



THE UNIVERSITY OF BRITISH COLUMBIA



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A Comparative Analysis of One Health Policies in Asia: Opportunities for Application in British Columbia

GLOBAL POLICY PROJECT

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List of Abbreviations

AMR	Anti-Microbial Resistance
APHC	Animal & Plant Health Center
BCCDC	British Columbia Centre for Disease Control
BCMAFF	BC Minister of Agriculture, Food and Fisheries
BCMECCS	BC Ministry of Environment and Climate Change Strategy
BCMOH	BC Ministry of Health
BCMOF	BC Ministry of Forests, Lands, Natural Resource Operations
CAOHRPA	Centre for Applied One Health Research and Policy Advice
CAVS	Animal & Veterinary Services
CFIA	Canadian Food Inspection Agency
CUOH	Coordinating Unit for One Health
FAO	Food and Agriculture Organization
ICDDR	International Centre for Diarrhoeal Disease Research
INGO	International Non-Governmental Organization
NPHL	National Public Health Laboratory
OH	One Health
OHCC	One Health Coordinating Committee
RVC	Royal Veterinary College
SEAOHUN	Southeast Asian One Health University Network
THOHUN	Thailand One Health University Network
UNICEF	United Nations Children's Fund
USCDC	United States Centre for Disease Control
WHO	World Health Organization





EXECUTIVE SUMMARY

The health of people is deeply intertwined with the health of animals and our shared environments. Three-quarters of emerging viruses and diseases that impact humans come from our interactions with animals¹. Further, climate change is increasing our exposure to health risks by making the relationship between humans, animals, and the environment more complex and constantly evolving. The ensuing increase in the frequency of global health outbreaks, such as COVID-19, signals the need for a more holistic approach to addressing shared challenges.

Emerging out of these conversations is the concept of One Health, a collaborative and multidisciplinary approach that recognizes human, animal, and environmental health cannot be separated. One Health requires breaking down silos between the three health sectors to more effectively address zoonotic diseases, anti-microbial resistance, food safety and security, environmental contamination, and other shared threats. British Columbia has yet to formally adopt a One Health approach to policymaking and faces barriers to cooperation, communication, and collaboration across sectors, which reduces the province's ability to respond to serious and wide-reaching outbreaks. One Health efforts instead occur in isolated pockets across the province, often by way of research projects that do not always translate into policy action at the government level. British Columbia will need to overcome these barriers to fully realize the benefits of a One Health approach and effectively prevent the next pandemic.

POLICY ANALYSIS OF ONE HEALTH IN ASIA

Our project intends to motivate action towards implementation of One Health in British Columbia by drawing lessons from Asia. Working closely with the British Columbia-based genomics and health-research non-profit organization, Genome BC, we were specifically interested in the processes and mechanisms in which research can inform policy solutions across ministries and other multidisciplinary spaces including universities and research organizations that seek to address public health challenges. For this, we looked to jurisdictions with prior experience in adopting the One Health approach, specifically **Bangladesh, Hong Kong, Singapore, and Thailand**.

Our project seeks to determine:

- who is currently involved in One Health networks;
- the ways in which research can support decision-making efforts;
- the funding models for One Health mechanisms; and
- the potential strengths and weaknesses of different approaches to One Health.

We conducted a comparative analysis across these four jurisdictions in Asia to explore the relevant policy insights that could be applicable to the British Columbia context. In doing so, we engaged in 13 interviews with experts and leaders in One Health across Asia and British Columbia, complimented by a literature review on One Health reports, strategic action plans, and academic articles.

KEY INSIGHTS

Despite their different approaches to One Health policies, all four jurisdictions in Asia presented three key characteristics that shaped their One Health policy development:

- inter-ministerial coordination is crucial for successful implementation of One Health policies;

-
- all jurisdictions employed a national strategic action plan that called for the One Health concept to guide decision-making; and
 - experts in all jurisdictions emphasized the importance of flexibility in working relationships in operationalizing One Health on a day-to-day basis.

MOVING TOWARDS ONE HEALTH IN BRITISH COLUMBIA

Adopting a One Health approach in British Columbia is an important step towards improving the overall health and well-being of humans, animals, and the environment. Yet the success of One Health is dependent on the province's ability to overcome siloed approaches to addressing increasingly complex challenges. The following recommendations were developed from insights on 'good practices' demonstrated in the four Asian jurisdictions to guide British Columbia's efforts in establishing One Health policies.

Since Genome BC is a longstanding player in advocating for health improvements across BC and can leverage strong channels of communication with the provincial government, we designed recommendations for Genome BC to implement internally, as well as recommendations for them to bring to the government. The goal of these recommendations is to improve coordination, information sharing, and funding between ministries and stakeholders to ensure better preparedness and response to emerging health challenges.

Our recommendations to Genome BC are:

1. Create a university network across British Columbia institutions to help integrate research efforts, thus ensuring One Health development and advancement.
2. Channelize funding to projects with applied research focus (i.e., projects with practical outcomes) to ensure optimum utilization of funding while ensuring quality research and One Health advancement in BC.

Recommendations for Genome BC to advocate to the Government of British Columbia are:

1. Create a coordinating committee amongst relevant ministries, which would act as a steering body for One Health development and implementation across the province.
2. Promote One Health education and professional training across post-secondary institutions to build capacity amongst future generations.
3. Develop a national strategic action plan that lays out the guiding principles and values of a One Health approach, including cooperation, inclusivity, and equity.



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CHAPTER 1: ABOUT US

THE CLIENT

Genome BC is a non-profit organization supporting genomics research in British Columbia, Canada, and beyond. Genome BC drives the responsible uptake of genomics to pressing social and economic challenges and invests in research that aligns with the needs of areas of strategic importance to British Columbia including human health, animal health, and the environment. Genome BC works collaboratively with government, academia, and industry to transform research and knowledge into action that can ultimately benefit British Columbians and Canadians. Genome BC is actively engaged in the One Health sphere. In 2020 Genome BC initiated a pilot project that surveilled COVID-19 in farmed minks to help prepare and build capacity for future pandemics. Genome BC also funds One Health projects examining SARS, norovirus, avian flu, and COVID-19 with the goal to provide powerful cross-disciplinary surveillance tools to help identify and mitigate risks.



THE PROJECT TEAM

We are a team of highly engaged policy makers from the University of British Columbia's Master of Public Policy and Global Affairs program. We hail from a diverse set of academic and professional backgrounds including global development, immigration and refugee policy, public health, nutrition, and business.



[Benedetta Beltramo](#)

Benedetta (Benni) Beltramo holds extensive academic and professional experience in immigration policy and public health policy. As an immigrant to Canada, Benni has become passionate about immigration issues across the globe and has gained experience working in the legal sector for immigration law as a legal assistant and case manager. As a second-year student in the MPPGA program, she is determined to continue building her skills to properly analyze current policies and drivers of policy change in areas of public health policy, immigration policy, and sustainable development.



[Soumya Kolluru](#)

Soumya has experience working in India's development sector in the nutrition and public health domain. She was part of the signature fellowship program of Tata Trusts (India's largest philanthropic organization) and the Ministry of Women & Child Development, Government of India, to implement the National Nutrition Mission in India's backward districts. Her grassroots level experience in public health and nutrition and academic training in policy studies focused on development and sustainability kindled in her an interest to delve deep into the current project.



[Lisa Slager](#)

Lisa has experience working in the legal sector for corporate and immigration law and is a Board Member for a grassroots non-profit that fosters capacity-building amongst Indigenous weaving communities of the Peruvian Andes. Currently, Lisa is focused on the role public policy plays in promoting positive human interactions with their social, cultural, and economic environments, specifically how social enterprises can be employed to achieve enhanced sustainable development.



[Lindsey Wall](#)

Lindsey is a public health professional whose work has taken her far and wide, including to northern British Columbia to explore the impact of changing environments on women's pregnancy and childbirth experiences, and to Kampala, Uganda to improve youth access to sexual and reproductive health services. Most recently, Lindsey spent four years in the non-profit sector delivering social programming to high-risk children and youth in the Lower Mainland with Boys and Girls Clubs of South Coast BC. Lindsey currently works as a Development Officer at Global Affairs Canada and is passionate about public health policy and its role in international development.



CHAPTER 2: BACKGROUND

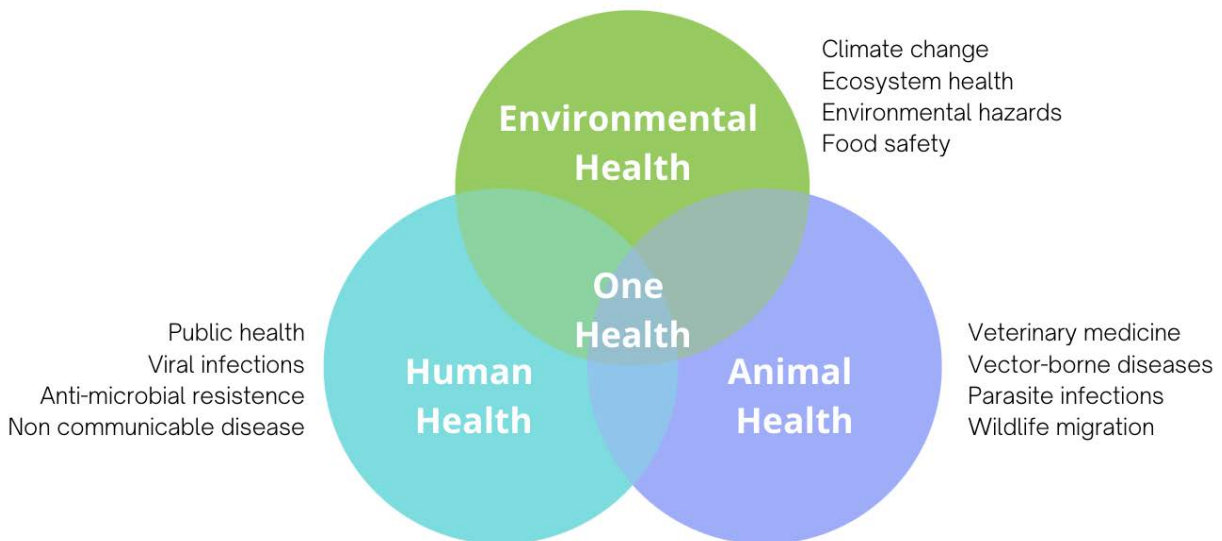
WHAT IS ONE HEALTH? EMERGING GLOBAL CHALLENGES

At the time of writing this report we continue to navigate a global health pandemic. SARS-CoV-19 ('COVID-19') has made it ever more apparent that there are significant health consequences to our interactions with animals and our environments. It is estimated that 75% of emerging infectious diseases are zoonotic in nature (diseases that spread between animals and people), infecting millions of people around the world every year². There are wide and heavy costs to these outbreaks; COVID-19 has resulted in nearly 6 million deaths to date³, spread to over 200 countries, and is expected to generate a global economic toll over \$12.5 trillion by 2024⁴.

In response to challenges that intersect humans, animals, and environments, there is growing international pressure to adopt 'One Health' approaches. Although there is no singular definition of One Health used around the world, the World Health Organization (WHO) defines it as an "an approach to designing and implementing programmes, policies, legislation and research in which multiple sectors communicate and work together to achieve better public health outcomes"⁵. In its most basic form, One Health places an emphasis on the interdependencies between human, animal, and environmental health. Recognizing that a single sector or siloed approach cannot solve complex and multifaceted issues, One Health is collaborative in nature and requires inter-disciplinary inputs to detect, prepare, prevent, and respond to these challenges. Examples of issues currently being addressed by One Health are:

- Zoonotic diseases (e.g., COVID-19, 'mad cow disease', Avian influenza)
- Anti-microbial resistance (e.g., salmonella)
- Food safety and food security (e.g., sustainable agriculture)
- Vector-borne diseases (e.g., West Nile, Lyme disease, malaria)
- Environmental contamination (e.g., pollution, waste management)
- Mental health (i.e., our relationships with animals and the natural world)⁶

Image 1. 'One Health' at the Intersection of Human, Animal, & Environmental Health



A CASE FOR ONE HEALTH IN BRITISH COLUMBIA

Traditionally, One Health has been used to address local and regional health challenges emerging from the human-animal-environment interface, such as outbreaks of Malaria, Ebola, and Avian influenza. British Columbians may not see high rates of these types of diseases as experienced elsewhere in the world, but within the last decade we have still been forced to grapple with West Nile, ‘mad cow disease’, and the current COVID-19 virus. These events have exposed the ways in which animal-to-human diseases can either emerge locally or transcend borders.

Risks are further exacerbated by climate change, which continues to shift the range of organisms we encounter and the emergence of diseases in places we may not have previously anticipated⁷. Viruses continue to evolve in response to human, animal, and environmental interactions. Genomics helps us understand these interactions better. **It is no longer a question of whether there will be another major global pandemic, but rather *when it will occur, and whether we will be prepared for it.***

One Health efforts are already emerging in British Columbia. There are leading representatives in genomics and clinical health research who are working closely with key government ministries on One Health frameworks and the economic feasibility of such an approach. There are also project-based One Health approaches to policy change. One such example is highlighted in the November 2021 announcement by the British Columbia government regarding their decision to permanently phase out the mink farming industry due to the “ongoing public-health risks associated with COVID-19”⁸.

However, there are still challenges to overcome when adopting One Health policies in British Columbia, such as:

- isolated project-specific efforts and difficulty scaling-up efforts to be formally institutionalized in government;
- difficulty in coordinating across sectors and agencies due to differing priorities, funding, resources, and data and information systems;
- a lack of shared knowledge across disciplines to assess and respond to risks, including the ways these risks affect humans, animals, and the environment;
- an absence of a uniform definition of One Health used across disciplines and sectors; and
- a lack of recognition or understanding of the importance of such an approach.

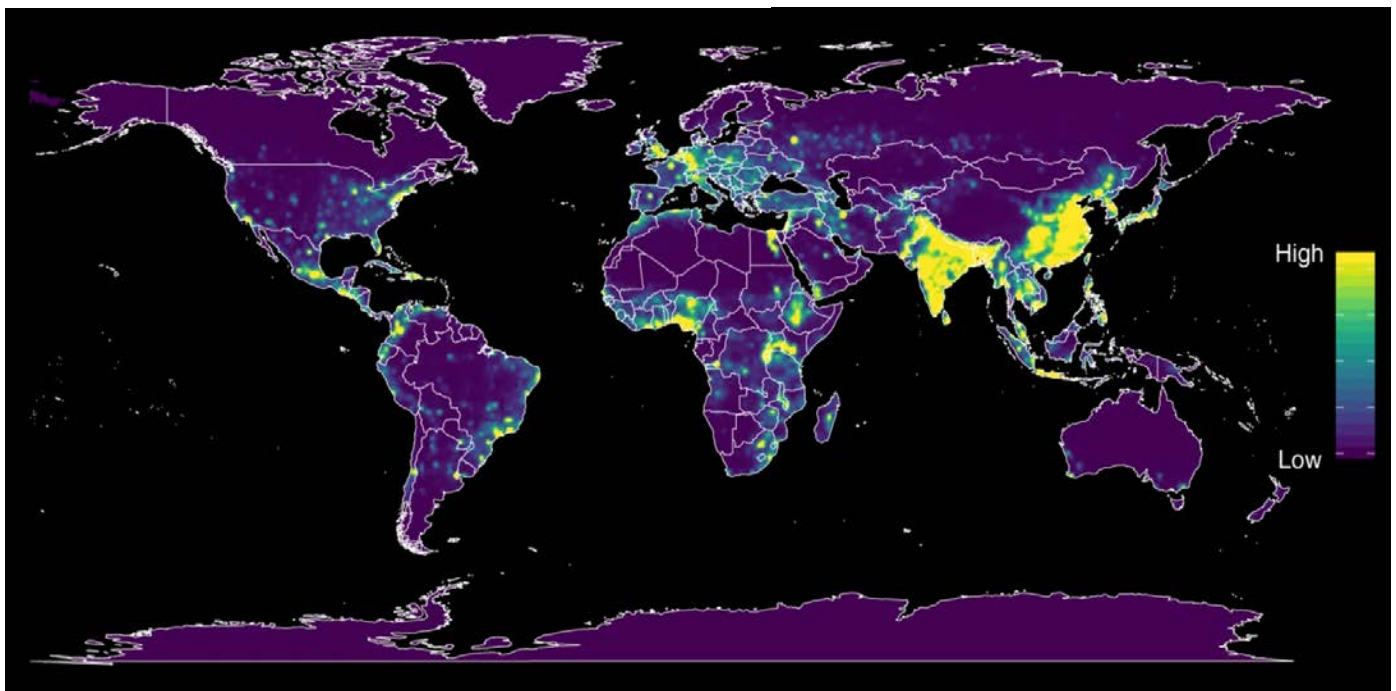
Despite these challenges, adopting One Health has immense benefits, including increased information sharing, interdisciplinary efforts in education, research, and policy, more resilient responses to shared risks, and increased opportunities for promoting health across the One Health triad. This project sought to understand these challenges better and to look for ways to address them.

LOOKING TO ASIA FOR 'GOOD' PRACTICES

In order for British Columbia to better prepare for future global health emergencies and manage ongoing pandemic issues, the province needs to overcome existing challenges by implementing a One Health approach. One way to do this is to find inspiration in ‘good’ One Health practices amongst countries with existing One Health policies. Our project explores this pathway by offering a comparative analysis of One Health policies in Asia.

Why Asia? Globally, Asia is home to most emerging infectious diseases. The map below represents the probability of future zoonotic disease outbreak intensity across all countries⁹. Asia in general – and the Southeast Asian Region specifically – have witnessed multiple outbreaks of new viruses in recent history (e.g., Avian influenza, Swine influenza), resulting in functional and decade-long One Health policies in response to these health challenges¹⁰. Lessons and insights can be drawn from policies across Asian jurisdictions to strengthen British Columbia’s approach to One Health. Thus, for the scope of our project, the Asian region was selected for case comparison purposes.

Image 2. Emerging zoonotic diseases around the world



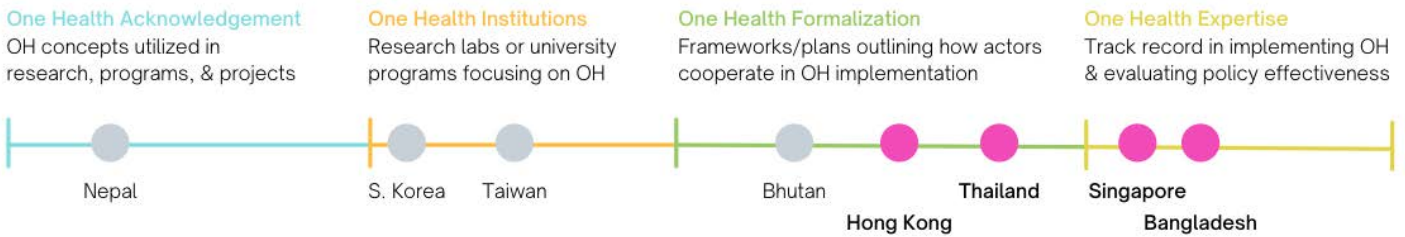
Source: <https://www.nature.com/articles/s41467-017-00923-8>

The level of sophistication of One Health policies among countries in Asia varies extensively. Countries like Bangladesh and Hong Kong have highly sophisticated One Health policies in place, whereas countries like Nepal and South Korea are only just beginning to institutionalize their One Health approaches. For case study purposes, we aimed to select **four countries** that demonstrate the highest level of sophistication in terms of One Health policy implementation. In this regard, ‘sophistication’ was determined as the presence of all or most of the following features:

1. **Inter-ministerial coordination:** One Health, by definition, is a multi-disciplinary approach. Hence, inter-ministerial coordination amongst various government sectors is crucial for successful implementation of One Health policy. Inter-ministerial mechanisms exist in Bangladesh, Singapore, Hong Kong, Thailand, and Bhutan.
2. **National ‘strategic plan document’:** A strategic plan document acts as the guiding framework for conducting One Health research, implementing policy, and evaluating results based on pre-determined targets. Plans exist in Bangladesh, Singapore, Hong Kong, Thailand, Bhutan, and Nepal.
3. **One Health research & laboratories:** All jurisdictions conduct health research, but not all have labs explicitly dedicated to One Health. Hong Kong and Singapore have dedicated One Health labs at the national-level One Health and Bangladesh has a One Health lab within their broader International Centre for Diarrhoeal Disease Research (ICDDR) framework.

4. **Training programs:** Training programs equip professionals with skillsets and knowledge specific to One Health approaches. All jurisdictions, apart from Taiwan and South Korea, have educational and vocational programs to train human, animal, and environmental health professionals (e.g., epidemiologists, veterinarians, government policy officers) on the principals of One Health.

Image 3. Sophistication of One Health Policies in Asia



Based on the above features, the four countries that were selected for comparative analysis were **Bangladesh, Hong Kong, Singapore, and Thailand.**



CHAPTER 3: THE PROJECT

AN OPPORTUNITY FOR ONE HEALTH IN BC

One Health policies are an emerging concept and have been gaining traction with the increase in zoonotic diseases and the onset of the COVID-19 global health pandemic. One Health policies, such as those implemented in countries in Asia, have been shown to strengthen identification, monitoring, and prevention of multifaceted health risks between animals, humans, and environments. However, in British Columbia, One Health policies are yet to be extensively developed and implemented. These ‘good practices’ can inspire and assist British Columbia in accelerating their own One Health policy implementation.

RESEARCH QUESTIONS

Acting as a bridge between research and policy, Genome BC plays an important role as an engaged stakeholder in the One Health space. Given Genome BC’s unique role within the health ecosystem of BC, we were guided by the following questions:

A) Understanding the adoption of One Health in Asia

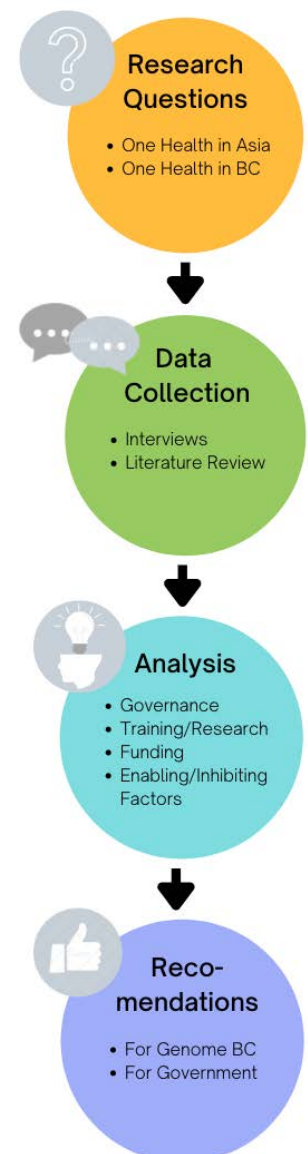
1. How are different types of One Health policies being implemented in jurisdictions in Asia?
2. What types of professionals participate in One Health research and what is the source of funding for their research?
3. How does research inform policy when multiple ministries or organizations are involved?
4. What are the inhibiting or enabling contextual factors mediating the successful or unsuccessful implementation of One Health policies in varied settings across these jurisdictions?

B) Applications of One Health in British Columbia

5. Looking at One Health implementation in Asia, which specific actors need to collaborate in order to implement a One Health framework in British Columbia?
6. How can these actors collaborate to successfully implement a One Health framework in British Columbia?

METHODOLOGY

Our project utilized both secondary and primary data. Secondary data was retrieved from a literature review and scans of public facing One Health websites, strategic action plans, and health databases. This was complimented by **13 semi-structured interviews** in order to fill in knowledge gaps and to provide more substantial, nuanced insights into the questions we posed.



Our team spoke with researchers, educators, service providers, human and animal health experts, and policy makers in British Columbia and our chosen Asia jurisdictions, **Singapore, Hong Kong, Bangladesh, and Thailand**. Interviewees shared with us their individual stories, experiences, and insights into the mechanisms of One Health, as well as their perceptions of the effectiveness of One Health policies with respect to their areas of expertise. Respecting the individuality of each interviewee, we recognize that everyone brought with them their own background, experience, and values to the issues at hand, as well as varying levels of experience with One Health policies.

By nature of the interdisciplinary approach to One Health, there are many different contributors to this collaborative space. In questioning how research influences policy, our data was primarily shaped by the experiences and perspectives of those involved in **research** or **academia**. Many interviewees held multiple roles as researchers and front-line professionals or researchers and government workers. Ultimately, our analysis has been shaped by those traditionally perceived to be ‘experts’ by Western values that are embedded in education, knowledge, and institutional power structures. Outside the scope of this project exists the perspectives of public sector workers, community leaders, and private industry involved in One Health spaces. Although these interviews are not substantive enough to offer a robust and expansive look at all levels of One Health policy coordination, the diverse range of professionals and jurisdictions we spoke with provided us with unique insights to highly similar challenges.



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CHAPTER 4: THE FINDINGS

Based on our desk review and interview interactions, four broad themes surrounding One Health policies have emerged from the analysis of the four case studies. These four themes include the ministerial governance and decision-making models for One Health policies, the avenues through which One Health research is conducted and informs policymaking, the funding modalities for One Health research and projects, and training initiatives for academics and professionals working in the One Health space.

ONE HEALTH MODELS

SUMMARY

- There are three models in which One Health policies are formulated and implemented: Coordinating Committee Model (top-down), Working Group Model (bottom-up), and Blended Model (bi-directional).
- The existence of a Coordinating Committee was present in three of the four case studies.
- Regardless of the model, coordination in all four Asia nations was guided by a National Strategic Action Plan that called for a One Health approach to policymaking.

COMPARING ONE HEALTH MODELS IN ASIA

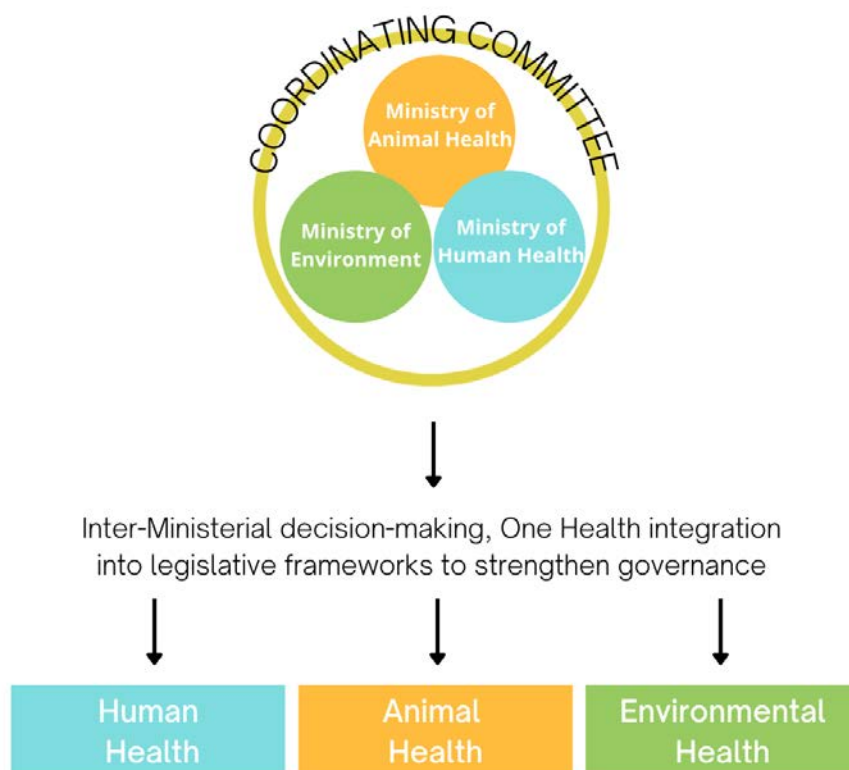
Each jurisdiction – **Bangladesh, Hong Kong, Singapore, and Thailand** – has a model through which One Health policies are formulated and implemented at the ministerial level. While key differences arise in the minutiae of each jurisdiction’s implementation framework, broadly speaking, there are similarities and shared characteristics among them. These frameworks can be grouped into three models: Coordinating Committee Model, Working Group Model, and Blended Model.

Supporting each jurisdiction’s One Health efforts is the existence of a national strategic action plan that encourages the use of a One Health approach to addressing challenges amongst human, animal, and environmental sectors. These documents are foundational; they promote cooperation across ministries, researchers, and professionals, and espouse values of cooperation, inclusivity, transparency, and active participation between actors. However, each jurisdiction’s implementation of their strategic action plan is highly dependent on their organizational model.

Coordinating Committee Model

The primary characteristic of the Coordinating Committee Model is having a team of government senior-level officials, public workers, and researchers centralized within the national government structure. This entity provides top-down direction across multiple ministries to ensure that decision-making is collaborative, coordinated, coherent, and in alignment with the government’s One Health strategic plan. In this model, an administrative arm provides technical and logistical support to the day-to-day functioning of the Coordinating Committee. This model represents how policy decisions are made in **Bangladesh** and **Thailand**.

Diagram 1. One Health Coordinating Committee Model



In **Bangladesh**, the government's **One Health Coordination Committee** encompasses three complementary groups:¹¹

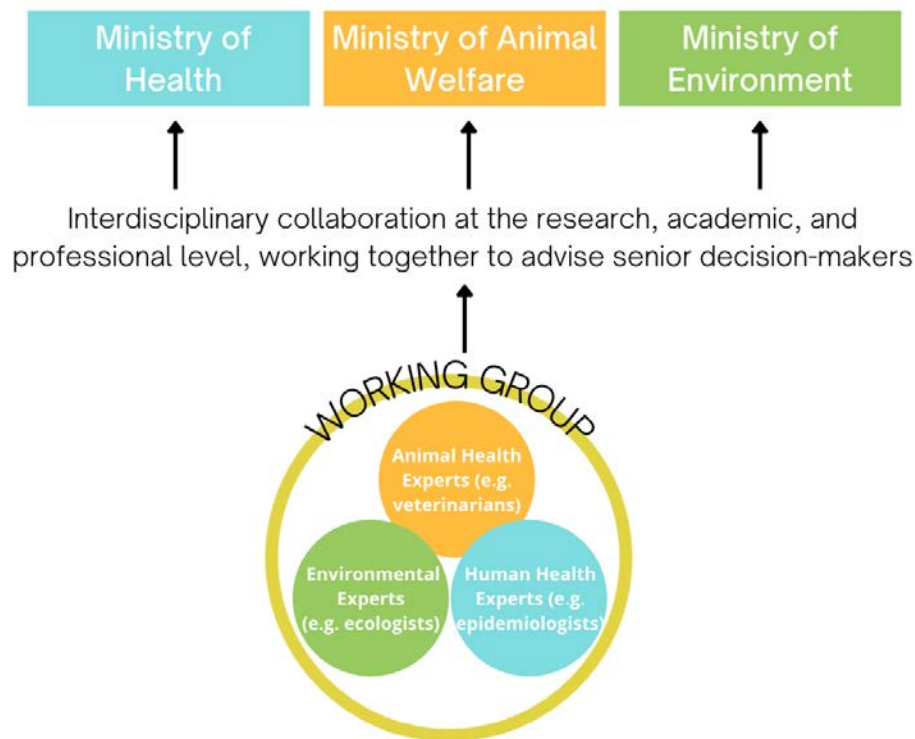
- The **Inter-Ministerial Steering Committee**, which includes senior decision makers from Ministry of Health and Family Welfare, Ministry of Fisheries and Livestock, Ministry of Environment and Forests, and Ministry of Agriculture, and is responsible for implementing Bangladesh's *Strategic Framework and Action Plan for One Health*.
- The **One Health Secretariat** supports the logistics of inter-ministerial collaboration and conducts monitoring and assessment of the activities outlined in the strategic action plan.
- The **One Health Technical Advisory Committee**, comprised of leading researchers and experts, provides technical guidance on One Health policies.

In **Thailand**, the **Coordinating Unit for One Health** (CUOH) the National Committee on Emerging Infectious Disease Preparedness and Response established the CUOH which is based within the Ministry of Public Health (MOPH) and is chaired by the Permanent Secretary for Public Health, while the Directors of the Bureau of Emerging Infectious Diseases, the Bureau of Epidemiology, the Bureau of General Communicable Diseases of the Department of Disease Control, and the MOPH, serve as Co-Secretaries¹². The CUOH serves as a focal point for One Health collaboration domestically and internationally and is guided by Thailand's *National Strategic Plan for Emerging Infectious Diseases*. The **CUOH Steering Committee** supports these coordination efforts by providing technical and administrative guidance to operations¹².

Working Group Model

Unlike the top-down approach seen with coordinating committees, the Working Group Model is a bottom-up organization in which a specialized and interdisciplinary team of experts at the clinical or university-level provide advice and guidance to senior decision makers across multiple ministries on health topics and policy issues.

Diagram 2. One Health Working Group Model



In **Hong Kong**, there are two such working groups, both of which are housed within the **Centre for Health Protection in the Department of Health**, each focusing on a specific policy area:

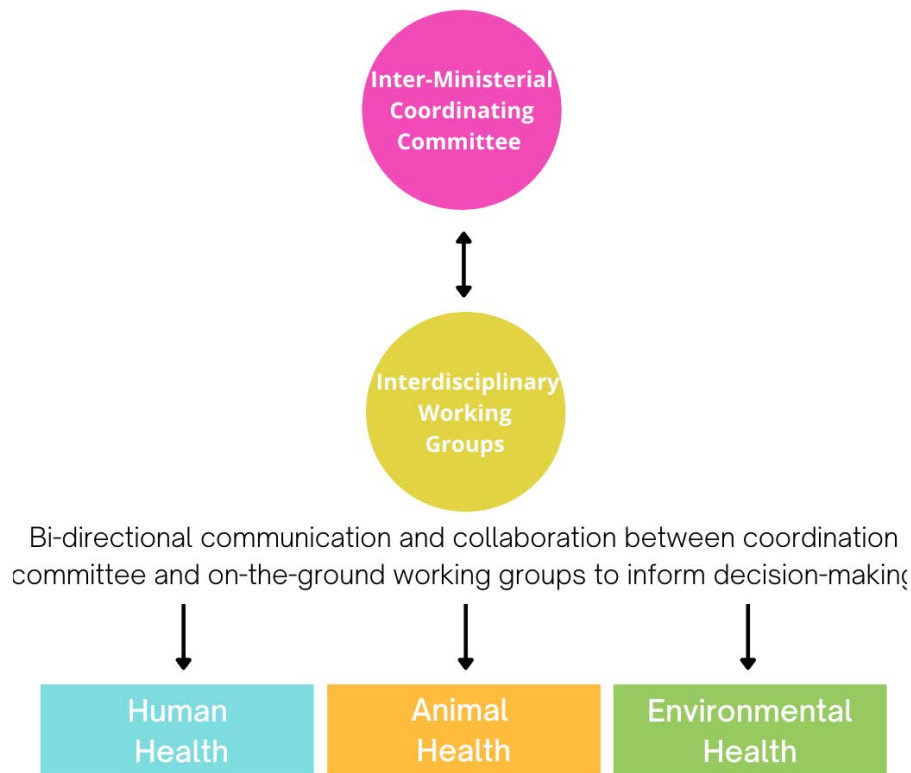
- The **High-Level Steering Committee on Antimicrobial Resistance (AMR)** advises and coordinates governance and multi-sectoral policies regarding AMR. They oversee the implementation of Hong Kong's *Anti-Microbial Resistance Strategic Plan* and ensure that implementation aligns with One Health principles¹³.
- The **Scientific Committee on Zoonotic and Emerging Diseases** advises on public health actions aimed at protecting the community from emerging diseases and provides the science behind the impacts of the changing social and economic conditions that play an integral role in the emergence of zoonotic diseases, such as population growth and mobility, food and eating habits, and shifting environmental factors¹⁴.

Blended Model

The Blended Model includes features of both the Coordinating Committee and Working Group Models, offering a bi-directional flow of information to inform policy.

In **Singapore**, the minister-led **One Health Coordinating Committee** provides strategic direction, sets priorities on One Health issues, and champions interagency coordination across the whole of Singapore's government¹⁵. The committee includes actors from Ministry of Health, National Parks Board, National Environmental Agency, and Singapore Food Agency, who are responsible for overseeing the *Anti-Microbial Resistance Strategic (AMR) Plan*, which calls for the application of the One Health concept in AMR policies¹⁶. Under the direction of the One Health Coordinating Committee, the **One Health Working Group** formulates, coordinates, implements, and reviews health-related programs, initiatives, and policies. As needed, the One Health Coordinating Committee will also establish specific One Health project teams to advise on specific issues as they arise.

Diagram 3. One Health Blended Model







STRENGTHS & WEAKNESSES OF DIFFERENT ONE HEALTH MODELS

The presence of a formalized coordination mechanism amongst ministries, such as that of a coordinating committee, signals legitimacy for collaborative approaches within government and creates a space where cooperative values can come to fruition. A coordinating committee allows ministers to co-create functional policies across departments, allowing them to overcome traditional challenges of siloed or disjointed approaches or contradictory policy efforts¹⁷. A strength of the coordinating committee model is the high level of coherence and cohesion on One Health actions throughout the government bureaucracy. However, such an approach is challenged by opposing priorities and agendas across ministries, and when visions or goals differ it can slow decision-making processes.

Alternatively, working groups at the academic and research level tend to be more inclusive in their cooperative efforts. For example, the Southeast Asia One Health University Network (SEAOHUN) expands beyond the human-animal-environmental health triad to collaborate with experts in economics, social sciences, urban design, etc.¹⁸. However, without collaboration at the government level, decision-making processes can be subject to ineffective policies across different departments as working groups cannot guarantee coordination at the ministerial level. Working groups must also determine key leverage points and communication avenues to inform government decision-makers on emerging health concerns, which may not always be an effective or reliable way to inform leaders in emergency situations.

Singapore's blended approach makes use of the strengths of the other two models, while simultaneously overcoming some of their weaknesses. A coordinating committee supports collaborative efforts across various ministries, while diverse working groups are assigned to address specific health challenges. There is a bidirectional flow of information, and working groups have a direct avenue to communicate and work with government decision-makers. That said, Singapore's model is still challenged by varying institutional capacities, as the committee and working groups are currently looking to address inequalities across actors.

Table 1. A Comparison of One Health Models Across Asia

	 Bangladesh	 Singapore	 Thailand	 Hong Kong
Strategic Action Plan	✓	✓	✓	✓
Model Type	Coordinating Committee	Blended	Coordinating Committee	Working Group
Advantages	Cooperative policy-making	Centralized focus on disease-specific projects	Synchronization in ministerial activities	Highly flexible Multi-disciplinary research
Disadvantages	Opposing agendas within ministries	Varying institutional capacities	Slow decision-making processes	Lack of centralized government body

IMPLICATIONS FOR BRITISH COLUMBIA: BUILDING A ONE HEALTH MODEL

A model for One Health in British Columbia is currently being envisioned. After speaking with leaders in this effort, we determined that the current model in British Columbia most closely resembles that of a **Working Group Model**, as seen in Hong Kong. Specifically, the research arm for the **British Columbia Centre for Disease Control (BCCDC)** has been proposed as the central hub for interdisciplinary knowledge sharing and programming across academia, researchers, health professionals, and government representatives. This follows a bottom-up approach to decision-making, with an interdisciplinary team of researchers providing government decision makers with science-directed and informed advice.

This type of model has been proposed in British Columbia because of existing institutional and governance structures. Specifically, government is not enshrined in legislation, but rather informal programming and policy. This allows for flexibility and lowers barriers for researchers to inform policy. In turn, many researchers and academics wish to communicate their findings to government to inform policy. The government official who receives this information depends on the applicable ministry for a particular issue, which becomes muddled when an issue spans across several government jurisdictions and falls under the responsibility of different decision-makers.

Importantly, there is an existing gap in the coordination mechanism at the government level in British Columbia, which makes it challenging to implement policies that cross jurisdictions. These barriers can be overcome by looking for inspiration in the Coordinating Committee and Blended Models found in Asia, which have demonstrated that the presence of a central unit comprised of key government officials and decision-makers across multiple ministries can signal government 'buy-in' and improve cooperation, coordination, and participatory decision-making across multiple departments. Coordinating committee units also offer a direct line of communication between working groups and government decision makers

IDENTIFIED GAPS

British Columbia lacks a National Strategic Action Plan calling for the adoption of a One Health approach to decision-making, and there is an absence of a formalized coordination mechanism for governments and stakeholders to collaborate on One Health initiatives.

across all essential departments, while also allowing for regular information sharing and collaboration on shared challenges. Some form of top-down guidance stemming from government coordination across sectors exists in three of the four cases in Asia and is a common model to be adopted for One Health efforts. However, a Coordinating Committee does not currently exist in British Columbia.

ONE HEALTH RESEARCH

SUMMARY

- All jurisdictions in Asia have university and clinical research centres that collaborate and inform policy, but not all jurisdictions have government labs dedicated to One Health.
- Government labs offer quick and consistent sharing of information across ministries but are limited to those involved or actively participating in One Health initiatives.
- Independent research centres are more multidisciplinary in nature, inviting research beyond the One Health triad (e.g., economics, social sciences, urban design), but are more likely to indirectly inform policy through briefs and academic publications.

CONDUCTING ONE HEALTH RESEARCH IN ASIA

Research pertaining to One Health tends to take place in academic or clinical laboratories, which can exist in government research arms or outside of government in independent facilities, hospitals, or universities.

Government Laboratories

Singapore has one of the more comprehensive government lab systems between the four jurisdictions in Asia¹⁹. The **National Public Health Laboratory** (NPHL) is a One Health research centre that operates at the national level under the direction of the Ministry of Health, where knowledge is contributed to by physicians and infectious disease experts (e.g., immunologists, epidemiologists, microbiologists). Further, under the National Parks Board are the **Animal and Plant Health Center** (APHC) and the **Center for Animal and Veterinary Services** (CAVS), both of which provide diagnostic services for surveillance and monitoring of human-animal diseases by leaders in veterinarian, wildlife, and environmental sciences. These government labs work in collaboration with a network of seven public hospitals and clinical labs across the country to advance One Health research.²⁰

Comparatively, in **Bangladesh**, One Health research takes place in the **Laboratory of Food Safety and One Health**. This lab exists within the larger **International Center for Diarrhoeal Disease Research** (ICDDR) and is considered a success in Bangladesh in part due to an expansive global research network, which includes contributions from renowned facilities like the Royal Veterinary College (United Kingdom), London School of Hygiene and Tropical Medicine (United Kingdom), Chatham House (United Kingdom), Sher-e-Bangla Agricultural University (Bangladesh), Bangladesh Agriculture University, and Massey University (New Zealand).²¹

Government-situated labs such as these allow health experts and academics to conduct tests and communicate findings that are essential for the monitoring, surveillance, identification, and response to infectious and communicable diseases. The results from research are directly shared with key government decision-makers,

providing an immediate line of communication between research and policy. Further, research conducted in these labs support surveillance efforts and improve preparedness and response time of highly infectious pathogens. **Bangladesh** has adopted a four-way linkage of information between animal and human health epidemiology with animal and human laboratory information, which is then communicated to the One Health Secretary for quick decision-making by senior researchers from these labs. This ensures the policy process is informed by the latest data and research¹.

That said, these labs are also challenged by their institutional reach. Unless labs have extensive networks that engage with those outside of government spaces – such as community leaders, front-line professionals, and industry – policy responses risk being ineffective on-the-ground.

University/Clinical Laboratories

Although Hong Kong and Thailand do not have dedicated government laboratories for One Health, they do host sophisticated university research platforms. **Hong Kong's Center for Applied One Health Research & Policy Advice** (CAOHRPA) is the key research centre located at the City University of Hong Kong, with specialists working in infectious diseases, public health, aquatic animal health, veterinary sciences, applies research, and policy. The CAOHRPA focuses on monitoring animal and human disease transmissions and food safety within supply chains and regularly contributes to publications by the Food and Agricultural Organization (FAO)²².

Comparatively, **Thailand's** research is facilitated by the **Thailand One Health University Network** (THOHUN), which operates under the **Southeast Asia One Health University Network** (SEAOHUN). THOHUN is a university network bringing together medical sciences, economics, pharmaceuticals, public health, veterinarian medicine, environmental sciences, dentistry, urban design, social sciences, agriculture, engineering, political sciences, law, and education from around the country.²³ Together, THOHUN provides One Health training to the future workforce by offering courses and workshops for early protection, prevention, and risk reduction of emerging diseases. THOHUN works in close collaboration with their primary funder, the United States Agency for International Development (USAID).²⁴ The benefit of an expansive university network such as this means that a wider range of actors can be brought together, and the network is much more adaptive and flexible than those seen in government labs.

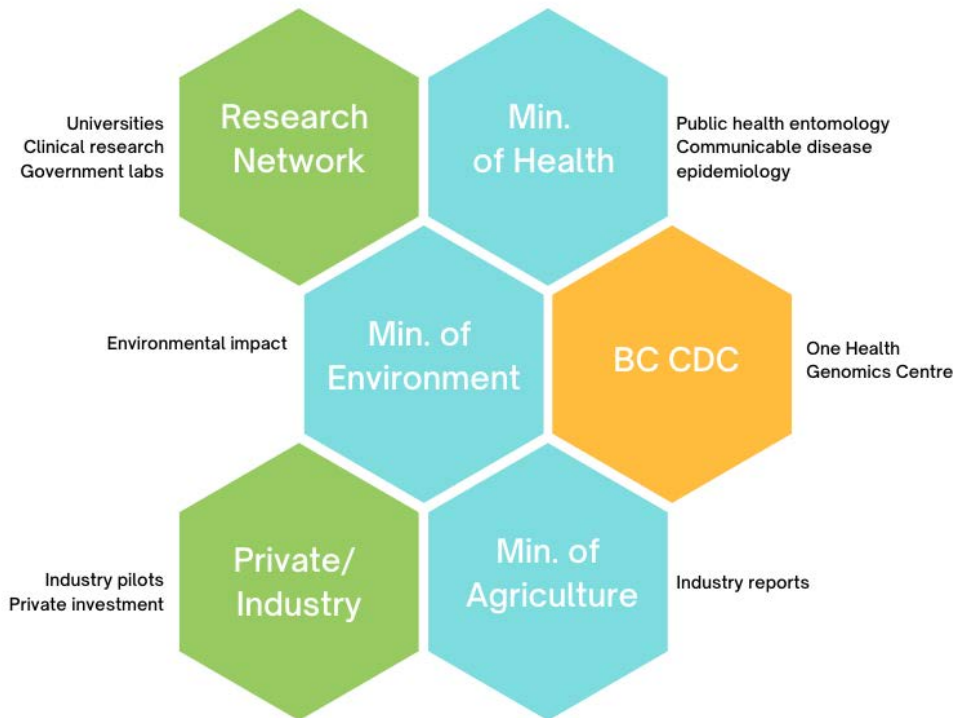
Research that is primarily conducted in independent clinical and academic laboratories, such as those of hospitals and universities, must share their information with decision-makers in a different manner. For example, **Hong Kong's** CAOHRPA does not directly inform government policy. Rather, it contributes heavily to international publications and professional network groups that inform policy in academic spaces. THOHUN similarly informs policy through academic spaces, but also goes a step further by working heavily with the media to perform One Health advocacy and educate the general public on important One Health communications.

IMPLICATIONS FOR BRITISH COLUMBIA: ONE HEALTH RESEARCH & INFORMATION SHARING

One Health efforts in British Columbia occur in isolated projects or programs. Interviewees in British Columbia helped our team identify some of these efforts. **Government** bodies, such as BCCDC and PulseNet Canada, are currently leading in One Health initiatives across multiple ministries, departments, and jurisdictions. For example, BCCDC has pulled in the Ministry of Health (BCMOH) and the Ministry of Agriculture, Food, and Fisheries (BCMAFF) into conversations regarding a One Health approach, and there is increased involvement from the Ministry of Environment and Climate Change Strategy (BCMECCS). Noted absences include the Ministry of Forestry, the Ministry of Higher Education, and the First Nations Health Authority. As One Health grows in British Columbia, there is potential for further engagement with other important government bodies such as these three ministries. There are

also non-governmental stakeholders contributing to the One Health environment in British Columbia, including that of **academic** and **clinical researchers** (public health, public policy, environmental sciences, veterinarians, etc.), **non-profit** (Genome BC), and **private** (start-up ventures, industry). One Health research initiatives are conducted at universities and non-governmental research organizations. An opportunity for expansion of One Health research in BC would be to incorporate One Health principles into research initiatives taking place in government research facilities. BCCDC is currently working on implementing such an initiative in the form of a One Health Genomics Research Centre.

Image 4. One Health Actors in British Columbia



However, experts we spoke with identified challenges in conducting multidisciplinary research and transitioning findings into policy. First, there is an increased emphasis on *applied sciences*, shifting away from research solely for academic purposes and instead advocating for and prioritizing research that has practical outcomes. Applied science has important implications for policymaking by actively seeking to inform key stakeholders and decision-makers to drive positive change with respect to human, animal, and environmental health. Applied research requires results to have real-world implications and for findings to be disseminated and communicated in order to inform policy change.

Secondly, there exists asymmetry and power imbalances between the various actors involved. Importantly, this means that the involvement of certain professionals across the One Health triad may not always be equal. This tendency was also present across Asia. In **Hong Kong**, One Health research is dominated by public health professionals, with veterinarians and animal health experts perceiving decision-makers and funders as being less receptive to their contributions. Further, the importance of environmental research, particularly that involving climate change, has traditionally been underrepresented in the One Health space. It is not only essential for British Columbia to increase representation across the One Health triad, but there also needs to be efforts towards inclusive and equitable engagement to ensure meaningful participation by all actors. **Bangladesh** has tried to address this challenge through rotational leadership between stakeholders working under their One Health Coordination Committee. Further, national

strategic action plans across Asia lay out the values sought by the One Health approach, including actors to be involved and the mechanisms set in place to promote meaningful participation. British Columbia currently lacks a One Health strategic action plan.

Lastly, interviewees stressed on the importance of a concerted need for data sharing mechanisms in British Columbia, such as shared platforms or datasets to track incidence rates of emerging diseases in human and animal populations. Typically, a single team will be responsible for a given dataset. Sharing data depends on the context in which the data was collected and whether sharing information is approved by the team possessing the dataset, feasible under the specific platform the data is hosted on, or shareable under legal regimes (e.g., *Access to Information Act*). These are friction points in data sharing between teams and ministries within British Columbia's government and restricts the ability for multiple teams to work together in a rapid, agile, and coordinated fashion required under One Health. The minute details of data sharing within the observed case studies were beyond the scope of this project, however exploring this aspect of implementing One Health would be a valuable area for future research.

IDENTIFIED GAP

There is a low level of integration across the isolated instances of One Health in British Columbia, primarily efforts emerging from academia, clinical labs, and research spaces.

ONE HEALTH FUNDING

SUMMARY

- Funding comes from three main sources: governments, non-government organizations, and private or industry partnerships.
- Funding for One Health programs and research across Asia was obtained from a mix of sources, but at least one or two primary funding sources stood out in each jurisdiction.
- Funding in British Columbia is primarily project-based because One Health has not been formalized at the government level.

FUNDING MECHANISMS FOR ONE HEALTH IN ASIA

Funding sources stem from three main sources: **government** (bilateral, national, provincial, or local governments), **non-government organizations** (international, regional, local) and **private** (industry partnerships). Bangladesh, Singapore, Hong Kong, and Thailand all receive funding from multiple sources, yet their funding models may be dominated by one or two sources in particular, based on what is contextually relevant for each jurisdiction. **Bangladesh** receives significant funding from international organizations (IOs), specifically obtaining One Health project- and program-specific support from WHO, FAO, and UNICEF²⁵. Comparatively, **Singapore's** One Health initiatives are embedded in the national government structure, ensuring they have dedicated budget lines that fund their One Health programs and research labs²⁰. **Hong Kong** and **Thailand** One Health initiatives occur at the

research and academic level, where funding has been obtained from partnerships with bilateral government organizations (e.g., USCDC, USAID, WHO).^{26,27} Thailand also has emerging funding relationships with the private sector, such as obtaining financial support from Pfizer to strengthen their AMR research²⁸. Overall, international aid has played a key role in the funding of One Health across Asia.

Given that very few jurisdictions receive dedicated government funding (or if they do, the contributions are minor), interviewees throughout this project continually stressed their challenges in securing long-term, stable, and predictable funding for One Health. Project-specific grants or international aid have supported the establishment of new One Health programs and projects, but these grants often come with an end date that raises questions as to how these One Health systems will be left to fund operations in the medium and long-term. Further, those in **Hong Kong** have identified trends in funding that prioritizes medical and public health research over environmental and veterinarian sciences, making it difficult for researchers to equally contribute to the One Health research space. To address some of these concerns with funding, **Bangladesh** has established a trust fund that is compiled of donations from supporters and One Health projects to finance their daily administrative costs and needs. As mentioned above, **Thailand** is looking to grow their private sector relationships and international networks to expand funding sources. **Singapore** has also identified international networks as potential sources of funding through ASEAN and the Global Water Research Coalition.

IMPLICATIONS FOR BRITISH COLUMBIA: FUNDING OPPORTUNITIES

Similarly, funding models in British Columbia will be highly contextual based on availability of sources and need. Funding One Health in British Columbia is still at a nascent stage, often determined on a project-to-project basis. This is partly because One Health has yet to be institutionalized at the government-level in British Columbia, where efforts can receive dedicated One Health budgets. Instead, early-stage financing in British Columbia's One Health space is heavily characterized by the contribution of non-government actors. For example, Genome BC's co-funding approach to research investment aided the launch of One Health pilot projects and research, such as the project that linked mink farming with COVID-19 transmission risk²⁹. Additional One Health pilot projects are planned for funding under Genome BC's **COVID-19 Rapid Response Funding Initiative**³⁰. This approach is unique as it is neither government-only funding nor an industry-only portfolio management approach, and thus relies on collaborative research agreements and commitments to milestones or outputs.

Interviewees raised concerns regarding the current funding models in British Columbia. For example, the Ministry of Health has one of the largest budgets, yet would be contributing less for potential One Health efforts when compared with the Ministry of Agriculture and the Ministry of Environment. Exploring the potential opportunities of federal and provincial budget allocation in British Columbia is currently being undertaken by BCCDC's economic case for One Health. Therefore, this project only reiterates these funding concerns to complement current exploratory efforts occurring elsewhere. Further, the specifics of the economic feasibility of funding were a challenge throughout this project as funding models in Asia were highly contextual and difficult to obtain information on in order to properly inform decision-makers in British Columbia. Potential future research could investigate what budget allocations would look like, as well as other opportunities for funding, such as dedicated and shared One Health grants contributed by collaborative agreements with agencies, hospitals, and academic institutions, as well as expanding funding beyond academia into surveillance and reporting (an area that is suggested to be neglected in British Columbia).

The presence of non-profit actors in British Columbia's funding model mirrors what is found in Asia, where non-profit organizations play an essential role in the establishment and ongoing operations of One Health projects, programs, and efforts across Bangladesh, Singapore, Hong Kong, and Thailand. As a reliable and longstanding government partner, Genome BC will continue to play an important role as a flexible funder and advocate for One Health funding.

IDENTIFIED GAPS

There has been an emphasis for a shift towards funding that has practical and applied outcomes in order to promote human, animal, and environmental health. However, funding of projects or research may not always transition into actionable items, with important health knowledge being held in solely academic or research spaces. Additionally, there are currently no provincial budget items explicitly dedicated to One Health efforts across the province.

ONE HEALTH TRAINING

SUMMARY

- Awareness of One Health as a concept is reinforced with capacity development, knowledge-sharing, and education.
- Education and training in Asia come in many forms: vocational and professional training, field training, undergraduate and graduate courses or programs, and theme-based workshops and seminars.
- Although BC has isolated instances of One Health concepts taught through courses or professional events, there are no formalized or targeted One Health programs and only a select few One Health-focused platforms for sharing information and knowledge.

ONE HEALTH TRAINING IN ASIA

Training and professional development programs were the most forward-looking aspects of One Health identified during this project. The availability of education and skills training for those working with the One Health ecosystem was a key component identified by experts in Asia when it came to the effectiveness of One Health policy formulation and implementation. The following elucidates the different types of training programs that appeared in Bangladesh, Singapore, Hong Kong, and Thailand.

Vocational & Professional Training

Singapore, Bangladesh, and Thailand offer vocational and professional training programs designated for those working within professional One Health spaces. This includes government officials, epidemiologists, and veterinarians. The benefit of these programs is that government officials and public workers are introduced and trained on key principles to One Health that supports them in collaborative efforts across different jurisdictions.

Field Training

In **Singapore, Bangladesh, and Thailand** there is an emphasis on incorporating One Health principles in existing **training and certification programs** for epidemiologists through Field Epidemiology Training Programs. In each of these jurisdictions, field epidemiologists are considered the 'front lines' of One Health, as they are typically the personnel detecting and reporting outbreaks of zoonotic and emerging diseases²⁶. Introductions to One Health prepare professionals for working with field professionals in other sectors and teach them to recognize key intersections between human, animal, and environmental health.

Undergraduate Training

Hong Kong offers One Health curriculum in their Veterinary and Life Sciences Undergraduate Program³¹. Similarly, **certificate programs** are offered at **Singapore's** Nanyang Technological University in their School of Biological Sciences and Bangladesh's One Health Institute at the Chittagong Veterinary & Animal Sciences University.³²

Graduate Training

Singapore is the only jurisdiction with **graduate-level training** in One Health. Namely, Singapore's Duke Global Health Institute offers a course with a focus on One Health.²⁰ That said, **Bangladesh** is currently collaborating with Massey University in New Zealand to roll out a Master's in One Health program. Both undergraduate and graduate training educates future professionals, academics, and researchers on the importance of One Health and introduces a more holistic perspective on the interdependencies between humans, animals, and their shared environment.

Theme-Based Workshops & Seminars

All four countries host **workshops and training seminars** for existing professionals. For example, in **Bangladesh**, the One Health Hub offers seminars, workshops, and conferences for professionals, and in **Thailand** there are opportunities for students and young professionals to participate in One Health workshops and training seminars through the Thailand One Health University Network (THOHUN). One Health platforms, symposiums, or conferences are some of the rare opportunities in which a large range of stakeholders (from government to industry to academia to the public) can engage in conversation with one another and share information concerning One Health topics.

Table 2. Comparing One Health Training Programs Across Asia

	Bangladesh	Hong Kong	Singapore	Thailand
Field Training	✓	✓	✗	✓
Vocational Training	✓	✓	✓	✓
Undergraduate Training	✓	✓	✓	✗
Graduate Training	✗	✗	✓	✗
Workshops & Seminars	✓	✓	✓	✓

IMPLICATIONS FOR BRITISH COLUMBIA: CAPACITY BUILDING & ONE HEALTH TRAINING

The existence of capacity-building, knowledge sharing, and skills training opportunities across all four jurisdictions indicates the importance of educating future generations about the interdependencies of human, animal, and environmental health. Building knowledge, capacity, and confidence in this regard ensures policy formulation and decision-making is further aligned with the core principles of One Health. Several interview respondents emphasized the role of training and education in their respective jurisdictions, thus further supporting this notion.

However, the existence of the above-mentioned instances is somewhat isolated since many jurisdictions around the globe do not offer One Health training or certification programs. This is also true for British Columbia. The presence of One Health education in British Columbia is difficult to measure. There are existing informal efforts to share knowledge and build capacity. For example, in the Fall of 2021, BCCDC hosted a *One Health Symposium* where clinical researchers, academics, government officials, and human, animal, and environmental health experts met virtually to discuss emerging One Health efforts across Canada. However, these platforms are not institutionalized or formalized as we have seen in Asia (e.g., Singapore’s One Health Platform hosted annual Symposiums prior to COVID-19 disruptions). Further, some academic instructors within health, animal, and environmental spaces are adding One Health concepts to their curriculum. For example, the University of Victoria offers a medical course (MEDS 487) on the interrelationship between human and animal health.³³ Looking beyond British Columbia, One Health efforts in Canada are also simultaneously undertaken in other provinces. The University of Guelph has designed a Bachelor’s degree in One Health.³⁴ Despite there being isolated instances across British Columbia, the province does not currently offer formalized or targeted One Health training programs that provide certification or skills development for professionals working within the human–animal–environment interface, such as those present elsewhere.

Additionally, there is no university network connecting shared efforts in One Health. As demonstrated by THOHUN, establishment of a network can allow renowned university departments to provide their own areas of expertise. The University of British Columbia can lead in higher-level knowledge in population and public health, including global health (School Population and Public Health), global policy affairs (School of Public Policy and Global Affairs), and genomic and microbiological laboratory services and training (BCCDC). Meanwhile, the University of Fraser Valley may be better suited to provide hands-on training to One Health field practitioners.

IDENTIFIED GAP

Programs targeting the training of future generations in One Health principles are isolated across British Columbia. There are also no courses or programs training professionals and students in One Health.



CHAPTER 5: OPPORTUNITIES & CHALLENGES

When considering One Health implementation in British Columbia, it is crucial to highlight the opportunities and challenges that are currently present within the local context that can both enable and inhibit One Health policy efforts. By highlighting the current gaps and strengths, stakeholders are made more aware of drawbacks, but also key opportunities to leverage for important policy change that has potential to promote a One Health approach to decision-making.

ENABLING FACTORS

1. **One Health research efforts are already emerging**, with examples of BCCDC's multi-disciplinary working group and ongoing expert support in the creation of a One Health laboratory.
2. **The presence of resources and funding** for One Health projects and information sharing within the non-profit space, such as efforts undertaken by Genome BC (e.g., mink pilot project, COVID-19 Rapid Response Funding Initiative) and BCCDC in offering expertise and guidance to provincial decision-makers.
3. **Informal programming in government structures** allows for flexibility in policy and science-based decision-making in collaboration with researchers and academics.
4. **Existing efforts to assess the economic and political feasibility** of a One Health approach in British Columbia.
5. **One Health symposiums** for Canada-wide and regional conversations on One Health, such as the One Health symposium hosted by BCCDC.
6. **Efforts to incorporate One Health principals across world-renowned universities** and institutions across British Columbia, such as those at the University of Victoria and Simon Fraser University incorporating One Health into their departments and curriculums.

INHIBITING FACTORS

1. **A lack of a formal coordination mechanism** for multiple ministry actors and outside stakeholders operating in the One Health space to coordinate and share information. Further, key ministries like Education and Forestry are not actively involved in One Health development in the region.
2. **A lack of a national strategic action plan** document that guides One Health efforts or calls for a One Health approach to decision-making and policy. This also contributes to a lack of understanding of One Health or the importance of such an approach across various levels of government and society.
3. **Few isolated instances of targeted One Health training programs**, either for field professionals, government workers, or post-secondary students.
4. **Funding for academic projects without an applied research focus** faces difficulty in transferring findings into practical outcomes, creating inefficiencies with funding. Currently, there are many projects in the academic research space, but comparatively fewer in the applied research space.
5. **A low level of integration amongst the numerous independent research** being conducted in the region, including a lack of a formalized university network to connect isolated instances of One Health in academia, research, and clinical labs. This leads to inefficiencies in resource utilization.



CHAPTER 6: RECOMMENDATIONS

Taking guidance from the enabling and inhibiting factors that are present in British Columbia, the following recommendations were generated in order to promote actions that will address gaps identified throughout this project. Some of the recommendations are for Genome BC to implement internally (in blue), whereas others are for Genome BC to advocate to the government (in green).

Each recommendation has been assessed based on **benefit** and **feasibility**, according to the criteria detailed below.

Benefits of implementation:

- **Research:** the promotion of a multi-disciplinary approach to genomics, veterinarian, health, and environmental research.
- **Funding:** ensuring optimum utilization of existing funding or making new sources of funding available.
- **Institutionalization:** the formalization of One Health at various levels (government, industry, community).
- **Advancement:** the encouragement or increased use of One Health as a framework for decision-making.

Feasibility of implementation:

- **Financial:** the availability of different sources of funding to implement the recommendation.
- **Economic:** the economic benefits involved in implementing the recommendation, comparing benefits created with potential costs incurred.
- **Administrative:** the availability of human and administrative resources to implement the recommendation.
- **Technical:** the technical ease of implementing the recommendation.

RECOMMENDATION 1: Create a university network

FEASIBILITY ● ● ● ●

BENEFIT ● ● ● ●

Identified Gap: There is a low level of integration amongst the numerous independent One Health research being conducted in the region. This leads to inefficiencies in resource utilization.

Policy Option: Creation of a university network across British Columbia and/or Canada. This option will build relationships with leaders already working in the One Health ecosystem. Establishing relationships such as this will promote knowledge sharing amongst a range of actors and capacity building across currently isolated instances of One Health.

Policy Implications: Creation of a university network is financially, economically, and administratively feasible. It ranks lower on technical feasibility because it can be difficult to bring together and coordinate higher education institutes under one network umbrella. In terms of benefits, it will help in integrating research efforts thus ensuring One Health development and advancement in the region. It will also ensure optimum utilization of funding. It will not create any benefit pertaining to institutionalization of One Health.

RECOMMENDATION 2: Prioritize funding for applied sciences

FEASIBILITY ● ● ● ●

BENEFIT ● ● ● ●

Identified Gap: Comparatively, there is a lower focus on projects in applied research than academic projects, or there are challenges in transforming academic projects into applied outcomes.

Policy Option: Channelizing funding for projects with an applied research focus can ensure optimum utilization of available funding. This includes projects that have specific milestones and output expectations that promote positive outcomes in the real world.

Policy Implications: Prioritizing funding for projects with an applied research focus is feasible on all four fronts (financial, economic, technical, and administrative). In terms of benefits, it will create high-quality research outputs and will further the One Health advancement in the region. However, it will not create any benefit with regards to institutionalization of One Health.

RECOMMENDATION 3: Create a coordinating committee

FEASIBILITY ● ● ● ●

BENEFIT ● ● ● ●

Identified Gap: There is currently no formal coordination mechanism for the multiple actors operating in the One Health space. This includes ministries, such as the Ministry of Health, Ministry of Agriculture, and the Ministry of Environment, as well as non-government actors leading in One Health, such as academics and researchers at BCCDC or non-profits like that of Genome BC.

Policy Option: Creation of a coordinating committee that will include representatives from all involved ministries and relevant external stakeholders. The committee will act as a steering body for One Health development and implementation in the region.

Policy Implications: Creating a coordinating committee is financially, economically and technically feasible and will create benefits pertaining to One Health research, funding, institutionalization, and advancement.

RECOMMENDATION 4: Create a One Health strategic action plan

FEASIBILITY ● ● ● ●

BENEFIT ● ● ● ●

Identified Gap: Strategic action plans are important documents that lay the foundation for One Health moving forward. However, British Columbia does not have a government-level strategic action plan that calls for One Health principles and values to be employed in decision-making processes.

Policy Option: When adopting a One Health approach, efforts must be guided by values of cooperation and equity from the onset. This includes establishing values that promote communication, cooperation, and inclusivity, as well as accountability mechanisms that can guide values in practice. The creation of a strategic action plan will help establish, formalize, and communicate these guiding values and principles for all stakeholders involved.

Policy Implications: Creation of a strategic action plan for the province is feasible on all four fronts (financial, economic, technical, and administrative). It provides benefits in One Health institutionalization and advancement in the region by ensuring cooperation amongst different players from the start.

RECOMMENDATION 5: Encourage One Health education & training

FEASIBILITY ● ● ● ●

BENEFIT ● ● ● ●

Identified Gap: There exists only a select few instances of training programs or courses for the One Health workforce in British Columbia, leaving a large gap in the education of One Health principles.

Policy Option: As demonstrated in Asia, there are several options available for expanding the education and training for One Health professionals. This can include more immediate instances of workshops, seminars, or topic-specific events that bring attention to the One Health concept and education on key principles. In the long-term, certificate programs, post-secondary degrees, and professional programs on One Health can be established.

Policy Implications: Advocating for education and professional training of a One Health workforce is financially and economically feasible. However, there exist administrative and technical difficulties in bringing the appropriate actors together to initiate and execute this option. However, advocating for greater education and professional training during the early stages of One Health development can have immense benefits. It can contribute towards institutionalization, advancement, and improved research in One Health.

The following table provides a summary of the 5 recommendations according to identified gaps found in British Columbia.

Table 3. Recommendations Based on Current Gaps in British Columbia

	IDENTIFIED GAPS	RECOMMENDATION	BENEFIT	FEASIBILITY
1	Low research integration	Creation of university network	● ● ● ●	● ● ● ●
2	Low focus on practical projects	Prioritize funding for applied research	● ● ● ●	● ● ● ●
3	No formal coordination mechanism	Creation of coordinating committee	● ● ● ●	● ● ● ●
4	Fewer efforts in maintaining ensuring inclusivity & equity	Creation of a strategic action plan	● ● ● ●	● ● ● ●
5	Lack of formal training	Advocate for education & professional training	● ● ● ●	● ● ● ●

● Recommendations for Genome BC to implement internally

● Recommendations for Genome BC to advocate to the Government



CONCLUSION & FUTURE OUTLOOK

As global health risks and climate emergencies continue to force our hand, the One Health approach is being implemented by governments around the world. Now is the time for British Columbia to overcome prevailing funding, logistical, capacity, and cooperative challenges and adopt a One Health approach that improves health outcomes for people, animals, and the environment. The benefits of a One Health approach are significant because One Health is multi-functional; it offers more than pandemic preparedness, as it encompasses food safety, food security, climate adaptation, and agricultural sustainability.

One Health presents an opportunity for the British Columbia government to approach public and environmental health differently than they have in the past. Understanding the importance of such an approach, there are existing efforts to adopt a One Health approach to policymaking in British Columbia, which this project aims to compliment. The recommendations outlined in this report will support province-wide efforts in establishing a One Health framework to inform future health policy. For example, without coordinated efforts across multiple stakeholders, the province risks maintaining the status quo of siloed decision-making that is ineffective at addressing shared health challenges. Cooperating with non-government partners, such as Genome BC, to implement these recommendations can catalyze change to overcome current policy challenges.

This project only represents the beginning stages of One Health efforts that were demonstrated in the Asian jurisdictions of Hong Kong, Bangladesh, Singapore, and Thailand, and primarily focused on establishing systems and networks for cooperation, coordination, communication, and capacity-building. There are further areas of interest that were beyond the scope of this project but are essential to investigate deeper to take full advantage of a One Health system. When speaking with experts and leaders in the One Health space, concerns were raised on the lack of available platforms for data sharing as well as the legal and logistical constraints when transferring information between ministries and external stakeholders. Further, surveillance activities have some of the least integrated coordination between stakeholders, as well as the lowest allocations for funding, despite surveillance being one of the earliest forms of detection on potential health or environmental risks. However, inspiration in addressing these additional challenges can be found through further exploration of the approaches adopted in Asia, as well as in other regions leading in One Health, including Africa and the United States.

Advancing One Health in British Columbia will foster a health system that is more holistic and effective at addressing shared health challenges, setting the stage for British Columbia to become a model for the rest of Canada. By taking on this challenge, British Columbia will become a national leader in health.

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Appendix A: Country Basics

Thailand

Thailand is a country located in the central region of mainland Southeast Asia primarily specialized in exporting manufacturing products, agricultural products, and agro-industrial products³⁵. Thailand emerged as a constitutional monarchy but has adopted a parliamentary system of government in which the Prime Minister is the head of government, and the monarchy is head of state³⁶. Thailand has a history of dealing with zoonotic diseases that can be traced back to 2004 when Avian influenza H5N1 was first identified²⁶. An overview of Thailand's population, GDP, and development indicators are presented in the table below.

ONE HEALTH IN THAILAND

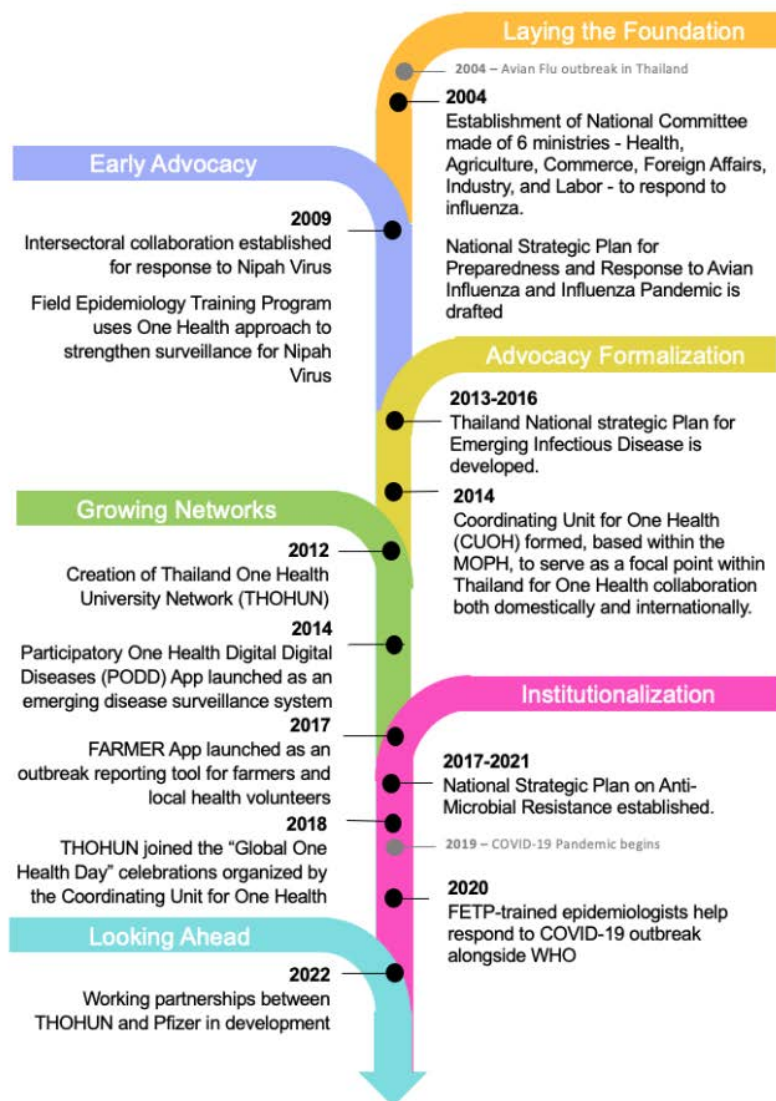


Table 4. Thailand and British Columbia demographics

	Population	Population Density	GDP	GDP per capita	HDI (Rating, Rank)	Life Expectancy
Thailand (2020)	69.8 million	137 people/km ²	\$501 billion USD	\$7,189 USD	0.777/1.007 9/189	77 years
British Columbia (2019)	5.07 million	4.8 people/km ²	\$193 billion USD	\$38,067 USD	*Canada 0.929/1.000 16/189	82 years

Singapore

Singapore is a city-state located in Southeast Asia and is comprised of one main island with 64 smaller satellite islands and outlying islets. Singapore's population urbanization statistics are 100%, with the second greatest population density in the world. The state has adopted a unitary parliamentary democratic system, although the government maintains significant control over politics and society with the People's Action Party ruling since their independence from 1954³⁷. In recent decades, Singapore has dealt with public health outbreaks and challenges, such as SARS, H1N1, and Zika virus³⁸. Additionally, Singapore has a strong focus on dealing with anti-microbial resistance (AMR) in relation to food-related diseases, specifically because majority of food is imported into the country.

ONE HEALTH IN SINGAPORE

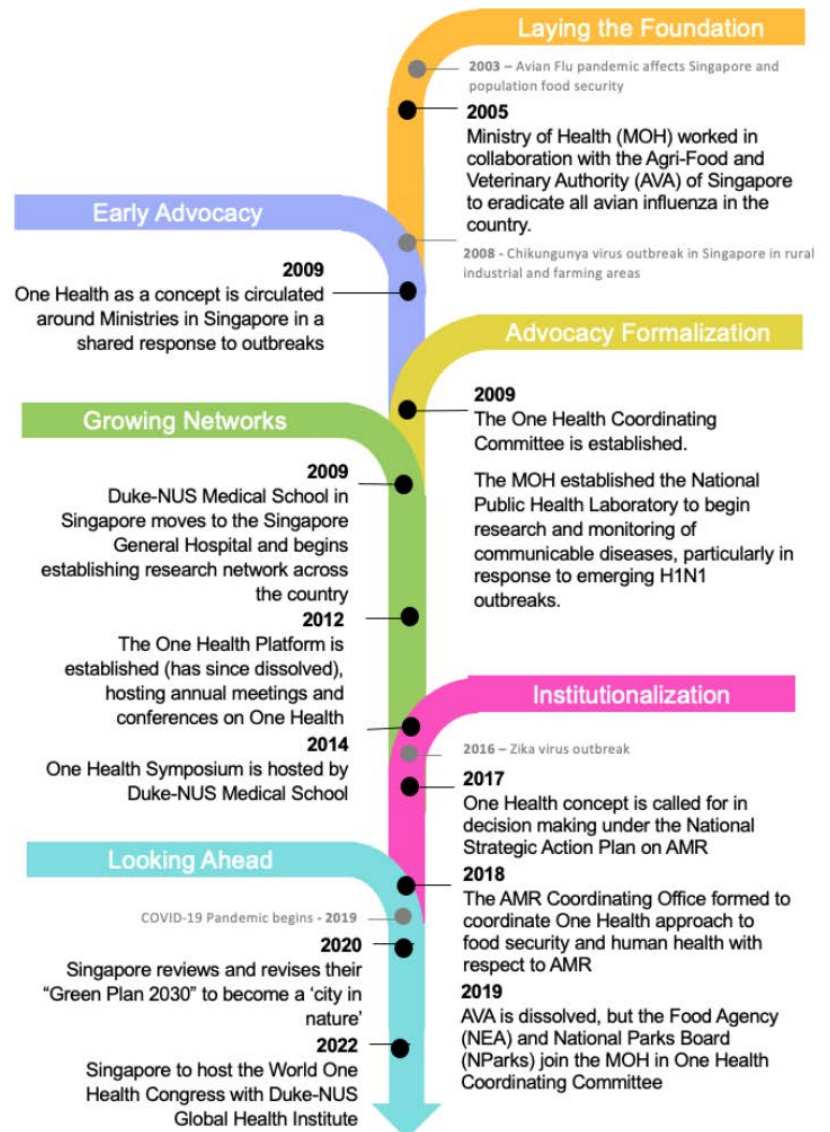


Table 5. Singapore and British Columbia demographics

	Population	Population Density	GDP	GDP per capita	HDI (Rating, Rank)	Life Expectancy
Singapore (2020)	5.69 million	8358 people/km ²	\$340 billion USD	\$59,797 USD	0.938/1.00 11/189	83 years
British Columbia (2019)	5.07 million	4.8 people/km ²	\$193 billion USD	\$38,067 USD	*Canada 0.929/1.000 16/189	82 years

Hong Kong

Hong Kong is a special administrative region of China located on the Pearl River Delta in Southern China. Hong Kong autonomously governs its internal affairs and external relations, while defence and foreign policy are managed by the People's Republic of China. Hong Kong's experience in managing emerging and zoonotic diseases dates back to 1999, when its first outbreak of Avian Influenza occurred.³⁹ An overview of Hong Kong's population, GDP, and development indicators are presented in the Table below.

One Health policies began to emerge in Hong Kong in the early 2000s, following the development of interdisciplinary and multisectoral responses to significant zoonotic outbreaks, such as Avian Influenza (1997 and 2004) and SARS (2003).³⁹ At present, One Health has been operationalized into policy and practice in Hong Kong in a variety of different ways, including outbreak management, government decision making structures, training, and research labs.

ONE HEALTH IN HONG KONG

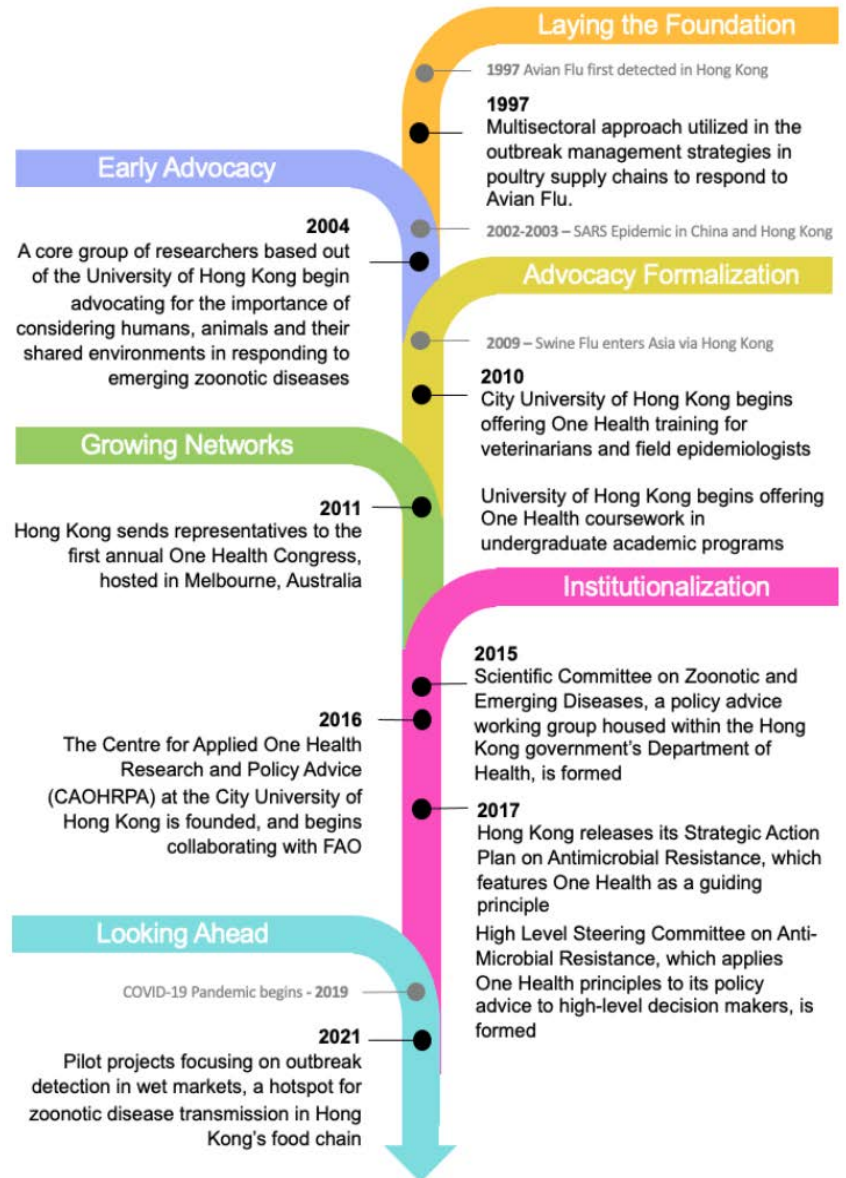


Table 6. Hong Kong and British Columbia demographics

	Population	Population Density	GDP	GDP per capita	HDI (Rating, Rank)	Life Expectancy
Hong Kong (2017)	7.39 million	6659 people/km ²	\$346 billion USD	\$46,820 USD	0.949/1.000 4/189	85 years
British Columbia (2019)	5.07 million	4.8 people/km ²	\$193 billion USD	\$38,067 USD	*Canada 0.929/1.000 16/189	82 years

Bangladesh

Bangladesh is one of the most densely populated countries in the world. Approximately 43.6% of the country's labor force is in agriculture and an estimated 25% of Bangladesh's population is directly involved in livestock raising practices, encountering millions of poultry, cattle, sheep, goats, pigs, and other animals daily.⁴⁰ Interaction between humans and animals remains very high in most parts of the country. Bangladesh has witnessed numerous zoonotic disease outbreaks in the past like Anthrax and Nipah.

ONE HEALTH IN BANGLADESH

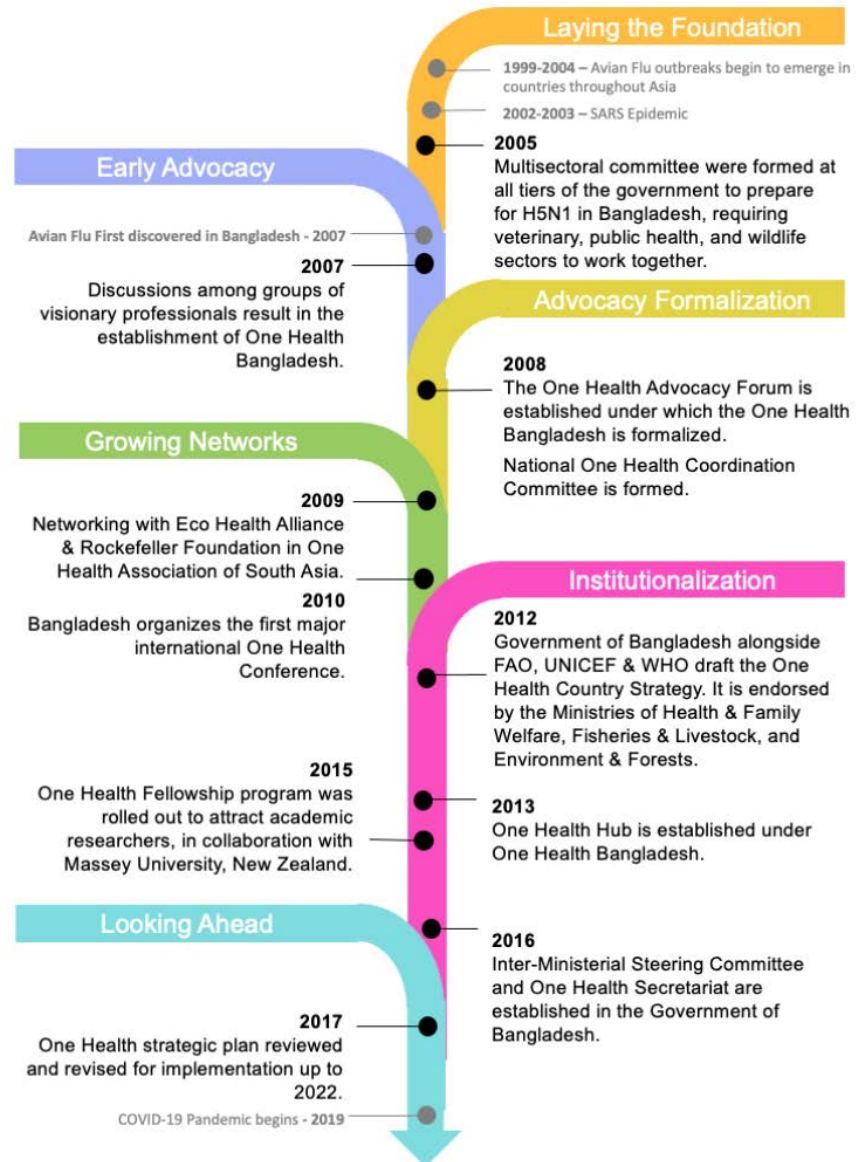


Table 7. Bangladesh and British Columbia demographics

	Population	Population Density	GDP	GDP per capita	HDI (Rating, Rank)	Life Expectancy
Bangladesh (2020)	164.7 million	1265 people /km ²	\$324.2 billion USD	\$1968.79 USD	0.632/1.00 133/189	72.59 years
British Columbia (2019)	5.07 million	4.8 people/km ²	\$193 billion USD	\$38,067 USD	*Canada 0.929/1.00 16/189	82 years

Appendix B: Cross-Jurisdictional Comparison

Table 8. A Comparative One Health Policy Analysis in Asia

	Bangladesh	Hong Kong	Singapore	Thailand
Implementation of One Health policies	<p><u>Coordinating Unit Model</u> Strategic Framework and Action Plan for One Health provides direction on implementation & outlines institutional mechanisms</p> <p>One Health Coordination Committee:</p> <ul style="list-style-type: none"> • Inter-Ministerial Steering Committee (enact strategic plans) • One Health Secretariat (logistics of inter-ministerial collaboration) • One Health Technical Advisory Committee (technical expertise & guidance) • One Health Bangladesh (civil society education & communications platform) <p>Years of experience: 15 Level of integration: ***</p>	<p><u>Working Group Model</u> Anti-Microbial Resistance Strategic Plan emphasizes One Health approach but lacks specific strategy</p> <p>Food and Health Bureau w/ the <u>Depts of Health, Agriculture, Food & Fish, Food & Env Hygiene, & Hospital Authority</u>. Conducive to implementing policies in alignment with One Health.</p> <p>Centre for Health Protection (Dept. of Health) expert committees:</p> <ul style="list-style-type: none"> • High-Level Steering Committee on AMR (provides governance, strategy & oversight) • Scientific Committee on Zoonotic & Emerging Diseases (advisory) <p>Years of experience: 18 Level of integration: *</p>	<p><u>Blended Model</u> Anti-Microbial Resistance Strategic Plan calls for the application of One Health in AMR management.</p> <p>One Health Coordinating Committee: strategic direction across Ministries of Health, National Parks Board, National Environmental Agency, Singapore Food Agency.</p> <p>One Health Working Group: under direction of the OHCC, formulates, coordinates, implements, and reviews programs. Can form working groups.</p> <p>One Health Platform to share information between collaborating sectors has since been dissolved, but annual One Health Congress meetings persist.</p> <p>Years of experience: 14 Level of integration: **</p>	<p><u>Coordinating Unit Model</u> National Strategic Plan for Emerging Infectious Diseases utilizes OH as core guiding principle, calls for collaboration between field experts</p> <p>National Committee formed in 2004 in response to the avian influenza outbreak. Comprises 6 ministers from Health, Agriculture, Commerce, Foreign Affairs, Industry, & Labor.</p> <p>Coordinating Unit for One Health (Min Public Health) shares data, information and resources, and supports OH activities.</p> <p>CUOH Steering Committee (technical & admin guidance)</p> <p>Years of experience: 18 Level of integration: **</p>
Types of professionals involved in OH research & their funding sources	<p>Types of professionals Public health experts (e.g., epidemiologists, geneticists); animal health experts (e.g., veterinarians); environmental experts <i>Climate experts did not play a big role at first, but more playing bigger role now</i></p> <p>Funding <u>International:</u> UN, WHO, FAO, UNICEF <u>National:</u> Royal Veterinary College (UK) <u>NGOs & Other:</u> Relief International, Chatham House, OH Bangladesh trust</p>	<p>Types of professionals Public health experts; animal health experts <i>Absences in research include social scientists and professionals with an environmental lens</i></p> <p>Funding <u>International:</u> WHO, OIE, FAO <u>National:</u> Global Challenges Research Fund (UK); National Institutes of Health (US); International Development Research Centre (Canada) <u>NGOs & Other:</u> Faithful Servant Charitable Foundation (HK)</p>	<p>Types of professionals Public health experts; animal health experts; environmental experts <i>Government labs work with external professionals and academics</i></p> <p>Funding <u>International:</u> potential to access (e.g. PUB ministry is part of the Global Water Research Coalition for public and enviro-health related grants) <u>National:</u> dedicated ministry funding <u>NGOs & Other:</u> Communicable Disease Public Health Research Grant, Industry Alignment Fund</p>	<p>Types of professionals Public health experts; animal health experts; environmental experts <i>Local community and local health experts play a role in research through app reporting</i></p> <p>Funding <u>International:</u> WHO, FAO <u>National:</u> USAID (major donor), Thai gov agencies (MOPH, National Health Security Office, Thai Health Promotion Foundation) <u>NGOs & Other:</u> Pfizer (private funding in AMR)</p>

From research to policy formation	<p>Research labs:</p> <ul style="list-style-type: none"> Laboratory of Food Safety & One Health University collaborations (Royal Veterinary College, Chatham House, FAO, and IEDCR, Sher-e-Bangla Agricultural University, BAU, icddr, US-CDC, FAO, WHO, Massey University) <p>Sharing results: Four-way linkage of animal health epidemiology & lab info with human health epidemiology & lab info. The linking mechanism (proposed by FAO & WHO) continues. Research results are shared among professional groups. They directly inform the OH secretariat to aid decision-making.</p>	<p>Research labs:</p> <ul style="list-style-type: none"> Center for Applied One Health Research & Policy Advice Research projects: Pig, Poultry, Fish (Health & Production), waterborne bacterial exposure, food safety, etc. Standalone research is also conducted by various professionals <p>Sharing results: CAOHRPA does not directly inform the research results and policy options to the government. It contributes heavily to international publications & professional network groups. Being a university lab, research informs policy options in the academic space and not the government directly.</p>	<p>Research labs:</p> <ul style="list-style-type: none"> National Public Health Lab (under Min of Health) + seven public hospital labs Animal & Plant Health Center (APHC) & Center for Animal & Veterinary Services (CAVS): provide diagnostic services for surveillance & monitoring Duke-NUS Medical School research lab <p>Sharing results: The NPHL comes directly under the Min. of Health. Research helps in surveillance & preparedness of highly infectious pathogens. Results directly influence government policies. Duke-NUS research informs policy in academic space.</p>	<p>Research labs:</p> <ul style="list-style-type: none"> Thailand One Health University Network (THOHUN): sponsored by USAID <p>Sharing results: THOHUN is directly involved with assisting the government to train OH workforce & professionals. The centre coordinates with relevant ministerial sectors to develop the OH workforce. Directly works with media for OH advocacy and educating general public on OH.</p>
Inhibiting & enabling factors for One Health Implementation	<p>Enabling Factors Strategic plan for OH vision; inter-ministerial steering committee to monitor OH implementation; OH Secretariat efficient in coordinating operations within the different departments; rotating leadership model where the chair of the committee will rotate once every three years from a different department; research lab & university network maximizes research & info sharing</p> <p>Inhibiting factors More integrated research is required; surveillance is not comprehensive/lacks formal mechanisms</p>	<p>Enabling Factors Centre for Applied One Health Research & Policy Advice focuses on OH research and involves experts from different fields and working group; all depts are grouped under the Food and Health Bureau, with a central decision-making body; High-Level Steering Committee on AMR; vets heavily involved in CityU creating OH as a specialized discipline</p> <p>Inhibiting factors Lacks official OH policies created at the government level (used as a concept rather than policy); freedom of information (i.e., constraints on research/journalism)</p>	<p>Enabling Factors National Strategic Action Plan on AMR; “whole of government” approach & cooperative work culture; One Health Coordinating Committee w/ inter-ministerial cooperation, transparency, & decision-making; OH lab at the national level; training programs for future work force; dedicated gov funding</p> <p>Inhibiting factors Ministry delegates may have opposing agendas or different styles of working which can slow down decision-making; there are different bureaucracy & institutional capacities ministries</p>	<p>Enabling Factors Centralized control of OH under the Ministry of Public Health; coordinating steering committee with a top-down approach in charge of OH policies/programs; funding from MoPH; university network allows public/students to learn about OH & conduct research on pandemic preparedness</p> <p>Inhibiting factors No dedicated OH lab; collaboration may be lacking; the MoPH does not work with other ministries on OH but their training program does involve veterinarians</p>

GLOBAL POLICY PROJECT

APRIL 2022



THE UNIVERSITY OF BRITISH COLUMBIA