands-on experience in OH activities.

OHCEA faculty and its leadership will conduct One Health seminars, lectures and campaigns to support sensitization of One Health concept at existing and new OHCEA schools.

## CONCLUSION

By 2014, OHCEA will have established itself as a fully functional regional One Health network with in-house capacity for sustaining continuous improvement of health and well-being of humans, animals and ecosystems through multidisciplinary research, training and community service. From its regional base OHCEA strives to contribute to One Health as indicated by its collaboration with international partners. OHCEA members and the human, veterinary and wildlife health systems they represent will be demonstrably better trained in the One Health approach and linked through integrated institution function, communications, operational protocols and policies. Curricula jointly designed and tested by these partners will be in place and utilized by pre- as well as in-service personnel. National government offices responsible

for disease surveillance and response will form key partners in OHCEA's transformation strategy and be targeted as a beneficiary of its training efforts. Most importantly, the new capacity and coordination facilitated through OHCEA will result in more rapid detection and response to emerging and episodic zoonotic incidents, thereby limiting loss of human and animal life and reducing the risks of pandemics while simultaneously operating more effectively to address common debilitating and deadly diseases.

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