Strengthening ties with public health for joint action on global health threats. Part 1.

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Introduction

There are many fine examples of partnerships among the animal health, public health, and environmental sectors, but the bulk of One Health programs and publications have a strong bias towards veterinary medicine as their instigator and lead. There is a growing expectation that public health must better balance engagement in the social, environmental, and ecological determinants of health by mobilizing multiple sectors to tackle some of our most challenging health crises. One Health has been proposed as a framework to achieve that end. It is, therefore, timely to consider what might motivate or dissuade public health engagement in One Health activities.

Despite accumulating evidence on the necessity to apply cross-sectoral thinking to our major global challenges, there is relatively little understanding about how to best address such complex and intractable issues. There is sparse empirical evidence of effectiveness, or impact of intersectoral approaches to health despite a strong belief that they are essential to remedy significant problems (1). Even though One Health collaborations are appealing, there remain questions of how to operationalize them in policy and practice.

Inter-organizational and inter-sectoral partnerships are rarely without problems, especially where differences in power and resources exist and when interests are treated and managed separately. They can be hard to initiate, sustain, and evaluate (2). Coalitions of interests supporting socially and ecologically integrated approaches are often ephemeral thus presenting a challenge to sustaining commitment to and involvement in socio-ecological approaches. The lack of a simple problem can hinder development of policy solutions due to overlapping or competing roles or raise concerns that policy will be ineffective in the face of wider social and ecological drivers. A key obstacle to progress with systems-level problems has been the tendency to act as if "one-size-fits-all" approaches will work (3). The proliferation of concepts such as ecohealth, planetary health, health promotion, and One Health suggest that no single approach has been able to address all needs and problems.

In this essay and its companion piece, I will explore if or how One Health can help public health (including veterinary public health) better balance engagement in social, environmental, and ecological determinants of health by examining the incentives, opportunities, and obstacles for regular, systematic, and meaningful intersectoral actions.

The perspectives expressed in this essay have been informed by a narrative review of the literature on One Health in public health practice, non-systematic targeted conversations with 17 environmental health frontline practitioners, medical health officers, and One Health practitioners and academics in Canada in 2022, and the author's experiences working in a One Health milieu for > 25 y.

Drivers for change

High-level political forums, academic circles, and the press are awash with opinions that public health must reorient its approaches. This has been driven, in part, by overlapping crises of climate change, the COVID-19 pandemic, food insecurity, environmental degradation, and the explosion of antimicrobial resistance. The extinction crisis, pollution pressures, and growing environmental injustices are amplifying these opinions. It has never been clearer to western medical thinking that emphasis on social or pathological determinants of health without systematic attempts to neutralize the environmental conditions leading to poor health is increasingly inadequate (4). The World Health Organization Director General underlined the intimate and delicate relationship between humans and our planet at the 2020 World Health Assembly, noting that failure to address this critical interface is doomed. Such international declarations are translating into pressures on national and local public health systems to reflect on how they can develop programs that are simultaneously socially, environmentally, and economically just.

In today's world of multiplying environmental health challenges, agencies established to deal with these problems quickly become overwhelmed or limited to incomplete solutions. The division of labor within agencies can result in programs operating independently of one another and separated from perspectives of other sectors. This unavoidably leads to gaps and overlaps. Unique solutions for each problem are neither feasible nor effective (5). Pressures such as climate change, urbanization, and global travel and trade have created new dynamics in

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which the health of humans, animals, and our environments are inextricably interconnected at unprecedented scales. These pressures are amplifying existing problems (*e.g.,* expanding ranges of vector-borne diseases) and causing new health threats (*e.g.,* heat domes and pandemics). Changing environmental conditions are producing shifts in social and environmental determinants of health that are leading to health crises.

Public health is incorporating more facets of practice that do not require the traditional training and certification to better address these crises. Although the response to global health threats continues to gain momentum, some believe that the current public health approach is not future ready (6). There are many opportunities to evolve public health to address mounting environmental health challenges. However, there are also extreme challenges such as a backlogs of funding needs, a global pandemic, preventable chronic disease epidemics, and inequities that threaten health and well-being. Regardless, the combination of public health crises like extreme weather events and epidemics plus the current high profile of One Health may provide a unique opportunity to reorient how public health engages in intersectoral collaborations with animal health and environmental health sectors.

What type of One Health is needed?

One Health can be placed into 2 broad themes. In 1 theme, the "One" in One Health is us. The intersectoral actions in this theme aim to prevent, dampen, or respond to human health threats arising from environmental and animal factors or, less often, to promote environmental services or assets that support human health. An inter-agency salmonellosis outbreak investigation is an example, as is a farm-to-fork food safety program. I call this theme "revitalized veterinary public health" — revitalized in the sense that it is concerned not just with the animal risks to public health risks but also the health promoting interconnections among humans and animals in a shared environment. I retain the term "veterinary public health" because many actions under this theme target classic veterinary public health issues, *e.g.,* zoonotic disease control, antimicrobial resistance management, or food safety. This is the form of One Health most frequently engaging the public health sector.

In the other theme, the "One" in One Health is the single healthy setting shared by humans and other organisms. These settings can range from local to planetary levels. For example, it can involve pesticide policies that concurrently protect farm workers, non-target insects, native flora, and wildlife or it could be a regional climate change strategy that uses local biodiversity protection to build community resilience. This theme can be conceived as an expansion of the healthy settings approach used in human health promotion but integrates action across risk factors that extend beyond human ecology and social determinants. Both themes can be implemented with a low diversity of partners (*e.g.,* a public health inspector and a veterinarian talking about a rabies exposure) or extensive partnerships (*e.g.,* wildlife co-management boards that work with communities to address rural food security and cultural integrity). International calls for "more One Health" to address global health issues usually align with the healthy settings conceptualization.

Regardless of the chosen One Health taxonomy, intersectoral actions are generally needed:

i) when programs are unable to address health challenges on their own;
ii) to improve coherence in addressing health challenges across sectors; and
iii) to increase and mobilize resources dedicated to improving health.

Table 1 overlaps these needs with the 2 taxonomies to illustrate the current diversity in One Health practice.

These proposed One Health taxonomies accommodate 5 questions relevant to public health:

i) how does animal health influence public health;
ii) how do the interactions of animal health and ecological health affect ecological services that influence environmental justice or intergenerational access to resources for well-being;
iii) how do non-animal environmental determinants of health influence public health outcomes;
iv) how does ecological health influence access to and sustainability of environmental determinants of health; and
v) how does the socio-ecological systems in a setting influence health and ecological justice?

In the backdrop to each of these questions is how community behaviors, politics, economic extraction, and population expectations impact outcomes.

One Health shares many perspectives and methods used in population health practice, health promotion, and global health. The fundamental difference should be the explicit attention to other species and the view of environments and ecosystems as entities deserving care and not just as economic resources or sources of threats for humans. Too often, public health practices, including veterinary public health, have viewed animals or environments primarily as sources of harms or hazards such as pathogens or contaminants. One Health can remain firmly human-centric in its attention to societal and individual health and well-being but can simultaneously recognize that protecting human health comes from protecting animal and ecosystem health.

The reason to belabor this description of One Health is to emphasize that it is not one thing. The flexible definition and implementation of One Health provides adaptability to different public health context, scales, needs, and objectives; however, it makes it difficult to make a list of standard procedures and protocols to follow that allow a public health unit to declare "we are doing One Health."

What impedes adoption of One Health in Canadian public health practice?

Although One Health is not widely known among public health workers, its holistic and systems-based principles are consistent with public health values and experiences (7). There is a long-standing agreement that many determinants of health are influenced outside of the legislatively defined health sector. This predisposes public health practitioners to see the benefits of cross-sectoral programs and actions taken outside of the public

Table 1. A One Health taxonomy with illustrative examples to characterize the diverse scope of problems and practice at the human-animal-environment health interface.

	One Health themes			
	Revitalized veterinary public health		One healthy setting	
Intersectoral need	Low diversity	High diversity	Low diversity	High diversity
Unable to address a health challenge on their own	Using animal health information in a health impact assessment to document presence or effects of contaminants	Integrated vector-borne pathogen surveillance tracking weather, vectors, animal, and human data	Pandemic hotspot detection and monitoring	Multi-sectoral advocacy for multi-solving climate change adaptation policies and investment
Coherence in addressing health challenges that cross sectors	Rabies control programs	Cross-sectoral antimicrobial resistance prevention and control strategies	Point source pollution control to reduce exposures for humans and lake biota in drinking water supplies	Identifying and protecting agricultural land to improve food security and rural income opportunities
Increase and mobilize resources for improving health	Shared cold chain resources to deliver human and animal vaccines in low resource settings	Investment in animal health to stabilize food security and safety in low- and middle-income settings	Combining urban wildlife ecology and urban planning to formulate rodent control programs in inner city areas	Managing watershed ecosystem health to provide water source protection, recreation opportunities, and biodiversity refuges

health sector. Despite this predisposition, there are practical impediments to bringing more One Health into practice.

Overload

COVID-19 has put profound and continuing pressure on public health systems. It will drive priorities for the foreseeable future. Amidst the pandemic, Canada suffered record numbers of drug overdose deaths, fatal heat domes, worsening mental health, and devasting forest fires and floods. These added to the ongoing burden of chronic diseases, an antimicrobial resistance pandemic, and inequitable social determinants of health. On top of these are the ongoing demands for health protection activities to safeguard food and water, ensure safe housing, and control endemic communicable diseases. This workload leaves little room to be part of new intersectoral programs.

Workforce crisis

A workforce crisis has been in the making for $>$ 2 decades (8). It has been exacerbated by COVID-19 burnout and the exodus of unsatisfied or retiring workers. With fewer workers and loss of institutional memory, the challenges of building back from the pandemic while preparing for the next pandemic and tending to a long list of present problems leaves fewer public health workers with time to think about, let alone be part of, new One Health initiatives.

Legislative boundaries

Day-to-day public health functions, such as surveillance, inspections, or investigations, are still siloed (9). Legislated boundaries can discourage or prevent working across sectors and make it easy for a practitioner to view actions or information outside of their scope of practice to be someone else's responsibility. Few legislative mechanisms pave the way for inter-sectoral collaboration.

Confusion

The adaptable and fluid definition of One Health creates confusion as to what it is and how it differs from concepts such as veterinary public health or planetary health (7). The bulk of One Health focusses on zoonotic diseases (10). This can limit the perceived relevance of One Health, especially to frontline public health workers. Zoonotic infections contributed a relatively small amount to Canadian burdens of illness as opposed to many countries in which zoonoses still shape health and well-being. Most zoonotic diseases confronting Canadian frontline public health practitioners can be rectified without tending to animal or environmental drivers. In cases in which this is not true, frontline workers turn to veterinary resources for assistance. When problems occur beyond the local level (*e.g.,* the provincial level) public health routinely assembles cross-sectoral groups. This routine use of collaborations and partnerships can make it difficult to see the value added in One Health.

Social determinants bias

The 2008 WHO report (11) on social determinants of health has shaped public health practice. However, this came at the cost of inattention to the environment as a positive determinant of health. Until recently the word "ecology" in the human health sector usually referred to the social or societal environment of a patient, with limited reference to non-human environments and ecosystems (12). Intersectoral approaches in human health have typically focused on social determinants of health.

Population health impacts of healthy ecosystems are large compared to impacts of the social determinants of health, yet the ecological determinants have received considerably less attention (13). There is little evidence that the Canadian health sector systematically partners with others to protect biodiversity and ecological integrity as part of community resilience policies or programs.

Evaluation gap

One Health evaluations often focus on resource use efficiency or capacity to find early warning signals rather than public health outcomes. This complicates attempts to convince managers to shift resources to One Health initiatives when faced with a wide range of underfunded public health crises and limited resources to tend to routine practices.

Next steps

In the second essay of this 2-part piece, I explore opportunities that One Health programs could exploit to overcome some of these obstacles and begin to develop more obvious co-benefits to humans, animals, and environment through more sustained engagement with public health. I will also explore necessary changes within the One Health community to ensure transformative changes that address the needs for health of all species and generations.

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