Implementing One Health as an integrated approach to health in Rwanda

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Implementing One Health as an integrated approach to health in Rwanda


ABSTRACT
It is increasingly clear that resolution of complex global health problems requires interdisciplinary, intersectoral expertise and cooperation from governmental, nongovernmental and educational agencies. ‘One Health’ refers to the collaboration of multiple disciplines and sectors working locally, nationally and globally to attain optimal health for people, animals and the environment. One Health offers the opportunity to acknowledge shared interests, set common goals, and drive toward team work to benefit the overall health of a nation. As in most countries, the health of Rwanda’s people and economy are highly dependent on the health of the environment. Recently, Rwanda has developed a One Health strategic plan to meet its human, animal and environmental health challenges. This approach drives innovations that are important to solve both acute and chronic health problems and offers synergy across systems, resulting in improved communication, evidence-based solutions, development of a new generation of systems-thinkers, improved surveillance, decreased lag time in response, and improved health and economic savings. Several factors have enabled the One Health movement in Rwanda including an elaborate network of community health workers, existing rapid response teams, international academic partnerships willing to look more broadly than at a single disease or population, and relative equity between female and male health professionals. Barriers to implementing this strategy include competition over budget, poor communication, and the need for improved technology. Given the interconnectedness of our global community, it may be time for countries and their neighbours to follow Rwanda’s lead and consider incorporating One Health principles into their national strategic health plans.

WHY ONE HEALTH?
One Health refers to the collaboration of multiple disciplines, sectors and groups working locally, nationally and globally to attain optimal health for people, animals and the environment. Recent examples of new and emerging diseases in animals and humans (Ebola, Middle East respiratory syndrome, avian flu (H5N1), swine flu (H1N1), severe acute respiratory syndrome) show how quickly balance changes and how vulnerable humans, animals and crops are to disease outbreaks. Infectious diseases are transmitted between humans and animals by a variety of routes including direct contact (rabies), the environment (anthrax), via food (campylobacter/salmonella/brucella/bovine...
tuberculosis), or through bites by arthropod vectors (malaria/leishmaniasis/Rift Valley fever). As we have recently seen with the Ebola and Zika outbreaks, in our interconnected world, an animal pathogen can catch a ride on the sole of a shoe, beneath a finger nail, or in respiratory passages, and travel from one remote corner of the globe to another in less than a day. Furthermore, zoonotic illness is not a small or insignificant problem; the majority of human pathogens are zoonotic (60%) and three-quarters of new and emerging pathogens are zoonotic from wildlife species. However, One Health, which is larger than simply zoonosis (other examples include land use, water toxins, forest degradation and climate change (see online supplementary appendix A)), can have a great impact on people and the quality of their lives as well as local and national economies.

Although perhaps the most discussed, infectious diseases are not the only relevant One Health concerns affecting the globe. Waste dumped in or near water bodies is not the only relevant One Health concern of their lives as well as local and national economies. A), can have a great impact on people and the quality of their lives as well as local and national economies.

ONE HEALTH IN RWANDA
Known as ‘the land of 1000 hills’, Rwanda has a north-south mountain range, various water sheds, rain forests and grazing lands. The nation confronts various challenges: energy sustainability, natural gas extraction from beneath Lake Kivu, a growing population, land degradation, crop raiding, wildlife poaching; a loss of biodiversity, conversion of forests to farm land and the risk of soil overexploitation; and climate change resulting in an increasingly variable rainfall. In addition, Rwanda is one of the most densely populated (415 people/square mile) countries in the world, where One Health disasters can quickly affect large populations. Further, areas with high population density are more prone to food insecurity, soil erosion, decreased grazing lands, and forest degradation, which in turn leads to increased food insecurity and other measures of poor health.

The eastern part of Rwanda is home to pastoral communities, which move from place to place in search of water and pastures to feed their animals. Movement is not limited to the national borders, thus pastoralists are at risk of picking up animal pathogens that can be disastrous to the livestock population in Rwanda such as foot and mouth disease and contagious bovine pleural pneumonia, both of which have become endemic.

These diseases have high mortality and thus affect food security and the economic well-being of these nomads. Contagion between animals (wild and domestic) and humans does not happen in only one direction. In 2011, one of the mountain gorillas, which provide large eco-tourism revenue for Rwanda, succumbed to a human virus (human meta-pneumovirus) passed on by a tourist.

Through these experiences, Rwanda has learned that the eradication of hunger through initiatives such as Girinka (one cow per family (see online supplementary appendix B)), improvements in public health indicators (eg, improved maternal health, reduction in HIV, reducing malaria and other vector borne illnesses), and environmental sustainability all depend on interdependent systems, shared responsibility, involvement of the community, and collaboration across government agencies, content specialists and policies—all ideas embodied by One Health, a burgeoning global approach to integrated health. The government of Rwanda has therefore framed policies and priorities to drive toward an integrated, holistic-system approach to promoting health. Moreover, it has led to the adoption of the One Health approach by the East African Community, and Rwanda is also working with its neighbours to address regional issues that recognise the inextricable connection between the health of the country’s people, animals and environment and the importance of this interconnection in development. The concept and approach of One Health provides an opportunity for the Rwandan government to expand its reforms to address important interdisciplinary, intersectoral health problems and work to meet the Sustainable Development Goals.
Objective 1: Rwanda’s government response

Rwanda’s One Health response (table 1) goes beyond the traditional approach of disease surveillance, outbreak investigations and response. It also includes new competencies around leadership/governance, efficiencies in resource utilisation, disaster management, delivery of healthcare, systems-related approaches, and vigorous attention to training for life-long learning. In the past, the Ministry of Health, the Ministry of Agriculture and Animal Resources, other government organisations, academic institutions and NGOs had separate roles with little overlap. Despite limited resources, Rwanda’s One Health approach is intended to develop collaborative leaders committed to improving health equity and social justice by addressing health disparities that impact on efficiency by promoting shared resources and collaboration among those working at the animal (wildlife, livestock and companion animals), ecosystem and human health interface.

Objective 2: Rwanda’s One Health community response

Another important goal of Rwanda’s One Health Strategy is to empower and mobilise various experts and lay workers and establish a One Health workforce to prepare, coordinate and manage epidemiological outbreaks of infectious, toxic or environmental health concern or health events. For example, the Rwandan strategic plan requires the inclusion of veterinarians, wildlife experts and environmental experts who work on emergency management committees. Similarly, disease surveillance of both zoonotic and potential zoonotic disease is monitored by a multidisciplinary team. This is a bottom-to-top approach that involves community health workers (CHWs), community-based animal health workers, NGOs, health clinics, hospitals, park rangers, farmers and domestic animal owners. These experts are prepared and trained to act rapidly and collaboratively given evolving information.

One idea moving forward is to create a hub-and-spoke network using the nearly 45 000 CHWs (spokes) linked to hubs (centres of expertise) through mobile phone technology. Perhaps one day the CHWs will be rebranded ‘One Health CHWs’ (OHCHWs) given that they are well situated to quickly identify unusual events or problems affecting humans, animals or ecology/ agriculture. Hub centres would be connected via the internet to district centres and eventually to a central repository and command centre. OHCHWs would routinely collect local information on the health of humans, animals and crops and notify hub centres when there are sudden changes or concerns.

Objective 3: Rwanda’s One Health educational (academic) response

Interprofessional team work and collaboration such as that mentioned above has the best chance of becoming routine if education and training starts early and focuses on core competencies that stress problem solving, teamwork, leadership, creativity, conflict management, communication, project management, transparency and outcomes. However, despite extensive capacity-building efforts in Rwanda, there remains an undersupply of physicians, veterinarians and environmental scientists. To combat this problem, several colleges and universities have recently coalesced into the University of Rwanda to improve opportunities for interprofessional training, interdisciplinary scholarship and research innovation.
and work force expansion. Harmonisation of the environmental health programmes offered by the old veterinary college and the old ‘human health sciences’ college has now provided another great opportunity to articulate One Health as a cross-disciplinary approach.

As a start, Rwanda has created a One Health curriculum embedded in its Master of Global Health Delivery programme which integrates collaborative problem-solving approaches with elements of infectious disease, epidemiology, ecology, environment, finances, food safety and leadership. Plans are also underway to integrate One Health modules into the Master of Public Health and Epidemiology courses, developing a 1-month community-focused field boot camp in 2017 to

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<th>One Health strategic objectives</th>
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| 1 (government level): promote and strengthen interdisciplinary collaboration to promote a One Health approach | ▶ Improve communication and interactions between ministries responsible for animal, human and environmental issues and regional agencies  
▶ Engage in One Health strategic planning focused on systems-thinking that considers the diverse range of complex and inter-related One Health issues impacting on animals, human health and the environment at the local, national and international level  
▶ Collaborate with the East African Community to expand the One Health concept across the region, given that toxins, infections and environmental degradation do not respect political borders  
▶ Provide financial incentive and support for One Health initiatives to incentivise collaborative problem solving |
| 2 (community/NGO level): strengthen surveillance, prevention, early detection, rapid response, and control of zoonosis in both animals and humans | ▶ Improve the capacity within Rwanda to conduct community surveillance, treatment and monitoring of outcomes of One Health problems including emerging and re-emerging zoonotic diseases, neglected diseases, and other public health events of international concern that pose a threat to human health  
▶ Introduce technologies including computers, mobile phone data collection applications, and tele-conferencing to improve detection, monitoring and intervention related to One Health problems at the community level  
▶ Promote timely and goal-directed communication between local communities, ministries, NGOs and neighbouring nations |
| 3 (academic level): build capacity and promote applied research at the human, animal and ecosystem interface | ▶ Improve training capacity of both professionals and mid-level providers to develop skills necessary to identify, monitor and respond to One Health problems that may cross outside of their area of expertise  
▶ Modify health science and environmental training programmes/curriculum to promote graduation competencies related to collaboration and cross-disciplinary problem solving  
▶ Develop training programmes for existing professionals to promote the sharing of knowledge, skills and resources to address current and future One Health needs  
▶ Train, keep current and incentivise One Health problem solvers to stay in Rwanda. Despite the huge investment of national resources, it is not unusual for trained health experts to leave the country for economic gain or even be pulled away for other national service  
▶ Protect national resources include the gorilla population and other wild animals that could be damaged by exposure to life-threatening human infectious diseases |
further train animal–human–ecosystem providers in inte-
grated problem solving, leadership and communication
skills related to One Health. Finally, a vibrant One
Health students’ club for undergraduates was established
in 2012, the first of its kind in the region, that links virtu-
ally with other health sciences schools around the world
who share a commitment to learning related to One
Health. It consists of students from veterinary medicine,
environmental health, nursing, medicine and agricul-
ture. The goal of the club is to bring One Health skills,
approaches and attitudes to a new generation of scient-
ists and problem solvers who will embrace the import-
ance of working together to serve the community rather
than working in silos.

**ENABLERS OF AND BARRIERS TO IMPLEMENTING ONE
HEALTH IN RWANDA**

While Rwanda has been forward thinking in developing
a One Health-focused national strategic plan, several
important factors have enabled this innovative change.
Following the 1994 genocide, Rwanda has benefited
greatly from two decades of social and political stability
from transparent governance with local, regional and
national representation. The elaborate network of
CHWs has been a key element in primary healthcare
delivery. Rwanda’s rapid response teams previously devel-
oped in response to outbreaks of Ebola and yellow fever
in neighbouring Uganda and the Democratic Republic
of Congo are now being used to address other One
Health problems by coordinating surveillance, informa-
tion sharing, and planning of risk reduction and
communication.

The country also benefits from many international
academic partnerships involving medicine, public
health, veterinary medicine, agriculture and the environ-
ment. However, until recently, most of these partnerships
were solitary and often focused on one disease or a
narrow sub-population. In the new model, driven by the
One Health strategic plan, interventions are highly coor-
dinated. Finally, within Rwanda there is relative equity
between female and male health professionals, making
it easier to address important gender and cultural issues
relevant to improving One Health.

Resolution of One Health problems often pits one dis-
cipline or sector against another with resultant percep-
tions of ‘winners’ and ‘losers’, at least in terms of
resources. Other barriers that need to be overcome
include a lack of experts trained in a One Health
approach, competition for government resources, battles
over curricular time in training programmes, issues
related to licensing and certification, and interdiscipli-
ary turf wars. There has long been a need to develop
infrastructure such interdisciplinary laboratories and
structures that promote interdisciplinary, interministerial
 collaboration focused on problem solving (eg, child-
hood diarrhoea linked to bovine mastitis). In Rwanda,
the key ministries related to One Health have already
coalesced to form a ministerial ‘Social Cluster’ which
meets monthly, with the goal of ensuring that there is
little competition for resources between ministries and
that shared issues are addressed collectively. However,
additional efforts to create a robust infrastructure that
would support collaboration and interdisciplinary train-
ing would further enable Rwanda’s One Health
response.

The One Health approach is in evolution and will still
require a cultural shift in Rwanda as power and organisa-
tional structures become realigned to provide new
reporting structures, new offices, new education and
new lines of communication. Moving forward, Rwanda’s
government needs to fund the implementation and
embrace the concept of ‘oneness’ such that the separate
ministries can develop common policies, approaches
and evaluations that can feed into action plans and
improved health infrastructure such as providing better
equipped laboratories and data tracking. Academics
need to think beyond the traditional silos (medicine,
public health, veterinary medicine, engineering, etc) in
ways that will stimulate innovation and encourage
problem solving.

**CONCLUSION**

As in most countries, the health of Rwanda’s people and
its economy are highly dependent on the health of the
environment. One Health offers the opportunity to rec-
ognise shared interests, set common goals and drive
toward team work to benefit the health of a nation.
Rwanda’s One Health approach provides innovations
that are important to both acute (disaster or emerging
zoonotic disease) and chronic (animal, human and eco-
system) health problems and offers synergy across
systems, resulting in improved communication, develop-
ment of a new generation of systems-thinkers, improved
surveillance, decreased lag time of response, and
improved health and economic savings. Given the inter-
connectedness of our global community in which
humans, animals and the environment impact on each
other and do not respect geopolitical boundaries, it may
be time for all countries and their neighbours to follow
Rwanda’s lead and consider incorporating One Health
principles into their national strategic health plans.

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