Constructing Knowledge and Policies on Avian Influenza:
How Do International Organizations Craft Global Models?

A DISSERTATION
SUBMITTED TO THE FACULTY OF THE GRADUATE SCHOOL
OF THE UNIVERSITY OF MINNESOTA
BY

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IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE DEGREE OF
DOCTOR OF PHILOSOPHY

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May, 2013
Acknowledgements

My dissertation represents the memorable journey and experiences I had during my years at the University of Minnesota. At UMN, I have encountered dozens of remarkable individuals who I wish to acknowledge.

First and foremost, I wish to thank my advisor, Professor Joachim Savelsberg, for being a great mentor during these years. He has been extremely supportive since the early days when I took his theory course. Joachim encouraged me to develop my dissertation idea, guided me through all kinds of applications, and provided precious, constructive comments. He not only provided me with academic guidance but also emotional support through this long, rough road of my PhD candidacy. During the difficult times, Joachim gave me moral support, freedom, and encouragement that helped me move on. Thank you, Joachim, for your wisdom, understanding, and passion as a scholar.

My committee members also inspired and supported me during the process – Elizabeth Boyle, Michael Goldman, and Susan Jones, thank you all for your suggestions, conversations and insights that pushed me to continue. In addition, I wish to thank other wonderful professors – David Knoke, Awa Abdi, Kathy Hull, Teresa Gowan, Ann Meier, Phyllis Moen, Lisa Park, Rachel Schurman, Chris Uggen, and Penny Edgell, who have inspired and encouraged me in different ways. I thank the department of Sociology for being my home for the past few years and providing such a positive teaching and learning
environment. Mary, Hilda, Becky, Ann, you have been the greatest and most helpful staff – we are so fortunate to have you.

To my wonderful friends at the UMN, particularly my data center crew, thank you for enriching my life in Minnesota. Without your company and encouragement, I would not have enjoyed the path as much. Thank you Erika, Wenjie, Meg, Minzee, Dalhia, Cyrus, Jack, and Shi-Rong, for the great breakfast, lunch, dinner and happy hours we enjoyed together. Thank you Liying, Xi, Reiping, Kyungmin, Suh-Ruu, Chia-lin, I-Chun, Pofu, Frank, Jasmine (Trang), Jim, Gulseren, Aysegul, Darin, Raphi, Vania, Artoro, Nicole, Jesse, Andy, Keith, Sinan, Wen, Emily, Andy (Chen-Yu), and Laurie, I will miss your laughter and company as well. Specifically, Sarah Barker, my dear friend and wonderful editor, thank you for your energy and patience. I miss our weekly meetings so dearly.

I thank my interviewees and survey respondents who participated in my fieldwork, shared their opinions with me, or even kindly hosted my visits. My dissertation could not have been finished without your participations. I am grateful to those who generously supported my research. My fieldwork, data collection and dissertation writing has been supported by the following benefactors: the Social Science Research Council; the Chiang Ching-Kuo Foundation for International Scholarly Exchange; the Consortium of Law and Values in Health, Environment and the Life Sciences (UMN); the Office of International Programs (UMN); the Graduate School (UMN); the Center for German and European Studies (UMN); and the Department of Sociology at the UMN. I also wish to thank the
Ministry of Education (Taiwan) and Academia Sinica (Taiwan) for supporting my studies and writing process.

Last but not least, I thank my fantastic family and cats for their understanding and support in my pursuit of this profession. If there are honors, I would attribute the honors to them.
Dedication

This dissertation is dedicated to my family, for loving and always being there for me.
Abstract

My dissertation examines how three specialized international agencies – the World Health Organization (WHO), Food and Agriculture Organization (FAO), and World Organization for Animal Health (OIE) – produced and shaped global authoritative knowledge and policies on avian influenza. Collaboration among international agencies is unprecedented in global governance. My dissertation examines this novel collaboration, specifically, how the three agencies managed to overcome disconnect and competition, and eventually agreed on a One Health policy framework. Besides explaining this policy transition, I reveal how the WHO, FAO and OIE negotiated, constructed, and prioritized their solutions; how they reshaped boundaries between research communities to curate avian flu science; and why gaps between their ideal framework and practices persist.

By illustrating the crucial and influential role of international agencies in science and policymaking, my research contributes to theories on international policy and norm formation. I demonstrate that international agencies are actively involved in global knowledge, policy and norm-making. In this case, they not only manufactured consensus on One Health, but they also influenced the interests and interactions of other global actors such as experts, transnational agribusiness, pharmaceutical manufacturers, and nation states. My work proves that international agencies have autonomy and power independent of nation states, which is often neglected in conventional theories on international relations and policy formation. In addition, my research challenges the conventional unidirectional assumption of the relations between science and policy. My
findings reveal that avian flu science has co-evolved with policies, and that the WHO, FAO and OIE actively mediated the production of avian flu science and One Health knowledge by networking with selected experts. Furthermore, I reveal that international agencies are actors with bounded rationality. Although they demonstrated great capacity to affect other actors’ interests, they are still constrained by their own bureaucratic attributes, the influence of other stakeholders, and political economic realities in the policy arena. Essentially, my dissertation reveals both the power and limitations of international agencies. It contributes to understanding how power is exercised in global governance, and how knowledge, power, and social order are intertwined.
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Chapter 1  Introduction: How Were Global Avian Flu Science and Policies Made?

Background: Unprecedented cross-agency coordination among international agencies

Since its re-emergence in 2003, Highly Pathogenic Avian Influenza (HPAI) has been recognized as a potential candidate for the next global pandemic. Experts fear that it may mutate into a strain capable of human-to-human transmission which could kill millions of people.\(^1\) As a zoonotic disease that infects both humans and poultry, avian influenza challenged not only species barriers and national borders, but also professional and sectoral boundaries. Three principal international agencies – the World Health Organization (WHO), the Food and Agriculture Organization (FAO) and the World Organization for Animal Health (OIE) – rushed to respond to avian flu outbreaks in Asia, Africa and Europe. These three agencies are responsible for public health, food safety and animal health, respectively. Previously operating in their specialized fields, the WHO, FAO and OIE found their work on avian flu control overlapping. They inevitably interacted with each other and began to negotiate policy responses.

These agencies’ tasks were challenging. As the most authoritative sources of information on avian flu, the three agencies validate disease knowledge and recommend policies to national governments. However, due to limited understanding of the disease and complexity of the threats, the WHO, FAO and OIE have contended for conflicting disciplinary perspectives, as well as organizational rivalries. They struggled to provide timely policy responses while simultaneously striving to increase scientific understanding of the viral type that was emerging and rapidly mutating. These international agencies frequently admitted that various knowledge gaps still need to be filled in areas such as risk factors, transmission factors, and the relative contribution of livestock trade and wild

\(^1\) HPAI used to infect only avian species. It had not been reported in humans until 1997 in Hong Kong. During that outbreak, the Hong Kong government destroyed the entire poultry population to control the disease and prevent human infection.
birds to the spread of the virus. Proposed global policies, for example on mass culling of poultry and vaccination campaigns, also incurred criticism with respect to their comprehensiveness and accuracy.

Nevertheless, the WHO, FAO and OIE have established close partnerships which were exceptional for international bureaucracies. Despite tensions and conflicts between these specialized agencies, gradually the WHO, FAO and OIE have established several joint surveillance and response networks since 2004. They agreed on a “One World, One Health” (OWOH, later called One Health) framework in 2008. The OWOH framework emphasizes cross-sectoral and inter-disciplinary collaboration, contradictory to the original design of these international agencies as specialized organizations. Since the endorsement of OWOH, the FAO, WHO and OIE have frequently admitted that their coordination for avian flu control was unprecedented and paradigm-shifting.

Since international agencies endorsed the OWOH policy frame in late 2008, the “Oneness” theme has proliferated in global governance. For instance, international officials called for “One Health, One Message,” which demands a consensus message to be conveyed to member states (Fieldnotes, One Health Congress, 2011). Italian veterinary expert Ilaria Capua promoted “One Flu for One Health,” which analyzed the influenza gene pool originating from all kinds of species as one entity. In a similar vein, the Southern African Centre for Infectious Disease Surveillance (SACIDS) coined “One Africa, One Health,” which aims to facilitate partnership between scientists and institutions of African countries. The Global Risk Forum, an international organization based in Switzerland, organized the One Health Summit 2012, highlighting the theme “One Health, One Planet, One Future.” “Oneness,” being symbolized by boundary-crossing cooperation, has become fashionable in the global policy arena.

Despite their mutual appreciation of One Health, the WHO, FAO and OIE seemed to struggle with putting it into practice. The concept is vague and dynamic. Debates and doubts about the definition and practice of One Health persist during consultation meetings. The WHO, FAO, and OIE preferred universal technical solutions and western
development models. Global avian flu policies hence were criticized for being top-down and technocratic (Scoones and Forster 2008), for ignoring key factors of disease transmission such as industrial farming (Davis 2005, Wallace 2009a), and for representing certain cultural practices as backward or “the other” (Bingham et al 2008). My dissertation aims to investigate how global models of avian flu control have been constructed. Only by analyzing the evolution of avian flu policies, the expertise that underpins these policies, and the contexts where policies were made, can we comprehend how agreements on global solutions are achieved and what their limitations are.

Research questions

My research investigates the construction and evolution of avian flu policies, focusing on the mediating role of the three principal international agencies in legitimizing knowledge, responses, models, and actors’ involvement. I intend to explain how the WHO, FAO and OIE negotiated, constructed, and prioritized their solutions; and why gaps between the ideal framework and actual practices persist. Theoretically, my research contributes to understanding on who makes international policies, and how global consensus on knowledge and policies is achieved. Because multiple international agencies were involved in the policy and knowledge formation process, my research also contributes to understanding of a new phenomenon in global governance – increasing cross-sectoral coordination and collaboration between international agencies. Examining the roles of the WHO, FAO and OIE, my dissertation attempts to answer the following questions:

1. How did the WHO, FAO and OIE, originally framing disease problems through different lenses, manage to achieve consensus and to cooperate? Why did they agree on the One World, One Health framework? Why did these agencies sculpt this seemingly holistic policy frame, while they simultaneously struggled with conceptualizing One Health and putting it into practice?

2. How did the WHO, FAO and OIE, respectively, react and adjust to the new framework – One Health? To what extent have international agencies’ behaviors
changed? Did the three agencies adapt to One Health at similar speed and with similar enthusiasm? Why or why not?

3. Who dominated the production of avian flu knowledge and policies? Who has the authority to determine what knowledge counts and to prioritize avian flu policies? Moreover, after One Health was endorsed, who became One Health experts able to define and develop “One Health knowledge”?

4. Why, despite the emphasis on cross-agency and interdisciplinary collaboration, did global disease response still often dissipate into technical interventions and become controversial? One might expect that cooperation between specialized organizations and experts from various disciplines would enhance the comprehensiveness of global knowledge and policies. Why were global responses to avian flu still criticized for overlooking important aspects, such as how commercial farms may contribute to the spread of viruses and how immunization campaigns intensify global inequality? For example, the FAO and OIE’s farming and trade standards were disparaged for favoring industrial production, and the WHO was disparaged for exaggerating pandemic risks posed by the H1N1 virus in 2009.

The objectives of my dissertation are not simply to examine how international agencies were involved in constructing the policies, but also to understand the influence and limitations of these crucial actors.

**Theoretical frames**

To answer the above question, my dissertation draws from and contributes to the literature on international bureaucracy, sociology of knowledge, science and technology studies (STS), and global governance. My research fills in a research gap in global governance by examining the emerging phenomenon of organizational cooperation. Little research has yet explored the effects of interconnections between multiple international organizations in making knowledge and policies. Most previous case studies focused on either a single organization’s behaviors, or an agency’s interactions with other actors such as states, NGOs, and academics. Very few studies have investigated the
phenomenon of coordination among international governance agencies, when global policies are constructed in a cross-organizational, multidisciplinary, and multi-institutional context. My dissertation hence contributes to understanding this new global governance model.

In general, my research builds on constructivist approaches to policy and knowledge construction. Drawing from the constructionist approach, I focus on how norms, standards and policies evolve by the interactions of social actors. I share basic assumptions of the constructivist paradigm, such as “(a) human interaction is shaped primarily by ideational factors, not simply material ones; (b) the most important ideational factors are widely shared or ‘intersubjective’ beliefs, which are not reducible to individuals; and (c) these shared beliefs construct the interests and identities of purposive actors” (Finnemore and Sikkink 2001: 392-393). Several primary theoretical debates I seek to engage and gaps I intend to fill are as follows.

1. International agencies as a source of norm- and policy-making

My research differs from traditional notions of international policy and norm-making by my focus on the essential roles of international agencies. Scholarship that explains the formation of global models often centers upon distinct global actors or forces, such as states, interest groups, civil societies and epistemic experts. For example, realist international relations literature considers nation states the main actors in international politics (Booth 1991); neoinstitutionalism emphasizes cultural diffusion of science and modernization (DiMaggio & Powell 1983; Meyer & Rowan 1991); the neoliberal school highlights the overwhelming force of an increasingly integrated global market, and the epistemic community theory (Haas 1990, 1992) and STS scholars focus on the influence, networks, and conflicts among scientists (Jasanoff 1990, Jasanoff & Wynne 1998). These theories, though informative, tend to treat international organizations primarily as passive actors. For example, a realist approach looks at how nation states negotiate, debate or wrestle during regulation-making processes. Scholars of this approach mostly examine international politics and interactions among states and/or other crucial stakeholders who
attempt to maximize their political or material interests, such as power, security or wealth. From this perspective, international standards are primarily determined by pure power politics between nation states.

Similarly, a political neoliberal approach to international relations studies, building on game theory and rational choice, similarly pays more attention to the motives for states to cooperate. Neoliberal international relations thinkers argue that states cooperate if an institutional arrangement brings benefits. In other words, international agencies are created in response to state interests, converging states’ interests and shaping their expectations (Krasner 1983). The realist approach is more useful in explaining international conflicts, while the neoliberal approach better explains international cooperation. However, both approaches overlook the relatively autonomous characteristics of international agencies, because both theories consider nation states as the primary units of analysis. In addition, both approaches assume nation states’ interests are external, independent of interactions, and that international agencies are created to fulfill states’ interests. They do not sufficiently account for the effect of social interactions and communication in the international system (Adler, 2002: 99). By focusing on politics and interactions among states and other crucial stakeholders, most international relations and international policy formation literature downplays the crucial and increasingly significant roles of international agencies.

My research diverges from the above assumptions in several ways. I recognize the power and influence of international agencies in crafting global policies. My theoretical standpoint builds on not only social constructivism (Alexandra Wendt 1992) but also on studies on international bureaucracy (Barnett and Finnemore 2004, Goldman 2005, Miller 2007). I draw from social constructivism, which departs from the previous approaches by considering how actors’ cultural values and common interests are learned and shaped

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2 Here I distinguish between political neoliberalism and economic neoliberalism. Political neoliberalism refers to a broad institutional phenomenon based on rational choice, while economic neoliberalism refers to the belief in free market economics and rejection of government intervention.
through their social interactions. I also gain insights from research about how organizational structure and cultures enable, but also limit, organizations’ capacities (Vaughan 1999a, 1999b, Eden 2004; Barnett and Finnemore 2004). Therefore, I argue that global actors, including states and international agencies, can learn to adjust interests, identities, and behaviors by interacting with others. Furthermore, I incorporate a neoinstitutionalist approach, which suggests that organizations are embedded in an institutional environment. Not only are interests of states and elite experts shaped by their social positions, but international agencies are similarly embedded in wider global political economic contexts. I intend to show that international agencies, like states, are actors who adjust their identities, interests and behaviors through social interactions and communication with other global actors.

I conceive of international agencies as a crucial source of policy and norm formation. My study pays particular attention to the roles and interactions of international agencies, examining how they connect, mobilize, empower, or marginalize actors and stakeholders in crafting global knowledge, norms, and responses. I argue that international organizations should be perceived as relatively independent actors with their own logics, norms, and interests. This research thus provides an important alternative organizational perspective to more structural, political economic and epistemic analyses of global policy formation and change. It also illustrates the dynamic relationships between international agencies and other global actors.

2. Internal micropolitics of international agencies

Besides examining the roles of international agencies, my research intends to examine how bureaucrats within these agencies contributed to policy and knowledge production by investigating their day-to-day interactions. Previous literature tends to treat international agencies as unitary actors, and therefore researchers seldom investigated their internal process of decision-making. Little work has been done on how international agencies’ attributes shaped the perceptions and behaviors of their employees and staff.
My research fills in this research gap by comparing experiences and perceptions of bureaucrats across the WHO, FAO and OIE.

My study was specifically built on sociological theories of bureaucracy and organizational studies. This scholarship highlights how bureaucratic structure and organizational cultures provide cognitive and normative maps which guide individuals’ perceptions and behaviors (Barnett and Finnemore, 1999, Trondal et al. 2010). For example, Olsen (2001) points out that everyday decision-making processes in international bureaucracies are compound, because these organizational systems often need to balance competing dynamics of actors, interests, decision-making arenas, and values sequentially and simultaneously. Abundant research has illustrated that bureaucratic organizations tend to resist change due to specialization and professionalization (Peabody1995, Hagan et al. 2006). Researchers have also found that features of bureaucracy can cultivate a “bureaucratic personality” (Merton 1957), and organizations’ structural secrecy and hierarchy normalized risk-taking and corner-cutting in the decision process (Vaughan 1996). Undesirable organizational behaviors or performance generated from bureaucratic structures and processes constitute the dark side of organizations (Vaughan 1999a).

Informed by the abovementioned theories, I examine the influences of two crucial organizational features of international agencies – their internal hierarchy and their control over technical expertise and information (Barnett and Finnemore1999). According to Barnett and Finnemore (1999), rational-legal authority, stemming from both normative inclines and bureaucratic organizational characteristics, is a primary source of international organizations’ legitimacy. Barnett and Finnemore (1999, 2004) note that international agencies tend to utilize rules, procedures, and standards to justify global policy decisions. Another source of these agencies’ legitimacy stems from making advantageous use of knowledge, especially scientific knowledge and associated technical expertise. Due to the great effect of organizational hierarchy and technical expertise on international agencies’ power, I intend to look into these two features and examine how
they enable or constrain officials’ adaptive behaviors, and how their day-to-day interactions shape international agencies’ behaviors.

3. Science across expertise boundaries

My research also examines whether and how multi-disciplinary science is possible. The production of avian flu knowledge requires the expertise of more than one discipline. A range of researchers, such as influenza experts, vaccinologists, epidemiologists, veterinarians, and ornithologists, have contributed to avian flu science. Their relations, similar to those among international agencies, were previously disconnected or competitive. I therefore draw on theories on how science is produced across expertise boundaries.

Previous literature provides divergent theoretical concepts on how scientific knowledge is communicated among experts within and across disciplines. Two theoretical approaches—boundary maintenance and boundary crossing—predict different outcomes of interdisciplinary collaboration. The boundary maintenance approach highlights social processes through which professionals seek to maintain disciplinary boundaries and engage in boundary work (Gieryn 1983). Studies have shown that experts found it difficult to cross expertise boundaries due to disciplinary epistemology (Lamont and Molnar 2002), methods being used (Hagan et al. 2006), political cultures and national styles of reasoning (Miller 2005). According to this approach, professionals deploy cultural boundaries of scientific and technical knowledge by distinguishing their professions from others and by competing for jurisdiction.

A contrasting approach emphasizes possible mechanisms facilitating communication among experts of disciplinary subsections or among various disciplines. For example, communication could be facilitated by creating “trading zones” (Galison 1997) or by shared perspectives and worldviews (Haas 1990, 1992). Scholars of this boundary crossing approach have examined various social locations for consensus building. For example, the epistemic communities approach (Haas 1990) emphasizes how consensus
emerges among scientists due to their shared knowledge and policy enterprise. In this perspective, professionals of an epistemic community, despite disciplinary differences, share ways of knowing, patterns of reasoning, and perspectives on policy agendas. I argue that it is necessary to consider how scientists weigh evidence, resolve conflicts, and obtain consensus. Incorporating established studies, I intend to reveal a more complex and dynamic perspective on science that takes place across disciplinary boundaries. I examine how both forces, the persistence of disciplinary boundaries and consensus-building mechanisms, are functioning when interdisciplinary communication is institutionalized.

4. Science and policy interplay

My research further examines the relationship between science and politics. Scholars hold divergent perspectives on the relationship between scientific knowledge and policy decisions. One perspective, the epistemic community approach suggests a rather linear relationship between knowledge and policies, i.e., policies are made based on scientific advancement (Haas 1990). By contrast, scholarship in science and technology studies (STS) reveals close intertwining of scientific knowledge and policy-making processes where science and political power are “coproduced” (Jasanoff and Wynne 1998, VanDeveer 2004). For example, researchers in global studies, international relations and sociology have revealed that international organizations shape global social order by actively deploying knowledge and expertise to help develop policies (Barnett and Finnemore 2004, Miller 2007).

My theoretical frame challenges the linear model suggested by the epistemic community approach (Haas 1990). My empirical evidence also shows that international organizations have been making policy decisions when scientific understanding of the disease is still incomplete. Realizing that international agencies played a significant role in making avian flu science, I specifically use organizational studies to examine how organizational attributes and involvement affect knowledge making (Vaughan 1999b, Eden 2004).
Specifically, previous research has found that the very organizational features that enable organizations to produce knowledge and policies may also carry bias and limit their capacities. Bureaucratic characteristics, for example, are frequently identified as sources of difficulties in transmitting, communicating, and processing complex information within organizations, even if they are developed to increase efficiency (Eden 2004; Vaughan 1996, 1999b; Barnett and Finnemore 2004). This is in line with Vaughan (1999b) who concludes that organizations working on techno-scientific knowledge constantly seek to reduce uncertainty and disagreements by engaging in “fact-hardening mechanisms.” Through these mechanisms, scientists and technical experts reaffirm their perspectives by gathering, processing, interpreting, negotiating, and using scientific information to support their prior positions. Informed by this literature, my project examines how intergovernmental organizations serve as causal mechanisms that co-produce scientific knowledge, policies, and the social order. I argue that international agencies could play a significant role in mediating the conflicts and interactions among scientists. I therefore investigate the basis and mechanisms international agencies use to prioritize some kinds of knowledge or perspectives as they strive for consensus, and how international agencies serve as causal mechanisms that co-produce scientific knowledge and policies.

5. Limitation of global knowledge

Last but not least, my study explores the challenges international agencies face in devising holistic solutions to intricate problems. Such exploration contributes to our understanding of international bureaucracy, a specific kind of organization that attempts to manage complex global issues. Recent studies of global authoritative policies have also noted that despite their normative commitment and the composition of professionals, international organizations frequently fail to achieve their missions. At times they actually generate new problems because of those strategies (Barnett and Finnemore 2004, Goldman 2005, Hagan et al. 2006). Global knowledge and solutions have been criticized for various shortcomings, such as ignorance of local knowledge (Ferguson 1990), the
assumption of universal modernity favoring technology and interventions that may not be practical or possible in reality (Ferguson 1990, Scott 1998, Mitchell 2002), and the reinforcement of power inequality (Sikkink 2002, Brooth 2004). Scholars attribute the partiality or restrictions of global knowledge and policies to different causes. Some attribute these problems to the context in which knowledge is produced, pointing at the hegemony of global capitalism (Goldman 2005), or at organizations’ bureaucratic structures and cultures (Barnett and Finnemore 1999). Others attribute them to the contested nature of scientific knowledge, contrasting disciplinary assumptions (Hagan et al. 2006) and the uncertainty and controversies inherent in science (Gupta 2004).

My research draws and expands on the theoretical investigation of organizational pathology (Barnett and Finnemore 2004). I argue that neither organizational context nor scientific controversies can exclusively explain the construction and limitation of global knowledge and policies. In addition to examining organizational characteristics and environmental factors, I consider the relationships among agencies, and whether and why interactions among actors facilitate or impede their mutual understanding.

My central argument is that international agencies are crucial global actors who constantly seek to secure their own resources, establish legitimacy, deploy technical expertise, shape expert networks, and craft global responses and norms. I incorporate the international bureaucracy literature with other lines of scholarship, revealing how international agencies actively mediate actions and interactions of other agencies, states, experts, and stakeholders to construct knowledge and global policies. By showing the conflicts and coordination among the WHO, FAO and OIE, and tracing how they have strove to reduce tensions between themselves and between crucial professionals, my research shows that these institutions are relatively autonomous actors with their own logic, interests, and practices. My thesis thus enriches theories of organizational autonomy and organizational collaboration in global governance.

To summarize, my research attempts to reveal how global policies are manufactured at the nexus of science, politics, and economics through the mediation of international
agencies. I argue that international bureaucracies should not simply be seen as forums or surrogates of other states or interest groups. Instead, they actively affect the interests and interactions of other stakeholders. Inevitably, their policy solutions are reciprocally affected by interactions among these actors. By revealing the intricate process of science production and policy formation, this study provides an alternative organizational perspective to previous state-centered analyses of global policy formation and change. Using avian flu as an example, my work answers crucial questions about why certain global models and norms arise and gain legitimacy; how disease science and global politics mutually shape each other; and what the consequences of intensified globalization and global governance are. By focusing on the responses, interactions and gradual adjustments of the WHO, FAO, and OIE, my dissertation sheds light on sociological explanations for the ability and limits of international agencies, the social construction of disease knowledge, and how institutional structures enable and/or constrain our capacity to respond to complex global challenges proficiently.

Methods

My research pays specific attention to debates and negotiations on policy formation, which continuously shape global avian flu policies. Investigating these intricate policy processes among three bureaucratic organizations and other stakeholders has been challenging. I employed multiple methods over a period of four years to examine both institutional structures/mechanisms and individual interpretations of crucial policy decisions. My methodological approach, informed by STS and organizational studies, focuses on studying moments of change, challenge and controversy in the knowledge and policy making process. To understand how international agencies are involved in making knowledge and policies, I propose that it is necessary to consider competition and negotiations taking place between these agencies, within each agency, and among various stakeholders who interact with these agencies. I therefore examine how contested scientific and policy claims were interpreted, negotiated, modified, and utilized.
My empirical data were collected in various ways, including collecting and studying policy documents, conducting semi-structured interviews and surveys, and analyzing research publications. First, to explain changes in global avian flu policies over time, I used archival analysis and in-depth interviews to identify organizational policy stances of the OIE, FAO and WHO, their competing policy frameworks about disease control, the shift of organizational policy frames over time, organizational characteristics, and inter- and intra-organizational consensus-building mechanisms between 2003 and 2010. I particularly traced the emergence of the new policy framework “One World, One Health.” Documents analyzed include policy recommendations, reports, bulletins, website pages such as WHO’s fact sheet, OIE’s Scientific and Technical Review, and FAO’s Understanding Avian Influenza. I interviewed 39 officials at the WHO, FAO and OIE whose work was relevant to avian flu control between 2008 and mid 2010.

I focused on interviewing officials at the WHO, FAO, and OIE, omitting the UNSIC, UNCEF, and World Bank, because the former three agencies specifically are considered having technical expertise on avian influenza. Due to the Institutional Review Board (IRB) requirement, I agreed to maintain the confidentiality of my informants. Interview quotes are hence presented in coded informant number (code number – year). These interviews, ranging from a half-hour to two hours, complement text material by revealing insider’s perspectives on conflict and consent in the policy process. Through these interviews, I identified crucial mechanisms and sites in which knowledge and policies were shaped, how international agencies interacted with other actors, and actors’ personal experiences regarding policy formation and transition. Based on these data, I constructed four ideal-typical policy intervention frames to serve as my analytical scheme, including the biomedical/technocratic, societal intervention, ecological conservation, and OWOH policy frames. Each entails distinctive assumptions about disease epidemiology and favors dissimilar intervention strategies, which I describe in chapter two.

3 OIE’s Scientific and Technical Review contains up-to-date scientific information for animal health governance, specifically addressed to national and international policy-makers and the veterinary community.
Second, to explain the scientific debates over avian flu and how distinct professionals contributed to avian flu knowledge of the four policy frames, I collected and analyzed scholarly publications on avian influenza in the prestigious journals *Nature* and *Science* between 1997 (when highly pathogenic avian influenza was first detected in humans in Hong Kong) and 2012. I utilized these data to investigate how different research communities studied avian flu, what they identified as research problems and what causal frameworks and methods they tended to use. I selected *Science* and *Nature* for the following reasons: First, articles in the two journals are recognized as prestigious among members of the scientific community. Second, neither magazine is discipline-specific, which allowed me to examine whether research approaches differ by discipline. The third reason is that *Science* and *Nature* contain not only original research but also reports on scientific debates and breakthroughs. This additional information provides a rich narrative resource to illustrate the overall picture of the growth, obstacles, and challenges of scientific activities. I argue that scientific updates in these two magazines offset the representation problem of analyzing only published work in specialized journals, where the time lag between achieving research results and publishing can be significant. Due to the process of reviewing and revising articles in specialized journals, journal articles may not be as current as *Science* and *Nature* articles are.

Articles in *Science* and *Nature* were identified through online searches, using the keywords “avian influenza,” “avian flu” and “bird flu.” Between 1997 and 2012, 137 articles in Nature and 267 articles in Science contain these keywords. They include original research, reports, research highlights, reviews, and letters and communications. If limited to original studies, the article number is reduced to 34 and 35 respectively. I used the frames I had previously identified (see chapter two) to code and analyze these articles. My analytical approach is to depict the overall trend of scholarly work, to identify dominant frames, to investigate major controversies, and to examine their policy implications.
Third, to examine the development and relationship between international agencies and experts, I surveyed experts who had contributed to avian flu policy discussions at these international agencies. I intentionally identified consultants in a broad sense, including experts who have served on committees and working groups, participated in all kinds of technical meetings, working groups, conferences of the FAO, OIE, and WHO, or who had conducted reports or research for these organizations. The list of survey participants was created by examining documents and proceedings of these meetings and identifying their contact email addresses. They included actors who had served on organizations’ technical committees, attended scientific or technical conferences or meetings, or received research funds from these organizations. Fifty-seven consultants and experts (out of 438) responded to my survey. Given this low response rate, results will be interpreted cautiously. The survey collects information on topics such as experts’ educational backgrounds and nationality, how they participated in policy discussions, and whether and how they interacted with international agencies (see survey questionnaire in Appendix 3). Table 1.1 summarizes the backgrounds of survey takers. In addition to the survey, I conducted participant observation at two international conferences (2007 Paris and 2011 Melbourne). Further, I visited two reference laboratories in 2010, and interviewed six consultants face-to-face or by phone to understand their first-hand interpretations of the consultations process. Although the response rate of this survey was not satisfactory, the results add to and are consistent with responses to my in-depth interviews. The survey allows me to investigate whether and how consultancy mechanisms transform or filter scientific understanding into policies. My research objective, however, is not just to describe how avian flu knowledge and policies evolved. Rather, I try to reveal the power dynamics involved in the process between bureaucrats, expert groups, and interest groups by explaining the dominant perspectives of bureaucracies, antagonisms between professionals, the ordering of scientific knowledge, and economic and political interests that are at play during the process. As a result, my discussion and analysis has been centered on a few major controversies, including debates over migratory birds’ role in disease transmission, conflicts over data sharing between experts, disputes about the extent to which industry farming or backyard farming
practices are accountable, construction of global biosecurity regulations, and WHO’s controversial vaccination strategies. Because these debates involved different actors and stakeholders, I was able to identify the multifaceted roles international agencies have played in different contexts.

Table 1.1 Summary of survey takers (N=57)

<table>
<thead>
<tr>
<th>Gender</th>
<th>Male</th>
<th>44 (77.2%)</th>
<th>Female</th>
<th>13 (22.8%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average age</td>
<td>50</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Training background (multiple choices)</td>
<td>Veterinary</td>
<td>31 (54.4%)</td>
<td>Virology+ Immunology + Medicine</td>
<td>24 (42.1%)</td>
</tr>
<tr>
<td>Affiliated agency</td>
<td>World Health Organization</td>
<td>16 (28.07%)</td>
<td>Food and Agricultural Organization</td>
<td>21 (36.84%)</td>
</tr>
<tr>
<td>Employment by</td>
<td>Government departments/ agencies</td>
<td>31 (54.4%)</td>
<td>Academic institutions</td>
<td>11 (19.3%)</td>
</tr>
</tbody>
</table>

Chapter organization

My dissertation includes eight chapters. Except for the first introductory and last concluding chapters, each chapter investigates and answers a specific empirical question. Having provided a general introduction to my research questions, theoretical background, and research methods in this first chapter, I now move on to introducing six thematic chapters.

Chapter two traces and explains the evolution of global avian influenza policies. Specifically, it explains the emergence and institutional endorsement of “One World, One Health” (which was later officially named One Health) despite the vagueness and versatility of this concept. I found that One Health evolved with the changing relationships of the WHO, FAO, and OIE. They grappled with tensions between
competing frames and divergent bureaucratic interests, and the One Health policy frame served as a boundary object to reduce conflicts and increase harmony among these agencies.

Chapter three investigates how three agencies reacted to their “arranged marriage” and One Health; and how professionally-trained bureaucrats at each organization reacted to intensifying coordination. I explain the variations in these agencies’ interests in One Health by examining their organizational attributes. By comparing the WHO, FAO and OIE’s variation, I found that organizational attributes are interdependent with their staff’s micropolitics and working dynamics, which affect officials’ willingness to engage in boundary-crossing behaviors. The more hierarchical and less diversified an agency is, the more reluctant its staff was to engage in boundary-crossing behaviors that One Health demands.

Chapter four explains why avian flu science has been more and more “biotechnicalized.” I found that avian flu science has grown unevenly and explain why biotechnological laboratory research on avian flu has become imperative. Specifically, international agencies’ emphasis on surveillance contributed to the preponderance of laboratory science. Before One Health emerged, researchers had been isolated or and in competition due to disciplinary and methodological differences. The advance of biotechnology, which allows laboratory scientists of veterinary and public health camps to investigate invisible viruses, made them influential knowledge producers. However, the necessity for and competition over access to viral samples for research intensified tensions between researchers and subsequently changed their relations. Some veterinarians began to partner with international agencies to resolve the tensions over sharing virus and genomic isolates. This chapter illustrates how laboratory-based scientific inquiries and policy attention to disease surveillance are mutually reinforcing.

Chapter five explains how a One Health epistemic community was gradually assembled and shaped through the intervention of international agencies. For the purpose of deliberating and defining One Health strategies, the WHO, FAO and OIE mobilized
experts from their reference laboratories and collaborating centers. International agencies consciously affected the international expert networks, and previous affiliation with policy organizations became a crucial basis for determining expert power and influence. The emergence of the One Health community, instead of simply growing out of shared understandings and goals, was intentionally constructed by international agencies. Although international agencies have attempted to expand the networks, experts affiliated with their laboratory networks are still crucial participants in defining and fulfilling One Health.

Chapter six examines the FAO and OIE’s assumptions, perceiving industrial poultry as a solution rather than a likely source of disease transmission. The organizations' policy solutions, such as “biosecurity” and “compartmentalization,” evolved with the goal of protecting the continuity of meat trade, and were promoted by powerful transnational agribusiness. The analysis shows how bureaucratic attempts to promote a compromise-based, modern and universal solution may reinforce the influence and scale of resourceful actors.

Chapter seven explains WHO’s controversial responses to the H1N1 flu pandemic in 2009 by examining its organizational practices and cultures. Criticism of WHO’s recommendation to stockpile vaccines reflect the agency’s systematic weakness due to biomedical-centric strategies. The development, manufacturing and use of the artifact – pandemic vaccine – has political effects on the relative power of international players and normalizes the lack of transparency in decision-making. This case illustrates the unexpected consequences of expert-dominated vaccine campaigns and decision-making in global health politics.

My last chapter, eight, summarizes my findings and draws conclusions. I summarize the complex and dynamic interactions between global governance agencies, epistemic groups, nation states, and private-sector actors in the construction of avian flu science and policies. I suggest, on one hand, the resilience of international agencies which are capable of establishing new working relationships, new norms and standards, and shaping other
actors’ interests and interactions. On the other hand, I also highlight structural constraints that compromised international agencies’ attempts to achieve a holistic policy solution. Furthermore, I discuss the limits of international agencies to respond to increasing comprehensive problems.

My thesis thus advances our understanding of the making of authoritative knowledge, the relations between contested science and policy making, and the legitimization and reinforcement of policies in a concrete institutional and multi-organizational setting. I hope that these findings provide valuable practical insights for future policymaking regarding complex challenges in a globalized world.
Chapter 2 Manufacturing the “One World, One Health” Framework

Introduction: The emergence of One World One Health

Since late 2003, worldwide outbreaks of Highly Pathogenic Avian Influenza (HPAI) in poultry have raised serious global concerns over a possible pandemic. Scientists warned that the avian flu virus posed great pandemic threats because it might evolve into a new viral type capable of human-to-human transmission. Multiple inter-governmental organizations rushed to develop control and prevention policies against H5N1 avian influenza. Three international agencies are most closely associated with the tracking and control of avian flu, including the World Health Organization (WHO), Food and Agriculture Organization of the United Nations (FAO), and World Organization for Animal Health (OIE). As a disease that infects both animals and humans, HPAI challenged pre-existing specialized international governance institutions and professions.

Distinct mandated responsibilities, interests, and perspectives of these international agencies soon resulted in inter-agency conflicts and tensions. The WHO, FAO and OIE are responsible for public health, food safety, and animal health, respectively. They tended to govern specific domains and seldom shared jurisdiction. Conflicts regarding policy prioritization immediately appeared. For example, WHO prioritized the necessity of strengthening pandemic preparedness, while OIE and FAO were more concerned with addressing the problem at hand – eradicating viruses in poultry. FAO official Phil Harris, for example, stated that “it is clear that avian influenza remains a potential risk to humans but a real risk to animals.” In addition, tensions often escalated due to divergent professional perspectives from which these agencies draw. For instance, public health experts at WHO and agricultural economists at FAO and OIE disagreed on large-scale culling of potentially infected birds. While WHO encouraged this strategy to avoid human infections, FAO and OIE were less willing to do so due to its impact on the food

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4 Harris was the Information Officer of FAO’s Emergency Centre for Transboundary Animal Diseases (ECTAD). His article was released in 2006, available on FAO’s website: http://www.fao.org/avianflu/en/issue.html.
system and market. OIE’s Director-General, Dr. Vallat, challenged WHO’s position by stating.

“Let us not forget that the WHO defines human health as not merely the absence of disease or infirmity but a state of complete physical, mental and social well-being. Thousands of farmers, firms and employees in the poultry industry all over the world are going to disappear pointlessly. Who is going to compensate them for their distress? How long before we can say ‘never again’?” (Vallat 2005).

Despite tensions and disagreements, international agencies frequently expressed the need for global collaboration. The WHO, FAO and OIE developed a few collaborative platforms, such as the Global Early Warning System for Major Animal Diseases, including Zoonoses (GLEWS), OIE/FAO Network of Expertise on Avian Influenza (OFFLU), and FAO/OIE Crisis Management Centre for Animal Health (CMC-AH). In late 2008, a significant policy shift took place, when WHO, FAO, and OIE, along with the United Nations Children's Fund (UNICEF), United Nations System Influenza Coordination (UNSIC), and the World Bank, jointly endorsed a “One World, One Health” (OWOH) policy framework. Taking this concept from the Wildlife Conservation Society (WCS), these agencies (re)defined OWOH as a cross-sectoral and interdisciplinary approach that recognizes risks at human-animal-ecosystems interfaces. One World One Health (OWOH), later officially called “One Health,” has now become a shared guiding principle for global disease prevention and control. Since then, the WHO, FAO, and OIE have held and supported numerous meetings, conferences, and training sessions to contemplate and promote One Health. As a European Commission officer Alain

5 OFFLU was renamed as the OIE/FAO Network of Expertise on Animal Influenza after the H1N1 influenza pandemic in 2009.
6 The WCS’ One World - One Health™ was also called the 12 “Manhattan Principles.” Its primary argument was to approach the prevention of epidemic/epizootic disease and the maintenance of ecosystem integrity holistically. For details, see http://www.wcs.org/conservation-challenges/wildlife-health/wildlife-humans-and-livestock/one-world-one-health.aspx
Vandermissen stated, “One Health is now more infectious than the disease [avian influenza].”

Many experts and international officials regarded the adoption of OWOH as unprecedented and paradigm-shifting in global governance, since it demonstrated the commitment to closer organizational collaboration. In their tripartite concept note, the three agencies state that they “realize that managing and responding to risks related to zoonoses and some high impact diseases is complex and requires multi-sectoral and multi-institutional cooperation” (FAO, OIE and WHO, 2010). However, OWOH was not clearly conceptualized when adopted and is still evolving. A series of conferences and meetings have been subsequently organized to elucidate its implementation. This chapter attempts to explain why the WHO, FAO, and OIE settled on and advocated OWOH despite its vagueness. It traces the evolution of global avian flu policies to clarify the emergence, consolidation, and shared appreciation of this policy frame. I argue that this global policy shift cannot be understood without examining the role of key organizational actors, who actively manufactured a new frame to reduce conflicts and strengthen legitimacy in a complex, globalized world.

Gaining insights from organizational research, I focus on the roles of international agencies, which connect, mobilize, empower, or marginalize actors and stakeholders in crafting global norms, knowledge, and policies. Specifically, by showing the conflicts, debates, and coordination among the WHO, FAO, and OIE, I demonstrate that the agencies are relatively autonomous actors with their own logics, interests, and practices. On one hand, they strove to reduce tensions between themselves. On the other, by advocating new policy frameworks, they affected and reshaped the interests and behaviors of other external actors.

In the following sections, I first elucidate how the agencies utilized three competing policy frames in the early stages between 2003 and 2008, and how a OWOH framework

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7 The speech was made at the first One Health Congress in Melbourne, Australia, 2011.
blended these three frames to create functional consensus. Further, I explain how officials of these agencies perceived the change and the potential and limits of the new policy frame. The findings reported here are primarily based on an analysis of policy documents from these three agencies and interviews with 39 officials at these agencies, conducted between 2008 and mid-2010. Documents include disease situation updates, technical guidelines, standards, recommendations, reports of organizational activities, and meeting minutes. The interview examined officials’ responsibilities, opinions, and experiences during avian flu policymaking.

Inter-agency tensions and competitions: 2003-2008

International agencies intended to maintain the specialization between sectors and agencies. Bureaucrats often insisted on division of labor and carefully avoided stepping on other agencies’ toes. Despite their shared responsibility in managing animal diseases, several OIE officials reminded me that implementing policies was “FAO’s work.” One official explained, “The FAO sometimes consulted with us. We give them our recommendations, but we don’t have offices in the countries to implement policies” (O2-2008). Another official emphasized, “Even though we appreciate collaboration, we still have different responsibilities and missions” (O7-2009). Similarly, WHO seldom dealt with issues of animal health. When the Influenza A/H1N1 pandemic occurred in 2009, FAO’s spokesperson denied human contagion by claiming that FAO only works on animal health issues, thus would not investigate the human-to-animal link.

Despite efforts to avoid duplications in their work, tensions still intensified due to resource competition. Mounting fear of a global pandemic made the WHO quickly dominate global policy discourses and attract enormous attention and resources. By contrast, the FAO and OIE, both interested in the poultry sector, primarily framed the problem from a veterinarian perspective. Conflicts were particularly severe between the public health (WHO) and veterinarian camps (FAO and OIE) in their fight over legitimacy and resources. The FAO and OIE’s relative periphery position made them allies for obtaining recognition. For instance, the Director-General of OIE, Dr. Vallat,
called for prioritizing improving veterinary systems in Asia in late 2005. He argued that “the global cost of such a programme is far lower, for example, than the very high cost of stockpiling antiviral drugs currently being undertaken by the rich countries to prepare for a possible pandemic.” He further argued that a pandemic would be less likely to occur, “had these same countries helped the poor countries of Asia at the start of the crisis in 2003, as we and the FAO suggested at the time but to no avail” (Vallat 2005).

Hence, FAO and OIE officials frequently expressed their dissatisfaction with WHO’s dominance, both in public and private. When I conducted interviews in 2008, one FAO official expressed his dissent about the marginal position of his agency. He said,

“You are interested in the topic and you come to interview me only because it [avian flu] threatens people. Right now avian flu is a hot topic, but that’s because it threatens people, not because it’s a poultry disease. The disease has existed for a long time, and nobody except veterinarians cared about it until now. But the WHO has taken the leading role now” (F4-2008).

Similarly, OIE and FAO officials’ frequently commented that “animal diseases seldom attracted this intensive attention by the international community before” (FAO 2007b), revealing their dissatisfaction with the situation and attempt to obtain more recognition. Officials often perceived these inter-agency tensions as being rooted in their different perspectives on disease control, as I depict in the next section.

**Competing fragmented frames: 2003-2008**

Between 2003 and 2008, the WHO, FAO and OIE drew from three competing frames to prescribe the solutions for avian flu outbreaks – the technical/biomedical intervention, societal intervention, and ecological conservation frames. These three “fragmented frames,” as I will call them, are often proposed and supported by distinct types of professionals. I identified these frames through document analysis and interviews based
on the epidemiological assumptions and proposed control strategies entailed in policy arguments (see table 2.1 below).

Table 2.1 Four policy frames

<table>
<thead>
<tr>
<th>Frame</th>
<th>Fragmented frames</th>
<th>One World One Health</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Biomedical/Technical Frame</td>
<td>Societal Frame</td>
</tr>
<tr>
<td>Norms</td>
<td>Modernity Development</td>
<td>Equality Empowerment</td>
</tr>
<tr>
<td>Knowledge</td>
<td>Virus behaviors Artifacts (anti-virals, vaccines)</td>
<td>Human behaviors and cultures</td>
</tr>
</tbody>
</table>

1. Technical/biomedical intervention frame

The First frame, a technical/biomedical intervention frame, saliently dominated policy deliberation of these agencies in the early stage. Its rationality is deeply rooted in science and technical progress. Experts in virology, microbiology, and veterinarian epidemiology and medicine constituted this frame’s knowledge foundation. They assume that modern science, technologies and pharmaceuticals are the basis for disease control and prevention. In this frame, the problem is primarily perceived as a battle between the virus and human beings. Using this frame, international agencies often portrayed H5N1 viruses as invisible and ever-changing entities that threaten global health and security. They therefore prioritized studies on the pathogen’s features, such as its molecular or genomic compositions, its infection and replication mechanisms, and the development of efficient vaccines and antiviral drugs. The frame also assumes unidirectional disease transmission, in which viruses infect wild birds, wild birds transmit the viruses to poultry, through which viruses reach humans.
Three guiding principles of the technical intervention frame direct its policy implementations. First, the pathogen should be identified and wiped out as soon as it appears. The earlier the pathogen is recognized, the more likely the virus can be eradicated before it spreads. Based on this assumption, killing the vectors, i.e. infected poultry or other animals, became the most efficient way to control infectious diseases such as avian flu, foot-and-mouth disease, and bovine spongiform encephalopathy (BSE). A second principle is to maintain strict biosecurity measures between contaminated and healthy populations. “Biosecurity,” in this technical frame, prevents malicious pathogens from invading “clean” populations. Building fences, disinfecting properties, wearing protective suits are all recommended biosecurity measures. A third principle is to use modern artifacts, such as antiviral drugs and vaccines, to control or prevent viral transmission and replication. For example, antiviral drugs like oseltamivir help to confine infection to a smaller area within the infected animal. These drugs function by blocking a surface enzyme (neuraminidases) in the virus, which permits newly-formed viruses to leave infected cells. By binding to neuraminidases, antiviral drugs confine viruses within infected cells and prevent them from spreading. The WHO, FAO and OIE thus proposed strategies to either eradicate the virus directly or to impede its transmission by applying modern artifacts.

Initially, the technical/biomedical frame prevailed in global policy deliberations. The three agencies, however, advocated dissimilar technical interventions due to diverse technical expertise. For example, FAO and OIE recommended biosecurity measures in poultry farms and markets. They urged farmers to build fences, disinfect poultry entities, adopt centralize slaughter, and avoid unhygienic practices to prevent the intrusion of viruses. The WHO also encouraged pharmaceutical development and stockpiling of drugs, in line with its public health policy. This technical/biomedical frame is fundamentally expert-dominated, because only experts, particularly those with biomedical expertise, can fill current knowledge gaps and develop the magic bullet to defeat the viruses. Overall, the WHO, FAO and OIE’s strategies have centered on fighting the pathogen, and their initial consensus was to “stop it spreading, find it fast, and kill it quickly” (FAO 2008).
2. Societal intervention frame

Despite sharing the technical/biomedical frame, the three agencies still experienced great conflict when they competed for limited funding resources. Dissatisfied with WHO’s pandemic preparedness campaign, FAO and OIE claimed that it was more efficient to control the disease at the animal source. Around 2004 and 2005, the two agencies began to utilize a different frame – the societal intervention frame – to legitimize and distinguish themselves from the WHO.

The societal intervention frame, mostly advocated by economists and social scientists, highlights how social and cultural factors complicate disease transmission and the implementation of control strategies. Instead of exclusively focusing on the pathogen, it emphasizes understanding of the underlying factors and drivers of disease emergence, and the need for changing human activities. Humans, in this frame, are not merely passive victims of H5N1 viruses but social actors influenced by broader structures, such as economic conditions, social trends, and cultural beliefs and practices.

The societal intervention frame highlights how human activities affect disease transmission or the effectiveness of interventions. For example, some experts argued that women and children who are often responsible for raising poultry may be at higher risk; legal or illegal trade of birds and bird products may facilitate virus transmission; and certain husbandry practices such as backyard farming or intensive farming may cause threats. This frame thus recommends tailoring control strategies for particular cultures or societies. Diverse diagnostic explanations and control strategies co-exist in this model due to the diversity of socioeconomic conditions around the world. While some intervention strategies are less radical, such as promoting health education and compensating farmers for their loss, some are more radical, such as condemning and banning modern factory farming (Wallace 2009a). Furthermore, this frame takes into account the social and financial impact of disease control policies. Generally, the frame advocates more bottom-up strategies and promotes community-based programs. Most of
its strategies require long-term investments, in contrast to contingency responses of the technical frame which emphasize efficient turnout.

FAO and OIE’s advocacy for the societal frame could be seen as an organizational strategy to enhance their political legitimacy. First, by increasingly emphasizing poverty alleviation, they challenged WHO’s insistence on stamping out poultry and legitimized their policy stances. The two agencies argued that economic concerns resulted in farmers’ reluctance to report suspicious outbreaks. They also noted that mass culling of poultry often results in the poor losing their main source of protein. Bringing in the societal frame therefore strengthened the FAO and OIE’s legitimacy in seeking to address the problem at the agricultural sector. Since 2005, the FAO and OIE started to recommend compensating farmers to encourage disease reporting and acceptance of culling. FAO further proposed Pro-Poor Risk Reduction Strategies to protect and enhance smallholders’ livelihoods in developing countries.

3. Ecological conservation frame

A third frame, proposed mostly by ecological biologists, conservationists and ornithologists, focuses on wildlife and ecosystem protection. This frame emerged in 2005, when the role of wild birds in disease transmission became increasingly controversial after an outbreak in China's remote Qinghai Lake. No scientific research has yet drawn convincing conclusions on whether wild birds carry HPAI viruses during long-distance migration, due to the difficulty of large-scale wildlife surveillance research. Despite scientific uncertainty, this frame argues that the emergence and spread of infectious diseases was mostly due to ecosystem degradation. The frame is thus more sympathetic to wild birds, compared with the other two frames. While the technical/biomedical frame assumes wild birds are dangerous vectors that spread viruses to poultry and humans, advocates of this frame suggest that wild birds might be victims of outbreaks from intensive poultry farms.
Specifically, some wildlife experts criticized that global policy priority has been given to short-term technical strategies, “namely on fixing the problem rather than preventing the factors that first led to its emergence” (Rapport 2006: 2-3). For example, a report published by the United Nations Environmental Programme (UNEP) identifies ecosystem degradation and ecological imbalance as root causes of emerging diseases (Rapport 2006). This frame argues that some farming practices may exacerbate disease spread, such as crowded conditions of factory farms, waste run-off from farms to wetland where migratory birds gather, and the inadequate use of antiviral drugs that drives the mutation of influenza viruses. BirdLife International, an international non-governmental organization (NGO) for the conservation of birds, argued,

“The role of wild birds must be seen in the much larger context of the global poultry industry and the movements of huge quantities of poultry products around the world. Focusing on wild birds alone is misplaced and a potentially dangerous diversion of energy, effort and resources. Attempts to cull migratory wild birds or destroy their habitat are highly misguided - experience shows that this approach is completely ineffective, and indeed is likely to make matters worse”. (Bennun, 2006)

Proposed strategies of this frame thus seek to protect ecosystem health and wild birds. Wildlife experts also argued that it is necessary to control human interaction with wildlife, such as regulating the wildlife market, bushmeat trade, and the international trade in wildlife.

The FAO and OIE soon responded to criticisms from wildlife experts by incorporating this ecological conservation frame. They periodically and increasingly stated the necessity of investigating the role of wild birds in disease transmission. For example, one FAO’s press release states that:

“FAO has been calling for such research [on wild birds] since early 2004, but insufficient resources have been allocated to be able to study the question
properly…As an international agency which has invested considerable resources in numerous aspects of biodiversity preservation and conservation, FAO would be the last to pinpoint wildlife as the sole source of virus dissemination.”

FAO and OIE thus organized an international scientific conference on avian influenza and wild birds to review the latest scientific knowledge in 2006. In addition, the FAO initiated a working group to address wildlife disease surveillance. Evidently, the ecological conservation frame strengthened these two agencies’ legitimacy in advocating for policies that represented their priorities, interests, and technical expertise. They promoted interventions that required the specific veterinary expertise they were qualified to fulfill.

Between 2003 and 2008, WHO, FAO and OIE often picked up different pieces of arguments from the three frames depending on the occasion. Dissimilar underlying assumptions made the FAO, OIE and WHO seem incoherent, sometimes even contradicting themselves. Among the three agencies, the WHO has tended to favor one-size-fits-all biomedical interventions, while FAO’s policy arguments and programs have been more diverse and fractured.

The convergence on the One World, One Health policy framework – 2008 to 2012

Experiencing inter-agency conflicts, WHO, FAO and OIE gradually recognized that divisions and tensions jeopardized global health governance and the organizations’ legitimacy. The WHO, FAO and OIE began to recognize that lack of cooperation between sectors hampered cross-species disease surveillance and efficient global responses. In 2005, they initiated collaboration to reduce antagonisms. Specifically, cross-agency coordination first commenced to strengthen disease surveillance by sharing information on outbreaks among agencies. The WHO, FAO, and OIE established working relationships through the GLEWS, OFFLU, and CMC-AH. The GLEWS, for example,

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tracks potential pandemic threats by exchanging outbreak information, and the OFFLU promotes the exchange of scientific information and biological materials among scientists. The three agencies also began to organize joint technical meetings and the International Ministerial Conferences on Avian and Pandemic Influenza. They acknowledged that physicians, veterinarians, and other health and environmental professionals should work closer to strengthen the knowledge foundation for global health governance.

With increasing interactions, initial tensions between agencies were gradually transformed into harmony. In my later field visits around and after the endorsement of One World One Health, officials’ sentiments of tension and competition seemed dramatically reduced, replaced by general appreciation for One Health. Many officials recognized that such intensive collaboration across agencies was extraordinary. One WHO official noted, “collaboration among agencies has never occurred at this level [i.e. among high-level officials] and in such scale. In the past, we collaborated on some topics or projects, but usually between departments. Avian flu has shifted the paradigm” (W10-2009). Similarly, another OIE official commented:

“We [the three agencies] have also learned to come together, sharing the work in a coherent way. This idea [One Health] has to be brought to the political level. We need to make more effort to persuade politicians and donors that inter-agency work is important. We have found common places on avian influenza. Now we have common missions, and there is a common structure in place. Maybe we are more creative in new cases [i.e., HPAI]” (O10-2009).

Most cross-agency interactions were established to regulate issues about trade. WHO and FAO also had previous coordination experience before HAPI outbreaks, particularly on the food safety sphere. They developed the Codex Alimentarius Commission in 1963 to develop and maintain the texts of the FAO/WHO Codex Alimentarius, which is a collection of internationally recognized standards, codes of practice, guidelines and other recommendations relating to foods, food production and food safety. Another example is the development of the International Portal on Food Safety, Animal and Plant Health (IPFSAPH) by a consortium of agencies. The IPFSAPH is an online source to facilitate international trade in food and agricultural products.
Another WHO official commented that “a little overlapping is better than distance” (W10-2009). Officials’ increasingly reiterated of the importance of partnerships since 2009 revealed that international bureaucrats began to see collaboration as beneficial.

It was roughly at this time when One World One Health attracted attention from these institutional actors. The slogan “One World, One Health” (OWOH), first coined by the Wildlife Conservation Society (WCS) in 2004, initially did not receive much political attention. During the fifth International Ministerial Conference on Avian and Pandemic Influenza in 2007, the conference background paper “the New Delhi Road Map” highlighted the need for convergence between the animal health and public health sectors. The OWOH principle was recognized, and participating national delegates requested that these international agencies prepare a strategic frame to guide country responses. The FAO, WHO, OIE, UNICEF, UNSIC and the World Bank thus jointly produced and endorsed the “Contributing to ‘One World, One Health’ Strategic Framework” during the following International Ministerial Conference on Avian and Pandemic Influenza in 2008. This document was exclusively drafted and discussed among six officials from these six agencies, without consulting external experts. It laid out five main strategies geared to reducing risk at the animal-human-ecosystems interfaces. Specifically, this framework highlights a cross-sectoral and multidisciplinary approach which recognizes the intricate relationships between human, animal and ecosystem health. This frame also calls for knowledge on complex interconnections between virus, human activities, animal populations and ecosystems. After this conference, the OWOH policy framework became the guiding principle for global health governance, which proposes that managing novel pathogens requires collaboration between different professions and between international agencies.

The five strategies in the OWOH policy framework include 1) Building robust public and animal health systems that comply with the WHO’s International Health Regulations and OIE standards, 2) Preventing and controlling disease outbreaks by improving national and international response capacities, 3) Addressing the needs of poor populations by shifting focuses to developing economies and locally important diseases, 4) Promoting collaborations across sectors and disciplines. 5) Conducting research that guides the development of targeted disease control programs.
In principle, OWOH seeks to combine the three competing fragmented frames discussed above, acknowledging that multiple factors contribute to disease transmission. It also seems to merge all values emphasized by the three fragmented frames, including modernity, social empowerment, and sustainability. Seemingly holistic, the frame was primarily conceptual and not clearly defined when it was released. Most officials at the three agencies recognized that the OWOH slogan is “catchy” and “appropriate.” However, until 2009 when I interviewed most officials, they could not articulate its meaning and practical steps. To most of them, OWOH is more of an abstract concept than a set of concrete policies.

To translate this abstract framework into action, WHO, FAO, and OIE subsequently organized several consultation and technical meetings. For example, in 2009, the Public Health Agency of Canada’s (PHAC) hosted a consultation meeting in Winnipeg. In May 2010, the Centers for Disease Control and Prevention (CDC) of the US hosted another consultation meeting to operationalize the concept. In February 2011, Australia’s Commonwealth Scientific and Industrial Research Organization (CSIRO) hosted the first One Health Congress to showcase relevant research and policy implementation. In 2011, the Mexican government hosted another high level technical meeting to address health risks at human-animal-ecosystems interfaces. Meeting participants were mostly invited international experts of medical or veterinarian backgrounds, officials of international agencies, and national delegates from both the public health and agricultural sectors. Since 2008, the three agencies have frequently expressed their enthusiasm for OWOH. In 2010, the FAO, OIE, and WHO (2010) jointly published a Tripartite Concept Note to reiterate their commitment to inter-agency collaboration. They also changed OWOH to “One Health” to recognize the WCS’ possession of the original phrase.

In the meetings to conceptualize One Health, nonetheless, participants struggled to give One Health a clear definition. After a FAO-OIE-WHO joint technical consultation in 2008, meeting participants agreed that “it became clear that this concept [One Health] was not new; however, the roles and strategies of all the players globally are not fully
understood nor effectively integrated” (FAO, OIE and WHO 2010: 13). Some meetings concluded that clear definitions and consistency of One Health was necessary. Most of the time, the scope of OWOH was left open or carried to the next appropriate meeting. One OIE officer summarized what she observed at the Winnipeg 2009 meeting:

“For some people [at the meeting], this [OWOH] means to investigate the animal-and-human interface, while others believed that food security is more important. Still other experts thought that health issues should be more broadly-defined, including not only disease prevention but also healthy life styles. The final consensus of the meeting was that One World, One Health could mean whatever people want to. Each country can emphasize any aspect relevant to the animal-human-ecosystem interfaces.” (O9-2009).

This vagueness persists. In the first One Health Congress in early 2011, experts and public officials still struggled to come up with a consensual definition. For example, in the opening plenary speech, one senior FAO official commented,

“One Health means different things to different people. If you ask ten people here, you may get ten different ideas. We may not eventually obtain an agreement on One Health in this room. However, all of us believe that it is important…During the next three days, we will discuss and conceptualize One Health in order to put our words to practice” (Fieldnotes, One Health Congress, 2011).

Experts participating in the Congress continued to debate the scope and definition of One Health. Some insisted on focusing on infectious diseases, while others believed that One Health should include promoting healthy lifestyles and securing nutrients. Several participants and speakers recognized that having a clear definition of One Health was difficult and that stakeholders were still free to prioritize tasks differently. Many experts also agreed that relevant programs and policies should be nation-dependent. Because, stakeholders have distinctive interests, they could prioritize One Health tasks in their own ways.
Interestingly, despite One Health’s vagueness, policy makers, experts, and international agencies all welcomed this concept. The endorsement of One Health clearly did not result from a solid scientific understanding of the complex epidemiological dynamics – international agencies and experts repeatedly recognized knowledge gaps in disease transmission mechanisms (see chapter four and five). Neither could the policy shift be entirely attributed to international politics, because most powerful nation states and donors were more interested in efficiently containing diseases from threatening the West.

The endorsement of OWOH, I argue, was mostly driven by the tensions and growing interactions between specialized international agencies in an increasingly globalised world that challenged the legitimacy of specialized governance institutions. It became a step toward appeasing cross-agency contradictions and forging consensus among them and with other global actors, such as divided professionals, self-interested nation states, and development-oriented donors. By merging different normative claims, knowledge foundations, and policies from fragmented frames, the WHO, FAO and OIE attempted to reduce cross-agency conflicts, avoid criticisms, and create global consensus that facilitated coordination.

**Functional consensus despite diverse interpretations**

The political function of OWOH was illustrated by officials’ diverse and sometimes contradictory interpretations of this concept. My interviews disclosed three distinct perspectives regarding OWOH, by those who bought into the idea, others who were content with current technical cooperation, and yet others who considered OWOH a strategic response. Yet, international officials all welcomed One Health no matter which perspective they held.

First, some officials were culturally adapted to OWOH. They whole-heartedly embraced One Health, praising it as a momentous paradigm shift in global governance. For instance, a WHO official commented that OWOH was “a new perspective that international organizations encompass.” She elaborated, “We’ve learned the importance of cooperation over the years” (W10-2008). Another FAO official said,
“One Health is to broaden the veterinary approach. In the past, you wait for the disease to emerge; you respond to it, you get rid of it. In One Health, you try to understand the factors that lead diseases to emerge. You try to broaden the spectrum of professionals: use communication specialists, socio-economists, bring doctors and vets together” (F9-2010).

These officials were enthusiastic about capturing “a big picture” of disease epidemiology.

Other officials took a continuity approach to OWOH. They believed that OWOH just consolidated ongoing inter-agency cooperation in global disease surveillance. One WHO official commented, “Some people consider OWOH a new idea, but actually we have been doing this for a long time. We just didn’t use this phrase” (W8-2009). He, along with other officials, considered One Health a reaffirmation of their ongoing technical collaboration rather than a paradigm shift. Another WHO officer held a similar opinion, arguing that OWOH just crystallized what had happened:

“It gives it a name. An expectation of a name seems to make sense. It helps us to capitalize what we have achieved and show that we can do more….It’s just a concept, a vision. Hopefully it will underline the work we do.” This interviewee continued, “I don’t want to see a new program that diverts the attention to the animal and human interface, because it’s already been there” (W7-2009).

Another FAO official explained, “For avian influenza, it’s already been One Health. Because this is a zoonosis, it has to be interdisciplinary” (F14-2009). Some argue that the principle only “put what the organizations had been doing in words” (W10-2009).

Lastly, several officials adapted to the OWOH frame for rational reasons. They considered OWOH beneficial for sustaining donors’ interests and investment in avian flu. For them, the adoption of OWOH was, at least partially, a strategic move. It was advocated primarily for reigniting global attention to avian flu prevention and control. During my fieldwork in 2009, several officials expressed anxiety about “avian flu
fatigue,” i.e., fading global attention to avian flu because the expected pandemic had not occurred. For example, an OIE official commented, “People in the public health and financial organizations were preparing for something that doesn’t come. Since bird flu has not occurred, donors would gradually lose the interest in AI (avian influenza) programs” (F4-2009). Similarly, another expert replied in the survey,

“It is unfortunate that international interest, in terms of funding, appears to be diminishing. Funds are needed to apply essentially existing knowledge, in structured and controlled ways, to the blocking of transmission of infection among poultry in countries where the disease is said to be ‘entrenched’. Progressive cycles of intervention with rigorous monitoring and evaluation are needed and would be expected to reduce the level of disease in poultry” (S37-2010).

To these concerned international officials and experts, the OWOH frame helped refocus global attention, particularly the financial commitment of donors such as the European Commission, U.S. Agency for International Development (USAID), and World Bank. Many officials emphasized that, “We have to let the funding agencies understand that the investment is beneficial” (F9-2010). Another WHO official added, “Each organization has its own agenda. We find the collaboration beneficial. But we need political support to make it happen” (W6-2008). Another consultant similarly commented, “It [One Health] is repackaging of what has been happening for the past 30 years to make it more attractive to donors - there is a need for cross-disciplinary coordination, but it has always been this way” (S17-2010).

Noticeably, no matter how these bureaucrats interpreted One Health, they recognized its significance. The three agencies also attempted to redefine the meanings and strategies of One Health by initiating discussions among international agencies, experts, and donors through organized meetings and conferences. Their shared enthusiasm but dissimilar interpretations of One Health illustrate the frameworks’ function as a “boundary object” (Star and Griesemer 1989). The WHO, FAO and OIE have strategically used this
evocative symbol to transform tensions between agencies and professions to coordination. One Health thus seemed to bind actors with heterogeneous perspectives and practices together to work toward one objective.

One Health comprises characteristics of a boundary object for being both robust and flexible. Star and Griesemer (1989) state that a boundary object is “plastic enough to adapt to local needs and the constraints of the several parties employing them, yet robust enough to maintain a common identity across sites” (1989: 393). Similarly, Shackely and Wynne (1996) also state that flexibility in interpreting scientific uncertainty facilitates interactions, translation, and cooperation between science and policy worlds. They use the term “boundary-ordering device” to describe uncertain discourses that “allow actors to define their interests, build alliances, map out futures and construct identities rapidly and across many domains” (Shackely and Wynne 1996:280). In the case of avian flu policies, OWOH precisely served the function of a boundary object. On one hand, specialized organizational actors and experts supported One Health due to their common objective in promoting heath. By recognizing that human, animal and ecosystem health are intertwined, One Health legitimized participation by all agencies knowledge and policy construction. On the other hand, One World One Health is open to many different readings. It allows dissimilar interpretations, as it includes all the essentials of fragmented frames, recognizes every possible epidemiological factor, and affirms different values. As an all-you-can-eat buffet type of framework, OWOH allows users to identify with different pieces of the frame. The “productive vagueness” of One Health as a result facilitates communication among previously independent social worlds. OWOH created a “structured disunity” (Halfon 2006), i.e. sets of equivalences that function as if they were the same.

Consequently, OWOH created a sense of harmony across agencies and stakeholders with dissimilar interests. They may not necessarily interpret and implement OWOH in the same way, yet they now share a common vision and a commitment to “get along” (Halfon 2006). Under the big umbrella of OWOH, individual bureaucrats, organizations, and
experts downplayed their conflicts and competition and agreed that they are, in fact, complementary. Disputes over prioritization were somewhat alleviated, as they no longer needed to choose one over another. The three agencies also established collective legitimacy by providing cultural and symbolic resonances, so One Health became a promising and investable global agenda. According to FAO’s budget estimate in 2010 (FAO 2010a), the financial requirement for One Health over five years (2011-2016) is about US$500 million, including US$300 million at the country level, US$125 million at the region level, and US$75 million at the global level.

By now, most international officials and experts have accepted that global problems are systematic. For example, the FAO claimed that One Health facilitates “understanding complexity, dealing with the unknown, and responding to uncertainty” (FAO 2010a). One Health has been promoted in a policy advocacy genre, appearing in positive, optimistic, abstract, and obscure tones. International bureaucrats and experts often exploited phrases such as public good, capacity building, and collaboration to demonstrate its comprehensiveness and merits. Policy recommendations also frequently include abstract phrases such as “life-span science,” “whole of government,” “whole-of-society,” and “public-private partnership” strategies. In a sense, One Health seems very much like “sustainable development,” a concept that was developed to appease conflicts between economic development and environmental conservation. One Health reveals that consensus can be “simultaneously official and superficial” (Vaughn 1999b: 928).

**Conclusion: A double-edged policy framework**

The evolution of OWOH in response to avian flu outbreaks demonstrates the influence of international agencies on global policymaking and policy change. The globalization of pathogens has not only penetrated national boundaries, but it also challenged existing specialized bureaucratic governance systems and professional production of disease knowledge. The political endorsement of One Health resulted neither simply from scientific advance nor from powerful states’ or donors’ foresight and influence. Rather, this chapter argues that the OWOH policy frame gained prominence with the influence of
principal international agencies. They are key actors who constantly seek to secure their own resources, establish legitimacy, deploy technical scientific and technological expertise, and craft global responses and norms. Competition and coordination between the WHO, FAO and OIE essentially shaped and promoted this new global health governance regime, which has now gone beyond avian flu and extended to other infectious diseases and pandemic threats. Ongoing institutional promotion and articulation of One Health illustrates that international agencies, though limited by their mandates and technical expertise, are not static. They can proactively respond to challenges, conflicts, and criticisms by adjusting policy claims and frames.

This research therefore contributes to international bureaucracy literature by showing how world organizations shape disease knowledge and political policies by interacting, mobilizing and networking with other global actors. The WHO, FAO and OIE strategically borrowed the concept OWOH from the WCS, transformed it into an overarching political principle, and consistently reconstructed its meaning and implementation. The emergence and popularity of OWOH can be attributed to negotiation and compromise between these principle organizational actors. It became widely appreciated before a clear definition and agreement on practical strategies was achieved. By adopting OWOH, the WHO, FAO and OIE not only reduced tensions among themselves and advanced their own legitimacy, but they also reshaped the institutional environment and interests of other stakeholders. For instance, these agencies began to encourage scientific investigations of the animal-human-ecosystem interfaces. They advocated for collaboration between medical, veterinary, wildlife and other professionals. The WHO, FAO and OIE also began to cultivate expert networks for One Health through organized consultation and technical meetings. Some experts and public officials have now identified themselves as One Health advocates and practitioners. In addition, these agencies sought to motivate donors and member states to continue investing in disease control and pandemic preparedness. Several officials emphasized the importance of “educating” donors and of encouraging nation states to promote One Health. As one FAO official commented, “It is very important to convince donors to
support OWOH. Because donors are like politicians – they are usually more interested in emergency responses rather than long-term programs” (F4-2010).

Moreover, this research complements the neoinstitutionalist approach by illustrating where new global norms and models come about. Neoinstitutionalism elucidates how broader cultural beliefs structure organizational cognition and guide their decision-making (Schofer et al, 2012). However, where these norms and rules emerge from and how they become crystallized has not been completely explained. Neither has much work explored how organizations respond to multiple, and sometimes competing, logic. This study shows that integration and abstraction could be one organizational strategy in response to norm contradictions. The WHO, FAO and OIE have shrewdly merged dissimilar values and knowledge claims to avoid tension and criticism. They incorporated distinct norms, including scientific advancement, social justice, and ecological sustainability, into an all-inclusive framework. The three fragmented frames, rather than succeeding one another, were blended into one frame. Evidently, the WHO, FAO and OIE, along with professionals and other global actors, have attempted to (re)construct OWOH through numerous technical, consultation and political meetings. Its meaning has been fluid and varying with different contexts and users.

With its flexibility, OWOH has both potential and limits. Although OWOH provides functional consensus due to its versatility, this very characteristic could prevent fundamental cognitive and behavior changes. Its vagueness allows different, or even conflicting, interpretations and strategies to coexist. With no concrete strategies except the need for collaboration, it could be rather ceremonial. WHO, FAO, and OIE’s earlier interventions have been criticized for advocating top-down and technocratic approaches (Scoones and Forster 2008) for ignoring key factors of disease transmission, such as intensive commercial farming (Davis 2005, Wallace 2009), and for representing certain farming practices as backward or “the other” (Bingham and Hinchliffe 2008).

Although OWOH incorporates fragmented frames, it does not always promise policy changes. Some officials and experts who held strong presumptions and beliefs in the
technical/biomedical frame could embrace OWOH without shifting their perspectives. Rather, OWOH may downplay tensions and essential differences between frames. Most international officials have quickly learned to speak and apply the new pattern of reasoning by developing optimistic statements and abstract blueprints. If an official perceives One Health only as a strategy to avoid tensions or to refocus political attention, he or she can still practice the dominant technical/biomedical frame without converting to the seemingly holistic One Health perspective.

Officials, in addition, tend to resist change. When I conducted interviews in 2009 and early 2010, some officials recognized that the political endorsement of OWOH had not considerably changed their work given that cross-agency technical cooperative programs had already been established. Several officials confirmed that, “We are doing the same work, whether we have this phrase OWOH or not” (F14-2010, interview). Another WHO official insisted that OWOH is only a concept. He said, “Don’t think that it [OWOH] is something that’s too concrete. It’s a new concept. We are not aiming at producing new programs….There are partnerships to advocate the new concept, to use the concept. But those are partnerships, not new programs” (W8-2009). These officials’ perception of the continuity of previous work suggests that international agencies tend to maintain their governance territories and resist the changes in bureaucratic structure that One Health demands.

In the age of globalization, a framework like OWOH, with a more sophisticated understanding of disease causality and management, is certainly welcome by many actors. Undoubtedly, improved cross-sectoral surveillance platforms such as the GLEWS have facilitated quick detection and contingency responses to disease outbreaks. Despite these improvements in technical cooperation and strategies, it is uncertain whether the WHO, FAO and OIE will overcome barriers of bureaucratic divisions, professional specialization, and international politics.

In the next chapter, I will explore these agencies’ adaption and resistance to One Health by investigating their behavior toward change. I move on to examine how the three
agencies reacted to the new One Health policy frame differently due to diversity in their organizational attributes and internal micropolitics.
Chapter 3 Organizational Variation in the Shift to One Health

Introduction: Different levels of eagerness for boundary-crossing collaboration

Growing emphasis on collaboration highlighted in One Health has not only challenged the specialization between international agencies, but it also presents an open question about whether and how international agencies overcome specialization and whether their bureaucrats embraced the new collaborative paradigm. This chapter explains whether and how the WHO, FAO and OIE initiated and encouraged boundary-crossing collaboration by examining the day-to-day experiences of their bureaucrats. I found that organizational attributes shaped officials’ experiences of and attitudes toward One Health, and these individual experiences, in turn, shaped organizational behaviors.

As the previous chapter illustrates, collaboration was a novel behavior for these international agencies. Before global avian flu outbreaks, the WHO, FAO and OIE seldom worked closely together. Each of these agencies governed its specific jurisdiction, and had little interest in crossing institutionally constructed boundaries. For example, William Karesh, the leader of the Field Veterinary Program of the Wildlife Conservation Society, once criticized the traditional separate governance model in the management of complex diseases:

“Now, why can’t we get more of that done? Because it doesn’t fit into the traditional agency model. The agriculture group says, “That’s not my job; my mandate is just for the livestock.” And the human health people say, “That’s not my job.” And the wildlife health people traditionally say, “That’s not my job.” And none of them, probably, have enough money to do everyone else’s work.”

Avian flu challenged this status quo by revealing the incompetence of the system and stirring tensions among these agencies. The WHO, FAO and OIE therefore began to

experiment with models of collaboration, specifically on disease surveillance. Most officials commented that the inter-agency disease surveillance network was an exemplary behavioral change resulting from One Health. Bureaucrats of these agencies subsequently had to engage in collaborative work. Later, the One Health policy frame (initially called “One World One Health,” OWOH) further encouraged cross-agency and inter-disciplinary collaboration in global governance.

However, the three agencies and their officials seemed to react to this One Health frame with different levels of eagerness, despite the fact that all of them agreed One Health was necessary and attractive. Of the three agencies, the FAO has been more excited about the concept and invested in One Health. By contrast, the WHO and OIE considered collaboration only on disease surveillance. For example, WHO’s attention was primarily on improving modern technologies and artifacts such as antiviral drugs and vaccines. This agency’s framing of the problem and response was dominated by the biomedical/technical frame. The WHO only occasionally incorporated strategies of a societal intervention frame, such as encouraging social mobilization and improving public communications. This agency showed no interest in engaging with the environmental conservation framework. A WHO senior official commented that OWOH demonstrated the political will for agencies to work in a collaborative manner, but she insisted that the definition of OWOH should be interpreted narrowly. She emphasized that the WHO was not interested in environmental health in itself:

“We [the WHO] worked on diseases that affect humans and animals. We may consider how humans and animals are infected by diseases due to the environment they share, but not environmental issues in general.” (W-10, 2009)

Similarly, OIE generally considers its contribution to One Health advancement of veterinary expertise and technical capacities, such as the capacity to quickly detect disease incursions and rapid respond to animal disease outbreaks. OIE’s recommendations on farm biosecurity primarily buttressed the technical frame, which focuses on impeding viral transmission. Since 2005, the OIE at times considered
strategies of the societal intervention and ecological conservation frame, but these statements and announcement were mostly made in cooperation with the FAO. For example, the OIE and FAO challenged WHO’s preferred strategy of mass poultry culling\textsuperscript{12} and they jointly recommended compensating farmers for their loss.\textsuperscript{13} Since 2006, OIE has also increasingly emphasized the necessity of investigating the role of wild birds in disease transmission. Despite the fact that the OIE has been more enthusiastic about One World One Health, OIE set its primary focus on improving veterinary expertise and capacities. Both the WHO and OIE insisted on realizing One Health by implementing discipline-based technical tasks. Their officials more frequently defended preexisting division of labor between public health and animal health sectors.

Compared to the WHO and OIE, the FAO has developed a more aggressive attitude toward One Health. Although FAO’s initial recommendations and responses were also mostly technically oriented, this agency invested more in diversified projects, such as conducting socioeconomic and market-chain studies in affected countries, and participating in international wildlife surveillance programs.\textsuperscript{14} In 2010, FAO listed One Health in its organizational agenda, drafted its own One Health Concept Notes, and initiated a five-year One Health Programme.\textsuperscript{15} By the summer of 2010, the FAO had held

\begin{itemize}
\item Recognizing that poultry is often a main source of protein and cash income for the poor, the OIE and FAO became increasingly reluctant to recommending a stamping out strategy. They more frequently proposed providing rehabilitation, education and financial assistance to affected farmers. In 2005, FAO and OIE jointly stated that “For ethical reasons, it is no longer considered acceptable to control and eradicate diseases mainly by applying mass killing of animals” (FAO and OIE, 2005: 49).
\item Since 2007, the OIE and FAO began to propose long-term strategies such as studying “socioeconomic factors, impact of disease and control programs on the food security of the most vulnerable, protect of biodiversity, and restructuring of poultry industries and farming systems” (FAO and OIE 2007: ii, 1). They also stated that control strategies should be “technically sound, economically sustainable, ecologically appropriate, and socially acceptable” (FAO and OIE 2008: 7).
\item For example, the FAO developed standardized field research techniques and participated in a Scientific Task Force on Avian Influenza and Wild Birds since 2007.
\item According to FAO’s Media Center, the One Health initiative was targeted with priority to action in South, Southeast and Central Asia, Africa, Latin America and the Caribbean - regions particularly vulnerable to the emergence and re-emergence and spread of infectious diseases. Actions envisaged included: 1)enhancement of disease early warning and detection systems; 2) strengthening of capacity for surveillance and response; 3) identification and assessment of disease drivers in food animal production and natural resource management; 4) strengthening of the capacity of public veterinary services in preparation, prevention and response to animal disease occurrence; 5) assessment of the social and economic impact of diseases; 6)
\end{itemize}
several internal meetings to promote One Health, attempting to spread the concept to tasks beyond avian influenza control.

FAO officials generally have seemed more enthusiastic about One Health than those in the WHO and OIE. One FAO GREWS official reflected, “Now it’s all about One Health [regarding FAO’s projects]” (F14-2010). During the same field visit in 2010, I also witnessed a complex conceptual map of One Health laid out on a white board in one of my interviewees’ office, which demonstrated FAO’s effort to conceptualize this concept and draft its own version of One Health. The official in charge of conceptualizing FAO’s version of One Health (F18) listed several interpretations on the board. His original draft was circulated and commented on by several colleagues who were also responsible for avian flu control. Another FAO official recognized that “FAO’s One Health is managed by itself” (F2-2010). He explained that the reason the FAO attempted to work by itself was to avoid duplication. The FAO deliberately developed One Health strategies that did not overlap with those of the WHO and OIE to prevent “asking money from the same donors to do the same things” (F2-2010).

Comparing the reactions of the three agencies to the shift toward One Health, we witnessed dissimilar levels of eagerness to expand tasks and engage in boundary-crossing activities. Why did these agencies respond to One Health with different levels of eagerness? What factors contributed to the variance of their responses? In this chapter, I explain the differences across organizations and between bureaucrats by looking into their organizational attributes and arrangements. I argue that organizational attributes shaped internal micropolitics among officials, which subsequently shaped the way in which these bureaucrats and their agencies reacted to One Health. In other words, officials’ willingness to cross expertise boundaries was associated with the organization’s internal culture and incentive mechanisms. I will show how an agency’s organizational

attributes shaped whether and how its bureaucrats adapted to or resisted change toward One Health.

**Theoretical standpoint: Internal micropolitics within international agencies**

In the previous chapter, I have shown that the meaning of One Health varied across agencies and users. Because One Health is still evolving, my study does not intend to assess whether One Health was successfully implemented. Rather, I attempt to understand under what conditions an organization and its bureaucrats are more willing to engage in collaboration across preexisting agency governance and professional boundaries, and under what conditions they are reluctant to do so.

Previous literature, due to research focus on the functions and activities of international agencies, tends to treat international agencies as unitary actors. Little research investigated their internal processes, such as how micropolitics and dynamics affect bureaucrats’ attitudes and behaviors. My research fills in this gap by comparing experiences and perceptions of bureaucrats across the WHO, FAO and OIE. I draw from organizational studies that highlight how organizational structure and culture provide cognitive and normative maps that guide individuals’ perceptions and behaviors (Barnett and Finnemore, 1999, March and Olsen, 1998, Trondal et al. 2010). Specifically, Weber’s theory of bureaucracy ([1904-05] 2001) provides the fundamental framework of my analysis, because international agencies are essentially bureaucracies with political responsibility. As marked by Weber, the division of labor, hierarchy, and specialization of tasks and goals allow these organizations to serve their purpose efficiently (Weber [1904-05] 2001, Barnett and Finnemore 1999). Nevertheless, bureaucracy has also been proven counterproductive to organizational resilience. I argue that we need to investigate

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16 Weber ([1904-05] 2001) defines bureaucracy as a highly-centralized organizational form. According to him, modern bureaucracy has the following characteristics: 1) a bureaucracy is hierarchical, 2) jurisdictional areas are clearly specified, 3) it is impersonal, 4) abstract rules govern decisions and actions, and 5) officials are hired according to their specialized expertise and merit. As the common modern organizational form, bureaucracy embodies rational-legal authority by following rule-bound and merit-oriented arrangement.
the decision-making process inside these agencies to understand how bureaucrats deal with the contradictions and dilemmas they face in their daily activities.

My focus is on two primary characteristics of bureaucracy – professionalization and hierarchy – because these two factors are primary sources of international agencies’ authority and capacity. These two factors also significantly affected organizational behavior. First, professionalization can positively or negatively affect international performance. For example, Deflem (2002) found that bureaucratization and professionalization of police institutions in different countries contributed to international cooperation on crime control. However, abundant research also illustrates that organizations tend to resist change due to specialization and professionalization, as evidenced by the homogeneity of staff. For example, Peabody (1995) found that WHO’s professional staff resulted in the agency’s limit to a medical approach. WHO’s worldview was limited due to the concentration of people with similar expertise, professional trainings and merit (Peabody 1995). Homogeneity of staff in WHO, though efficient, hindered the agency’s ability to deploy non-medical strategies. Similarly, Hagan et al. (2006) found that health workers tended to rely solely on health demographics, therefore neglecting the significance and cause of many deaths and missing persons directly due to the violent causes of humanitarian emergencies.

In addition to professionalization, and thus homogeneity of staff, hierarchy also affects organizational performance. For example, hierarchy structures the decision-making process and contributes to organizational efficiency. However, researchers also found that features of the bureaucracy can cultivate a “bureaucratic personality” (Merton 1957:195-206), i.e., officials become “methodical, prudent disciplined.” Barnett and Finnemore (2004) noted that bureaucracies can become obsessed with their own rules, producing unresponsive, inefficient, and self-defeating outcomes. Hierarchy also affects information being communicated between departments and across organizations (Vaughan 1996). In her book *The Challenger Launch Decision*, Vaughan (1996) found that organizations developed their own local knowledge due to their different roles, equipment, cultural
beliefs, and goals. This institutional history and group dynamics created a culture of high-risk technology, which accepted risk-taking and corner-cutting as norms, that led to devastating outcomes.

Informed by the aforementioned theories, I examine how professionalization and hierarchy of the WHO, FAO and OIE affect their officials’ reactions to One Health. Olsen (2001) points out that everyday decision-making processes in international bureaucracies are compound because these organizational systems often need to balance competing dynamics of actors, interests, decision-making arenas, and values sequentially and simultaneously. Likewise, Trondal et al. (2010) also found that in European Union officials are likely to activate one or a combination of four logics in their day-to-day activities – intergovernmental, supranational, departmental and epistemic. I thus investigated how officials developed different perceptions of and strategies for a new cultural and policy frame that contradicted professional expertise-based thinking.

I argue that organizational attributes and micropolitics are dynamically connected. That is to say, organizational attributes shape individuals’ behavior, and micropolitics among individuals in turn, affect organizations’ adaptation and resilience. Data for analysis includes personal interviews, minutes, reports, statements, and discussion papers of various committees. Figure 3.1 illustrates my analytical frame, showing that organizational attributes and micropolitics are intertwined. On one hand, staff diversity and hierarchy of an agency shapes its internal micropolitics, which affect bureaucrats’ experience and attitudes. On the other hand, bureaucrats’ experiences affect an

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17 According to Trondal et al. (2010), if an official is guided by a loyalty to his/her home country, he/she is intergovernmental. If s/he is loyal to the organization as a whole, it’s supranational. A departmental dynamic predicts that bureaucrats to be representative of his/her unit and portfolio. An epistemic dynamic predicts the staff is influenced by external professional reference groups.

18 My interviews with officials inquired into officials’ responsibilities, experiences, and reactions to cross-agency and inter-disciplinary collaboration. For example, I ask questions regarding how officials perceived and reacted to emerging tensions and conflicts; what had changed after One Health was officially adopted; and how they perceived their work relating or contributing to One Health. Owing to my multiple field visits to these agencies, some interviews were conducted before the adoption of One Health and others were conducted after. Additionally, I used meeting minutes and official statements to capture the complexity of negotiations, debates, and compromises behind the scenes.
organization’s overall performance and resilience. In other words, organizational behaviors are interdependent with the experiences of bureaucrats.

In the following sections, I first compare the organizational attributes of the three agencies, depicting how they structured their work on avian flu control differently. Next, I illustrate how at the interagency level, these agencies initiated technical cooperation before political commitment emerged, therefore cultural introduction and translation of One Health was required. After that, I elucidate how different organizational arrangements shaped officials’ working dynamics and micropolitics, and hence their framing, attitudes, and willingness to collaborate. I focus on two organizational attributes – staff diversity and hierarchy. Finally, I conclude with a discussion of how organizational attributes enabled and/or constrained officials’ willingness to engage in boundary-crossing activities that One Health demands, reversely affecting organizational adaptation to the frame shift.

**Organizational characteristics of the WHO, FAO and OIE**

The WHO, FAO and OIE have similarities and differences, which shaped their worldviews and capacities. Being intergovernmental agencies, the WHO, FAO, and OIE
share similar organizational infrastructures that balance political influences and technical expertise. They are all made up of a supreme governing body and an administrative body. Their governing body, i.e. the Council of member countries,\textsuperscript{19} decides on major regulations during annual delegate meetings. Meanwhile, the administrative body, i.e., the bureaucracy, serves to facilitate, deliberate, prepare, choose, and implement policies. Generally, the administrative body consists of headquarters, regional offices\textsuperscript{20} and country offices. Despite my research focus on bureaucracy and their behavior, it should be noted that these agencies are still more or less constrained by the interests of their member states. Later I will also illustrate how the political personality of international agencies shapes the working dynamics and micropolitics within these agencies.

Despite similarities in organizational infrastructure, the WHO, FAO and OIE vary significantly in their responsibilities, technical expertise, size, culture, and arrangements for avian flu work. Table 3.1 summarizes primary differences in organizational characteristics of the three agencies, specifically variances in responsibilities, technical expertise, and administrative structure in the headquarters.

As shown in Table 3.1, an agency’s responsibilities are closely related to its dominant professional expertise, which is a prime source of its legitimacy and authority. The WHO, FAO and OIE thus habitually recruit officials with similar professional backgrounds. For instance, the WHO is primarily staffed by health experts. The OIE recruited mostly veterinarians, and the FAO’s avian influenza work has been primarily directed by veterinary professionals. These differences proved to be barriers to cross-agency partnerships. After avian flu worldwide outbreaks, officials quickly experienced conflicts and tension when they found their work overlapped.

\textsuperscript{19} The governing body consists of delegates of member states. Delegates meet annually to review, approve, and determine policies of these organizations, and each member state has equal voting right in these three agencies.

\textsuperscript{20} FAO and WHO have regional offices and representatives in countries. The OIE does not have regional and country offices due to its limited resources and mandates.
<table>
<thead>
<tr>
<th>Agency</th>
<th>WHO</th>
<th>FAO</th>
<th>OIE</th>
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<tbody>
<tr>
<td>Goals and Responsibilities</td>
<td>Human health</td>
<td>Food security/ Animal health</td>
<td>Animal health Standards for trade of animal/ products</td>
</tr>
<tr>
<td>Tasks:</td>
<td>-International Health Regulation (IHR 2005)</td>
<td>-Recommendations on food security</td>
<td>- Codes and Manuals for diagnosis and regulations</td>
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<tr>
<td>Establishing regulations</td>
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<td>- Livestock disease surveillance</td>
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<td>Making recommendations/guidelines</td>
<td>- Disease surveillance (human influenza)</td>
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<tr>
<td>Other actions</td>
<td>- Technical assistance for emergencies</td>
<td>-Technical assistance for emergencies</td>
<td></td>
</tr>
<tr>
<td>Technical expertise</td>
<td>Public health/ Epidemiology/Virology / Communication</td>
<td>Veterinary/ Agricultural Economics/ Communication /Wildlife</td>
<td>Veterinary</td>
</tr>
<tr>
<td>Organizational Size</td>
<td>&gt; 8000 employees</td>
<td>≈ 6000 employees</td>
<td>&lt; 80 employees</td>
</tr>
<tr>
<td>Organizational Structure</td>
<td>Headquarter (Geneva) Region offices Country offices (decentralized in regional matters)</td>
<td>Headquarter (Rome) Region offices Country offices (decentralized in regional matters)</td>
<td>Headquarter (Paris) Regional representatives</td>
</tr>
<tr>
<td>Organizational Cultures</td>
<td>Bureaucratic, hierarchical, and divided</td>
<td>Bureaucratic, hierarchical, but avian flu work was comparatively less divided</td>
<td>Bureaucratic, but more horizontal due to its small size</td>
</tr>
<tr>
<td>Department/personnel for avian flu-related work</td>
<td>Spread in several departments and divisions, including GIP, ARO, FOS, and HSE etc.</td>
<td>Mostly congregate in the Animal Product and Health Division</td>
<td>Mostly in its Scientific and Technical Department. Also carried out by a few designated GLEWS personnel and OFFLU officials</td>
</tr>
</tbody>
</table>
Tension between international officials was associated with not only their agencies’ bureaucratic interests, but also their professional expertise. By bureaucratic interests, I refer to the specialized responsibilities each agency has. International agencies’ mandated responsibilities constrained their willingness to collaborate. As one OIE official commented, “We are all in our own silos, we speak different languages, and we are all very busy” (O4-2008). Most officials I interviewed agreed that cross-agency cooperation was difficult, albeit desirable. Another WHO official commented on the difficulty of crossing agency specialization by commenting that “It was difficult to make three ‘monsters’ work together” (W2-2008). Similarly, reports assessing One Health almost all point to “organizational architecture” (Scoones and Forster 2008) and “cumbersome, bureaucratic structures” (UNSIC and World Bank 2010) as barriers to One Health.

In addition to bureaucratic interests, diverse professional expertise was a crucial source of conflict. FAO and OIE’s avian flu work was primarily led by veterinarians, in contrasted to the medically-led WHO. These agencies soon engaged in conflicts over experts’ dissimilar interests and perspectives. Officials frequently remarked on the disconnect between veterinary and human medical authorities. For example, experts representing different agencies focused on different pieces of evidence during mission trips. A WHO official recollected,

“Veterinary experts sent by the FAO and OIE’s CMC-AH [FAO/OIE Crisis Management Centre for Animal Health] are concerned more about how to contain outbreaks in poultry. However, for WHO missioners, we seek to answer one crucial question: ‘Does this start a pandemic?’ From WHO’s perspective, we want to have this question answered as soon as possible” (W10-2009).

Organizational rivalries often evolved into debates over suitable technical expertise for the problems, as evidenced by different technical definitions of the disease. For example, the FAO and OIE named avian influenza outbreaks differently from the WHO to defend their expertise. Instead of calling highly pathogenic avian influenza a pandemic as the WHO does, the FAO and OIE often labeled avian flu as “a current panzootic,” or “the
current HPAI epizootic” (FAO 2006: 6). FAO and OIE argued that identifying it as a human disease was misleading. One FAO’s manual clarifies that HPAI is “a chicken term…which should really not be used to describe the infection in other species (wild ducks, tigers, ferrets, or humans), even if they are infected” (Whitworth 2007: v).21 Even though FAO and OIE occasionally recognized that avian influenza is a disease that has “zoonotic potential” (OIE 2007), these agencies preferred naming human infections “AI virus infections or influenza viral infections of avian origin.” (Whitworth 2007: v).

In addition to insisting on framing the task as a chicken problem, the FAO and OIE actively defended their expertise – veterinary science – to defend their positions. For example, both agencies endorsed the contribution of veterinarians to global pandemic preparedness, arguing that veterinarians actually knew more, rather than less, about avian influenza. One OIE scientific review claims:

“What has been largely lacking in the public perception, however, is the fact that avian influenza viruses have been part of our ecosystem for a long time, being well adapted to their natural hosts (primarily wild waterfowl) in a fine balance between survival of the virus and the host population. Thus, for us in the veterinary field, avian influenza in either low or highly pathogenic forms is nothing new.” (Mettenleiter 2009:15).

This comment illustrates interagency conflicts intertwined with tension between professions. By insisting avian influenza was an animal disease which had been thoroughly studied by veterinarians, FAO and OIE officials legitimized their contributions to disease control “at source.” They frequently underlined that unfledged veterinary services in developing countries were a culprit in disease control. OIE began to survey member countries’ veterinary services and encouraged them to improve the condition. This agency developed the OIE Tool for the Evaluation of Performance of

21 This article is published in a FAO’s manual (2007b): Wild Birds and Avian Influenza: An introduction to applied field research and disease sampling techniques.
Veterinary Services (OIE PVS Tool) to evaluate a country’s veterinary services against the standards it defined.

In a similar vein, officials also used their technical expertise to disqualify other agencies’ legitimacy for intervention. For example, several officials at WHO, FAO, and OIE argued that the United Nations Children's Fund (UNICEF) was unqualified to disseminate avian flu education programs in affected countries. One OIE official said, “UNICEF does not have technical expertise; it only helps to prepare the message for local communities and children” (O3-2008). Another official at the WHO claimed that some messages UNICEF provided were incorrect, “because they don’t understand the virus” (F5-2008).

Some officials questioned the leading role of the World Bank and the UN System Influenza Coordination (UNSIC) in the coordination and distribution of funds for avian flu programs. A few FAO officials claimed that the World Bank and UNSIC did not have technical expertise (F4-2009, F5-2008). As these conflicts indicate, bureaucratic responsibilities and professional expertise were barriers to boundary-crossing behavior and activities. Because the FAO and OIE shared professional expertise (veterinary science), they quickly established an alliance against the WHO. Since 2005, these two agencies jointly published The Global Strategy for the Progressive Control of Highly Pathogenic Avian Influenza, and increasingly emphasized the necessity of dealing with the problem in animals and the contribution of veterinary expertise to global public health.

The WHO, FAO and OIE also differ in other organizational attributes, such as size, structure, and organizational culture. These other differences, I argue, significantly affected how they devised avian flu work as well as their capacity to move beyond technical perspectives. The FAO and WHO, both belonging to the United Nations system, recruit thousands of employees to their headquarters. Both of them maintain offices at the regional and country levels, due to their responsibilities in complex health and food

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22 The FAO and OIE first published The Global Strategy for the Progressive Control of Highly Pathogenic Avian Influenza in November 2005, revised in March 2007 and October 2008 to reflect new development and knowledge.
safety challenges. These two agencies therefore developed more complex organizational structures than the OIE. While the FAO and WHO are more hierarchical and their departments/units more specialized, OIE officials consider their agency less bureaucratic and hierarchical. OIE only has roughly 70 officials at the headquarters in Paris. The much smaller size of the OIE makes it structurally more horizontal. Several OIE officials noted that they had no problem communicating directly with their Director-General if needed, which was uncommon in large international agencies.

Furthermore, the three agencies vary in diversity of staff’s professional background. The OIE has fewer resources, is much smaller, and cannot afford country offices. The OIE’s primary responsibility is setting standards for animal disease diagnosis and control, and its staff is mostly composed of veterinarians. Its very tightly focused responsibility made the OIE the most homogeneous in staff composition. This is probably why the OIE has identified itself as the main promoter of veterinary expertise.

Comparatively, FAO and WHO’s staff are more heterogeneous than that of the OIE. The reason for their staff diversity was not only greater size, but also these two agencies’ complex responsibilities. To address various health or food safety issues and to implement relevant programs, the FAO and WHO need to recruit professionals beyond their dominant expertise. For example, the FAO’s Animal Production and Health division hired agro-economists to analyze economic impact, communication experts to carry out development programs, as well as wildlife experts to assess disease impact on wild animals. In addition to medical, epidemiological, and virological professionals in the Global Influenza Programme (GIP), WHO has a few communication experts, veterinarians and development practitioners in different units assigned to work on avian flu related projects. These units include the Health Security and Environment (HSE),

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23 OIE’s main task is to constantly revise and expand OIE’s Codes and Manuals by composing selected specialist commissions and working groups in the relevant fields. The Terrestrial animal Health Code published since 1968 is to guide national veterinary authorities to manage disease that has potential for international spread. The Manual of Diagnostic Tests and Vaccines for Terrestrial Animals published since 1989 provides the diagnostic standards by describing internationally agreed laboratory diagnostic techniques, such as on sampling methods and good laboratory practices for laboratory technicians.
Food Safety and Zoonoses (FOS), Epidemic and Pandemic Alert and Response (EPR), Global Capacities, Alert and Response (GCR), Pandemic and Epidemic Diseases (PED), and the Global Alert and Response Operations (ARO).

Although FAO and WHO’s staff are more diversified, these two agencies still differ in their division of labor on avian flu control. The WHO maintained more strict departmental division of labor, the leading unit of its avian flu work being the Global Influenza Programme (GIP). As a result, WHO’s policy frame was primarily developed by medical experts. The FAO is primarily led by veterinarians and its avian flu work was mostly developed from a veterinarian perspective. However, the FAO established a working group on avian flu that allowed some communication between units and professionals. Later I will show how these working arrangements affect officials’ interdisciplinary communication experiences.

In summary, differences in bureaucratic interests and professional expertise had been barriers to cooperation. Oftentimes, agencies exploited their dominant technical expertise to legitimize their own stance. In the next section, I discuss how boundary-crossing activities between agencies began and evolved. I will also illustrate that a profession present in all three agencies – veterinary science – gradually became the bridge between these three agencies. Following that, I will discuss how staff diversity and hierarchy also profoundly shaped micropolitics between officials within each agency.

A technical arranged marriage: Veterinarians became boundary spanners

Boundary-crossing activities between agencies did not emerge naturally. Collaboration between the WHO, FAO and OIE started with technical tasks, primarily on disease surveillance. These agencies’ political commitment to One Health actually came much later. Before OWOH was officially endorsed, the WHO, FAO and OIE had established working relationships and platforms to coordinate their responses. Between 2004 and 2006, three major collaborative networks were launched roughly at the same time – the FAO/OIE/WHO Global Early Warning System for Major Animal Diseases, including
Zoonoses (GLEWS) between three agencies in 2004; the OIE/FAO Network of Expertise on Avian Influenza (OFFLU) between FAO and OIE in 2005; and the FAO/OIE Crisis Management Centre for Animal Health (CMC-AH) between the OIE and FAO in 2006.\(^{24}\)

All of these cross-agency platforms are designed to conduct specific technical tasks – the GLEWS monitors disease outbreaks, OFFLU strengthens avian influenza expertise, and CMC-AH manages emergency responses. External expectations and support were the primary motivations for their boundary-crossing collaboration. One official explained that the three agencies’ collaboration was like an “arranged marriage” (F2-2009). His metaphor vividly portrayed these agencies’ somewhat unavoidable and pragmatic relationships, as well as their reluctance. These forged interactions were expected to fulfill both external expectations and improvement of agencies’ efficacy.

Let us take a look at these platforms. Interestingly, most officials in charge of the three interagency platforms were veterinarians, a profession present in all three agencies. The launch of the FAO/OIE/WHO Global Early Warning System for Major Animal Diseases, including Zoonoses (GLEWS) was driven by the need to improve disease surveillance systems. With its establishment, the three agencies intended to share information on zoonotic disease outbreaks. Beforehand, each of these agencies had had its own independent surveillance system. WHO’s Global Outbreak Alert & Response Network (GOARN) monitors and responds to disease outbreaks in humans; OIE’s WAHIS/WAHID (World Animal Health Information System/Database) conducts animal...
disease surveillance; and FAO’s EMPRES Global Animal Disease Information System (EMPRES-i) tracks published disease events for both animals and plants. Member states of the OIE and WHO are officially required to send reports of disease outbreaks in animals and humans to these two agencies. The FAO, though not officially responsible for disease tracking, worked on early warnings and timely responses, thus also requiring some animal disease surveillance. However, the three surveillance systems were independent and did not formally share information. Neither did any of them track how zoonotic diseases moved between people, domestic animals and wildlife. Outbreaks of severe acute respiratory syndrome (SARS) between late 2002 and 2003 exposed the inefficiency of these isolated surveillance systems and a failure by international agencies. For instance, the WHO was blamed for responding to the outbreaks inefficiently because it was only aware of a zoonotic disease after receiving official reports.

The GLEWS was the first experiment between these agencies to monitor avian flu and other zoonotic diseases jointly. It aimed to improve these agencies’ capacity for disease surveillance. The GLEWS was funded by the Canadian government, because Canada was heavily impacted by SARS. In 2004, the Canadian International Development Agency (CIDA) funded the GLEWS to strengthen global disease surveillance. With CIDA’s five-year grant, the GLEWS monitored 19 zoonotic diseases and analyzed pandemic risks. As one WHO officer commented, “We [the three agencies] don’t naturally come together. We need a good reason to keep working together. When donors and countries asked us to work together, it pushed us to do so” (W10-2009). Another FAO official explained, “Countries and funding agencies were interested in having us work together, so we coordinated” (F-16, 2010). These statements reveal that the WHO, FAO and OIE, though having some autonomy, are still affected by other global actors. Their collaboration was requested and facilitated by resourceful international aid agencies.

25 The OIE can only release outbreak information officially submitted by Chief Veterinary Officials (CVOs) of member counties, and the WHO received official reports from the Public Health Sector of member counties.
26 Target diseases include those that have serious public health impacts, are unusual or unexpected, or bring significant risk of international spread. The list of target diseases evolved over time.
The three agencies took this opportunity to strengthen their capacities. The path was by no means easy. Since 2004, the GLEWS has undergone trials, negotiations, changes, and institutionalization. For example, the WHO, FAO and OIE once debated about whether they could share unofficial and sensitive information with other agencies, whether each agency should consider reports from other organizations official, and whether the GLEWS should also be responsible for joint responses. In the end, they agreed that information should remain confidential unless it was confirmed. The FAO and OIE later established the Crisis Management Centre for Animal Health (CMC-AH), which assumed responsibility for joint contingent responses in the animal health sector. Therefore, the GLEWS was designed simply to collect, share and analyze disease information. The GLEWS officials were also responsible for communicating with member countries through the WHO’s GOARNS, OIE’s Chief Veterinary Officers, and FAO’s country representatives, particularly to confirm disease situations. Most of GLEWS’ work at the early stage involved highly pathogenic avian influenza due to the media attention on this disease.

After years of coordination, the three agencies consider the GLEWS beneficial. GLEWS collects information not only from both the public and animal health sectors, but also from both formal and informal sources, including the media, laboratory networks, collaborating centers, and even rumors. By collecting, sharing, and analyzing outbreak information jointly, these agencies all improved their surveillance capacities. For instance, they no longer simply relied on official outbreak reports sent by the member states, who were often reluctant to report outbreaks in a timely manner for fear of negative economic effect. One OIE official (O2-2008) commented that the GLEWS was a win-win strategy because it allowed the three agencies to detect disease outbreaks from multiple sources and respond quickly.

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27 Because the GLEWS deals with suspect or not yet public information on zoonotic disease occurrence, international agencies insisted that this sensitive information should be confidential.

28 Most of their focal points at the country level are government officials in national reference laboratories, research institutions, or international officials in country or regional offices.
Over the years, the GLEWS has been increasingly institutionalized. Initially, the GLEWS Working Group only consisted of 15 designated officials, referred to as “focal points.” In other words, only two to three officials from each agency participated in the GLEWS at the beginning. These focal points, mostly with veterinary backgrounds, shared disease outbreak news via email and phone calls. As time went by, GLEWS’ officials’ individual contact email addresses were replaced by a generic email address for each agency, which allowed other officials to continue receiving information when the designated person was out of the office. Later in 2008, a web-based electronic GLEWS platform was established, which allowed officials to post information, risk analysis and follow-up notes online, particularly to evaluate the risks of the diseases they found most relevant.  

Now the GLEWS work is routine, and officials take sharing information for granted. For example, during my field trip in 2010, I was able to sit in a GLEWS weekly meeting at the FAO. This meeting took place in a conference room, with about 20 officials who worked on zoonotic diseases. The meeting was joined by corresponding WHO and OIE officials online or by phone. During this meeting, the organizer summarized outbreaks of targeted diseases using a PowerPoint presentation. She reviewed suspicious, reported and confirmed outbreaks, marking their geographical locations on the slides. Each case was followed by a brief discussion of the nature of the outbreak, its potential impact, and follow-up steps. Occasionally, officials got into details about where the precise location was, what risk the outbreak posed, and how to confirm the information. Within fifteen minutes, this meeting concluded, and each official went back to his or her work. These routine practices are the most crucial technical work the WHO, FAO and OIE share.

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29 At the beginning, information was shared by e-mail. Each organization also creates a generic e-mail account that is used by correspondent officials. In this way, the work could be continued even if the staff is off-duty. In April 2008, a web-based electronic platform (http://www.glews.net/) was initiated. Any GLEWS member that has relevant information can submit the information to the platform, and any member can open a new event.

30 The GLEWS has daily, weekly and monthly meetings. Compared to daily meetings, weekly and monthly meetings usually consist of more backgrounds and risk analyses.
While GLEWS conducts disease surveillance across the three agencies, the OFFLU and CMC-AH, are operated jointly by the FAO and OIE. In other words, these two platforms take place primarily in the animal health domain. These two platforms focus on sharing avian flu science and contingency responses to animal disease outbreaks, respectively. For example, the OFFLU aimed to strengthen avian influenza science by creating a network of veterinary experts with “proven laboratory expertise” (such as molecular diagnostics, vaccinology, etc) and/or field experience with avian flu. With scarce financial resources, the OFFLU employed only two coordinators and two scientists. The two coordinators, one working at OIE and the other at the FAO, have been responsible for identifying avian flu experts, creating a laboratory network for diagnostic and technical support, discussing technical issues such as standardizing reference materials and diagnostic kits, and evaluating the effectiveness of poultry vaccination. In addition, two OFFLU scientists were responsible for specific avian flu research by collaborating with OIE and FAO’s reference laboratories. As the OFFLU worked mostly with the veterinary community, it was not until much later, when flu sample sharing became an issue, that OFFLU officials interacted with the WHO more frequently.

The last platform, the CMC-AH, is responsible for FAO and OIE’s contingent responses to animal disease outbreaks. The CMC-AH sets up a rapid deployment team within 72 hours of an official request of support to an animal disease emergency in member states.

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31 After the pandemic H1N1 2009, the OFFLU was renamed as OIE/FAO Network of Expertise on Animal Influenza, extending its expertise to influenzas in animals. The OFFLU coordinated several Technical Activities supported by external experts in order to manage relevant influenza related issues. These activities have included delivering guidance on diagnostic protocols, antigenic matching of vaccine strains with circulating field viruses, developing biosafety guidelines for laboratory workers, and strategic guidance on animal influenza surveillance.

32 The OFFLU was operated without external funding at least until early 2006. In OFFLU’s Scientific Committee meeting in 2006, problems such as the lack of funds, demand for missions in excess of the capacity of OFFLU, and the need for a veterinarian employed by the OFFLU were addressed. (For details, see Minutes of the OFFLU Scientific Committee, Paris.)

33 The scientists conducted the technical projects for Egypt and Indonesia, aiming at characterizing H5N1 strains and evaluating the efficacy of currently used vaccines.

34 The two scientists were appointed to the Istituto Zooprofilattico Sperimentale (IZE) in Padua, Italy and to Veterinary Laboratories Agency (VLA) in Weybridge, UK.

35 The FAO assigned the EMPRES to conduct longer-term strategies, instead of the CMC-AH.
Similar to the GLEWS, although the CMC-AH responded to a number of diseases’ occurrence, the majority of its work was related to avian influenza at the early stage. At times, CMC-AH officials needed to coordinate with the WHO during their mission trips. For instance, if human infections were detected, the CMC-AH would need to collaborate with WHO’s counterparts at Alert and Response Operations (ARO) under its Department of Epidemic and Pandemic Alert and Response (EPR). Thus their interactions with the WHO depended on the disease situations.

The development of the three platforms revealed two attributes of these boundary-crossing activities between specialized agencies. First, boundary-crossing activities to some extent were externally imposed. The WHO, FAO and OIE also intended to improve their efficiency in detecting and eradicating disease through these new platforms. These cross-agency platforms primarily focused on responding to the symptoms rather than preventing disease emergence, spread and persistence. Second, interagency cooperation was built on boundary spanners who shared similar professional backgrounds – veterinary science. Even in the WHO, designated GLEWS officials (focal points) were veterinarians and epidemiologists at the Alert and Response Operations (ARO) rather than virologists or medical experts at the Global Influenza Programme (GIP).

As a result, the GLEWS, OFFLU and CMC-AH are all highly technical, task-oriented, and veterinarian-dominated (except a few of WHO’s ARO officials). Evidently, shared veterinary science background laid the foundation for emerging interagency collaboration, which illustrates the effect of professionalization on cooperation (Deflem 2002). These veterinarians served as boundary spanners to fortify interagency collaboration, specifically on technical tasks. Technical tasks fulfilled by veterinary expertise became the foundation of the “arranged marriage” of these three agencies.

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36 WHO started to employ veterinarians before HPAI outbreaks, and they primarily were responsible for monitoring the health and safety of people working with animals.
37 The three agencies have begun to send representatives to each other’s technical meetings. For instance, OFFLU experts attended WHO’s seasonal vaccine meetings, WHO and FAO experts participated in OIE’s ad hoc thematic and working groups, and OIE officials attended FAO/WHO’s Codex Alimentarius Commission’s work on food safety.
I would like to highlight here that these interagency collaborations were disconnected from the development One World One Health. OWOH was formulated top-down, rather than emerging from experimental working relationships. OWOH was developed and adopted during a series of political meetings on avian flu. After the International Ministerial Conferences on Avian and Pandemic Influenza (IMCAPI), international agencies were asked to conceptualize OWOH for the next IMCAPI scheduled in Egypt in 2008. Therefore, the WHO, FAO, and OIE, along with the World Bank, the United Nations Children's Fund (UNICEF), and the United Nations System Influenza Coordinator (UNSIC), produced this official document regarding One World One Health to be endorsed in the IMCPAI of 2008. A selected group of six senior officials drafted this document, one from each agency to represent the technical expertise of these agencies, such as in communicable diseases, veterinary science, food safety, and livestock. OWOH was not discussed by or with officials of the GLEWS, OFFLU and CMC-AH, nor were external experts consulted due to time constraints. One WHO official recalled,

“It was very different [from the typical consultation process]. If we had done that, we would never have got it done. If we had gone through external consultation, the document would be impossible” (W8-2009).

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38 These meetings and conferences included meetings in Geneva (November 2005), Beijing (January 2006), Vienna (June 2006), Bamako (December 2006), New Delhi (2007). The concept first appeared during the International Ministerial Conferences on Avian and Pandemic Influenza (IMCAPI) of 2007. Annual IMCAPI convened global responses between national delegates, international agencies, donors and other stakeholders. In 2007, the WHO, FAO and OIE assisted the host, Indian government, to produce the background paper “New Delhi Road Map” to be discussed by national delegates. This roadmap highlighted the lack of coordination between the public and animal health sectors in many affected countries as a major problem for disease control.

39 The OWOH policy document was drafted and discussed only among these six organizations without the contribution of external experts, not even the discussion with those of the Wildlife Conservation Society. The framework was co-authored by representatives of these six organizations, who were Paul R. Gully (United Nations System Influenza Coordination); Jørgen Schlundt (World Health Organization); Alejandro Thiermann (World Organisation for Animal Health); Joseph Domenech (Food and Agriculture Organization); Jimmy Smith (The World Bank); and Osman Mansoor (United Nations Children’s Fund). Different from its original appearance in the New Delhi Road Map which emphasized collaboration at the country level, the official endorsement of OWOH in 2008 scaled up its application and emphasized collaboration at local, national, regional, and international levels.
In other words, between agencies, technical cooperation and political commitment developed separately. The WHO, FAO and OIE’s political commitment to OWOH, though related to their experiments with collaboration, did not completely grow from the interactions of the GLEWS, CMC-AH, and OFFLU. Although veterinarians became boundary spanners to bridge specialized agencies, they were disconnected from the endorsement of OWOH. Because One Health developed top-down and was not part of administrative officials’ day-to-day work, its relevance was not self-evident to bureaucrats at these agencies. Lower-stratum technical officials might not have grasped this concept immediately. In the next section, I depict whether and how officials developed the willingness to engage in boundary-crossing activities, and whether officials internalized OWOH that emerged top-down. I found that while staff diversity was positively associated with officials’ boundary-crossing mindset, organizational hierarchy and political sensitivity tended to constrain officials’ openness to boundary-crossing behaviors. I now move on to explain the effect of these two organizational attributes in detail.

Staff diversity vs. internal micropolitics

At the beginning of the chapter, I illustrated how the three agencies reacted to One Health differently. Among them, the FAO has been the most motivated, and its officials appeared more enthusiastic. My interviews with officials reveal that their differences were associated with staff diversity, which shape internal micropolitics and their experiences. Generally, I found that the more diverse an agency’s staff is in terms of their professional backgrounds, the more likely they were to appreciate and incorporate perspectives other than those of the dominant profession.

The WHO, FAO and OIE differed in the extent to which boundary-crossing communications between professionals were encouraged. Comparatively, FAO’s more diverse staff and its establishment of a cross-functional team encouraged official’s boundary-crossing interactions. FAO avian flu officials seemed to espouse more cross-disciplinary communications, and they more frequently remarked on the benefits of
crossing professional boundaries. By contrast, the OIE and WHO were more specialized and homogeneous in staff composition – the OIE was primarily staffed by veterinarians, and the WHO by medical experts. The OIE continuously employed or borrowed veterinarians from their member countries to conduct GLEWS and OFFLU’s work. Similarly, the WHO relied on medical experts, such as those in influenza, immunization and epidemiological to develop and implement its policies. Veterinarians employed by the WHO have played a more peripheral role, conducting zoonotic disease surveillance and analyses. They tended to work exclusively and separately from the main decision-making unit on avian flu – GIP. Similar to the OIE, the WHO was more confined by its discipline-focused perspective.

WHO’s slightly greater staff diversity was also offset by the fact that departments were segmented. WHO maintained clear division of labor between departments. Its avian flu work is spread over several specialized units, such as the GIP, ARO, EPR, FOS, and HSE. Each unit is responsible for specific tasks. For example, the GIP handles influenza pandemic preparedness; the ARO is involved in disease surveillance; the FOS is in charge of safety issues regarding poultry consumption; and the HSE is engaged in social mobilization in affected communities. Across these subunits, the GIP took the lead in handling avian flu outbreaks and accessing disease situations.

By contrast, the FAO, though dominated by veterinarians, allowed staff with different backgrounds to communicate more frequently. To address complex food safety issues, the FAO’s staff composition was necessarily more diverse. For avian flu tasks in particular, the FAO became the host agency of newly-established collaborative platforms – the GLEWS, OFFLU and the CMC-AH. The agency therefore had to expand its staff pool and coordinate work between these different units. The FAO intentionally composed an Avian Influenza Working Group, which was a cross-functional team. In addition to veterinarians, this working group included a few social scientists, communication experts,

40 The working group was under FAO’s Emergency Centre for Transboundary Animal Diseases (ECTAD) of the Animal Production and Health Division.
and one wildlife expert. Further, most of FAO’s avian flu staff were located in close vicinity. In contrast to the WHO, where related units are located in different buildings, most of FAO’s avian flu staff worked in the same building. Proximity enabled FAO officials to engage in communications on a daily basis. To some extent, FAO’s staff heterogeneity and closer interactions contributed to a different working dynamic from that of WHO and OIE. Due to the differences in perspectives of officials with different professional training, FAO’s staff diversity was both a source of tension and opportunity for boundary-crossing interactions.

Within the OIE and FAO, where staff was more diverse, whether an official’s profession was dominant and salient significantly affected his or her perception of boundary-crossing possibilities. Officials whose professional backgrounds were less dominant within the agency unintentionally or intentionally emphasized their specific contributions. For example, a WHO GLEWS official (veterinarian) underlined the contribution of veterinarians in WHO:

“We have learned that many human diseases are caused by pathogens originating from animals; therefore, the WHO has begun to hire more veterinarians to analyze zoonoses and food safety issues. The number [of veterinarians at the WHO] is still increasing. Our work on zoonoses has been more and more emphasized by WHO.” (W6-2008).

Other underrepresented professionals at the FAO, such as social scientists and wildlife experts, highlighted the “non-technical” perspectives they brought to discussions. For example, one of FAO’s wildlife experts argued that “the importance of knowledge on wildlife has long been understood. It is surprising that this was not emphasized before” (F6-2009). FAO’s social scientists and economists also noted that a societal frame “came into the policy discourses very late” (F12-2009.) Officials with social sciences backgrounds thus attempted to highlight their worldviews and contributions by bringing in ideas of poverty alleviation.
Sometimes differences sparked tensions. A few FAO officials commented on differences in language and worldviews due to professional expertise. An FAO social scientist gave an example of interpretations of the concept “participatory epidemiology”:

“We [communication specialists and veterinarians] don’t share the meaning of the same concept…Most veterinarians thought participatory epidemiology is just a way to change local people’s behaviors. Veterinarians only accepted this idea to impose their technical projects, which was against the principle of participatory epidemiology. For us [communication specialists], participatory epidemiology is to use participatory methods to solve epidemiological problems. It also means to learn from local knowledge, and to develop disease control programmes that are acceptable to stakeholders and are effective. However, veterinarians just use this concept to impose their plans. They don’t really want to learn from the local people” (F12-2009).

She also expressed frustration when attempting to bring in alternative perspectives. She commented that it was sometimes challenging to “have our voices heard” (F-12, 2009). She articulated,

“During internal meetings, it seemed that everybody agreed that socioeconomic analyses were crucial. But later when it came to decision making, the discussions were often back to technical issues” (F12, 2009).

Boundary-crossing between officials within the FAO therefore could be frustrating and time-consuming. One FAO officials commented on the effect of officials’ heterogeneity, “This is FAO’s strength…, but that is why everything progresses very slowly, because you get so many opinions and it takes time to discuss” (F9-2010). Despite these constraints, FAO officials generally recognized the benefit of FAO’s diversity. Another FAO official commented that, “FAO is very unique, because it has so many officials from different disciplines” (F2-2010). FAO’s social scientists recognized that veterinarians at the FAO often had “more sense of poverty problems” than those at the other agencies:
“Veterinarians at the FAO had been much better than veterinarians at other agencies – We educated them well.” (F12-2009). By contrast, OIE and WHO officials reported much less internal tension over differing worldviews.

Staff diversity and more frequent interactions therefore proved to encourage boundary-crossing activities. FAO’s staff diversity and closer cross-departmental communication contributed to its broader and varied approaches regarding avian flu control, even before One Health was endorsed. FAO’s avian flu officials had more opportunities to interact with colleagues with different expertise. FAO social scientists noted their contribution to FAO’s adoption of societal intervention strategies, such as developing compensation schemes for poultry culling, market-chain risk analyses, and participatory epidemiological campaigns. Wildlife experts at the FAO noted FAO’s rapid incorporation of an ecological conservation frame.

Soon after OWOH was endorsed, FAO quickly used its staff diversity to claim leadership in the campaign. Officials there, whether their professional expertise was dominant or peripheral, welcomed this policy frame. For veterinarians at the FAO, broader One Health strategies differentiated them from the OIE’s veterinary strategies. For other professionals at the FAO, the new frame recognized their authority and contribution. Despite the fact that veterinarians still dominated FAO’s avian flu work, FAO continuously stated that avian flu “represents an invaluable opportunity to bring together biological and social expertise” (Harris 2006). For example, the FAO invested more in wildlife surveillance than the other two agencies.41 The FAO later emphasized the need to address wildlife health in conjunction with professions in the fields of forestry, natural resources, conservation, agro-biodiversity, fisheries, land use, climate change, rural development, socio-economics, anthropology, legal affairs and the like (FAO 2010a:14). By portraying itself as the leader of One Health due to its broader and/or unique technical expertise,

41 Initially, the FAO had been reluctant to invest in wildlife surveillance. Conservation projects and policies fell in the United Nations Environment Programme (UNEP)’s governance. Later the FAO participated in the International Scientific Task Force on Avian Influenza and Wild Birds, and it also cooperated with the WCS in the Global Avian Influenza Network for Surveillance (GAINS).
FAO attempted to solidify its authority in One Health. Its staff diversity turned out to be an asset. FAO’s organizational attributes affected its staff’s willingness to engage in boundary-crossing behaviors.

By comparison, OIE and WHO officials had fewer boundary-crossing experiences before OWOH was endorsed. Both of these agencies tended to reinforce discipline-based perspectives. Medical experts at the WHO generally have been less enthusiastic about One Health. Most of its One Health programs were implemented by its veterinarians and nutritionists. WHO and OIE officials tended to insist on narrowly defining One Health as zoonosis disease control or technical collaboration. They repeatedly emphasized strengthening surveillance systems as the crucial goal of One Health.

**Organizational hierarchy vs. internal micropolitics**

In addition to staff diversity, hierarchy significantly affects internal micropolitics. Officials’ attitudes to One Health not only differed by profession, but also by their position and perceived responsibilities. Because One Health was developed top-down, most officials initially felt disconnected to the concept. Officials’ perceived autonomy and interpretation of One Health varied greatly by their hierarchy within the agency. Generally, the lower or the more insecure an official’s position was, the more he or she felt constrained in speaking up for One Health. I also found that some officials, particularly those in lower-rank who primarily conducted surveillance, tended to interpret One Health in a technical sense. In other words, organizational hierarchy often negatively affected bureaucrats’ willingness to change behavior and adopt One Health.

The political personality of international agencies is woven in organizational hierarchy. Officials developed binary distribution of responsibilities for international agencies’ work. During my interviews, officials frequently commented that collaborative work was stratified at two different levels – the political and the technical level. They perceived these two kinds of responsibility as related but divided. Even though some officials had already worked for the GLEWS, OFFLU and CMC-AH, they felt foreign to the concept
of OWOH. Only senior and higher-spectrum officials were assigned responsibility for resource allocation and making political statements. As previously illustrated, the OWOH document was drafted exclusively by senior officials of the agencies. Many officials expressed that OWOH illustrated political will – senior officials and state delegates declared the political commitment to collaborate. Lower level officials saw the responsibility as one for senior officials who attended important political meetings, such as International Ministerial Conferences, and thus it was up to Director Generals and high-stratum officials to determine whether, how, and to what extent their organization would engage in interagency collaboration.

Possibly due to their political responsibilities, most officials who took a strategic approach to One Health were senior officials (W7-2009, F4-2009, O10-2009; also cf. Chapter 2). These officials more frequently highlighted that OWOH would generate more donor supports, or the importance of educating donors. Most senior officials resisted “reinventing the wheel.” Senior officials at the WHO insisted on maintaining division of labor between agencies (W7-2009, W8-2009), and refused to integrate OWOH into the agency’s structure. One senior OIE official explained that collaboration should, “not focus on the structure but on the behaviors” (O10-2009). Some officials commented that new organizations or mechanisms were redundant or dangerous.

By contrast, most lower-stratum officials and contracted bureaucrats seemed to refrain from defining One Health and its directions when this concept first appeared. They repeatedly claimed that they simply worked on technical issues. This attitude was particularly prevalent among officials in charge of the three cross-agency platforms. During my visits in 2008 and 2009, most lower-stratum officials I interviewed at the GLEWS, OFFLU and CMC-AH did not seemed to feel greatly connected to OWOH. Some of them were reluctant to elaborate its meaning. A fair number of designated GLEWS and OFFLU officials were employed by contract, contingent on the availability of funds for avian flu. In these cases, when an official’s position was sponsored by global funds or through short-term grants, he/she tended to be more cautious, avoiding sensitive
topics, such as commenting on cross-agency relationships or the direction of OWOH. These officials, though agreed on the importance of cross-agency and interdisciplinary coordination, insisted that their work was scientific and technical rather than political. For instance, when I asked an OIE official what “the big picture” is that OWOH pointed to, he seemed puzzled and referred me to other officials. Another official emailed me a presentation PowerPoint file made by her colleague, explaining that OWOH is a broader idea that “goes beyond science” (O9-2009). Most of the interviewees suggested reading the document itself, or interviewing officials at higher rank. A few officials acknowledged that they had not yet read the document, by early 2009.

To these technical officials, political sensitivity is encoded in bureaucratic structure. Lower-stratum officials initially felt reluctant to identify with One Health or bring it forward. However, given their sporadic criticisms of bureaucracy, most lower-stratum officials seemed to adapt well to the bureaucratic and politically-sensitive nature of their work. They are accustomed to hierarchical decision-making, probably for the sake of career security. Some technical officials pointed out that avian flu tasks were particularly sensitive due to the impact on global economy and trade, therefore they intentionally avoid sensitive issues or maintained the confidentiality of their GLEWS tasks (F7-2008, F14-2010). Other lower-stratum officials explained that they were not certain if their interpretations correctly represented their agency’s political standpoints (O2-2008, O6-2009, W2-2008, F7-2010). These officials were self-censored, being careful that the messages they conveyed were completely technical. Some of them insisted that their work was strictly-defined and technical, such as disease surveillance. It seems that because One Health was politically endorsed and promoted top-down, “translation” or “internalization” seemed necessary for lower-stratum officials to identify with the concept.

It was not until my later field visit in 2010 that most GLEWS, OFFLU and CMC-AH officials wholeheartedly embraced OWOH, claiming their work was essentially One Health. For example, a FAO GLEWS official commented, “For avian influenza affairs,
it’s already been One Health. Because it a zoonosis, it has to be interdisciplinary” (F14-2010). She did not think the adoption of One Health changed her work:

“I don’t think it [the endorsement of OWOH] changed my work, but it let people recognize that my work is important….With One Health, people appreciate our work much more. For GLEWS’ work, there is no big change. There are the events, reactions, and some actions needed [during disease outbreaks]. If we can come in very very early on, it's always better” (F14-2010).

Veterinarians of GLEWS and OFFLU quickly internalized One Health. They claimed that they had been, “doing One Health all the time. We just didn’t use the phrase” (F2-2010), “We are doing the same work, whether we use this phrase OWOH or not” (F13-2010). Due to FAO’s general enthusiasm for One Health and the internalization process that promoted the policy, its officials seemed more welcoming toward One Health.

Differences in response to OWOH between agencies also illustrate that some socialization mechanisms were needed to establish a new understanding of roles, rules and interests. However, since low-stratum technical officials thought current technical platforms already functioned like One Health, structural innovation was considered redundant. Similarly, lower-stratum officials at the WHO and OIE remained staunchly in the technical realm, standardizing laboratory techniques or monitoring diseases. They preferred to narrowly interpret One Health as sharing technical information and knowledge on diseases across sectors. Differences in attitudes of officials in the high and low stratum illustrate that officials’ interpretation and acceptance of OWOH was shaped by organizational hierarchy.

**Conclusion: the mutual impact of internal micropolitics and organizational behaviors**

In this chapter, I illustrated that international agencies’ behaviors are associated with their organizational attributes and internal micropolitics. By comparing variations in the WHO,
FAO and OIE’s shift to One Health, I found that the willingness of these agencies to intensify their One Health activities was dependent on their staff’s interactions and experiences, which were, in turn, shaped by their staff diversity and hierarchy. Generally, the more hierarchical and less diverse an agency is, the more reluctant its staff was to engage in the boundary-crossing behaviors that One Health demands.

As Trondal et al. state, “international bureaucracies are multidimensional administrative apparatuses, embodying contradictions and dilemmas that are difficult to resolve and that affect how decisions are made” (Trondal et al. 2010: 12). How an agency devised its apparatus therefore affected its capacity to deal with new challenges and emerging policy frames. Between agencies, veterinarians became the boundary spanners who collaborated over technical surveillance. Within agencies, the three agencies reacted to One Health differently due to their staff diversity and structure. Because the WHO, FAO and OIE differ in their staff compositions and working arrangements, their officials experienced and perceived dissimilar opportunities for crossing professional boundaries. FAO’s relatively high staff diversity and closer working relationships encouraged its officials to cross professional boundaries and incorporate alternative ideas. By contrast, officials at the WHO and OIE were less likely to conduct boundary-crossing activities, except technical cooperation on disease surveillance. WHO and OIE officials were more likely perceive One Health from a disciplinary perspective. Furthermore, organizational hierarchy negatively affected officials’ perceived autonomy regarding One Health alternatives. Lower-stratum officials often confined their work to technical issues of disease surveillance. In other words, organizational attributes can enable or confine officials’ willingness to engage in boundary-crossing activities.

To summarize, internal micropolitics was affected by and also shaped an agency’s ability to respond to the novel paradigm of One Health. My study therefore indicates that if an agency maintains a professionally narrow and hierarchical structure, it will have little capacity to implement an encompassing policy frame like One Health. By examining how bureaucrats’ experiences and reactions to changing morale differed, I highlight the
mutual influence of organizational attributes and internal politics, which are often omitted in international organizational studies.
Chapter 4 Producing Avian Flu Science – the Preponderance of Laboratory Investigations

Introduction: the preponderance of laboratory science

This chapter investigates the dominance of the technical/biomedical frame by examining how avian flu scientists negotiated the relative importance of knowledge. I argue that avian flu knowledge and policy interests co-evolved. Avian flu science, as well as interaction between researchers, has evolved along with attention to policy.

To trace the development of avian flu studies in the past decade, I coded articles and reports in *Science* and *Nature* between 1997 and 2012. By using the key words “avian flu,” “avian influenza,” and “bird flu” to search articles, I identified 34 original articles in *Nature* and 35 articles in *Science* that contain these key words. I then used the ideal types of frames I had previously identified in chapter two – the technical/biomedical, societal, ecological, and OWOH frame – to code and analyze these articles. I found that 87% of avian flu research represented a technical/biomedical frame. Among all original articles, knowledge accumulated via laboratory science accounted for 88.4% of research. Figure 4.1 illustrates the distribution of research frames by year.

![Figure 4.1 Research frame by year](image)
This revealed that laboratories have been the pivotal site for knowledge production, supporting technical interventions such as vaccine development. By now, researchers have accumulated extensive knowledge about the characteristics and behavior of the pathogen, its capabilities, its molecular construction, and the biological components and mechanisms that determine its virulence. In contrast to thorough understanding of the virus per se, epidemiological inquiries have not been completely and satisfactorily answered. Little research investigated the disease’s transmission dynamics, particularly as it relates to wild birds and socioeconomics. Fewer researchers explored how the virus evolves, behaves, travels, and the social factors of disease epidemiology.  

My interviews with six avian flu experts and survey with international consultants confirmed the dominance of laboratory science. Most of my interviewees and survey takers agreed that diagnostic techniques and vaccine production capacities have considerably improved. Nowadays scientists can study not only pathogens’ behaviors but also their molecular and genetic components. As one veterinarian commented, “We [veterinarians who study avian influenza] have understood the disease. Laboratory technologies have now matured” (E4-2010). By contrast, almost all experts I interviewed acknowledged that it was difficult to understand how the virus travels and mutates in the real world.

I investigate the preponderance of laboratory science by examining the politics and interactions between scientists. Rather than taking an essentialist perspective on science, i.e. science reveals the truth, my study looks at the mutual influence of science and policies. An essentialist approach perceives science as either predetermined factors or useful products provided by scientists in advance or independent of policy making.

42 Socioeconomic research was often lacking not simply due to the focus on hard science of Science and Nature. It also represents a larger trend. Using the Web of Knowledge (http://apps.webofknowledge.com/UA_GeneralSearch_input.do?product=UA&search_mode=GeneralSearch&SID=T2AGmj2pgN1n98nNdID&preferencesSaved=), a search index that contains both natural and social sciences, only 125 articles of all 8297 articles (1.51%) containing “avian influenza” were from social sciences and humanity journals as of March 15th, 2013. This evidence shows that social science investigations on avian have generally scarce.
However, this perception neglects the fact that scientific understanding may be deeply intertwined with policymaking processes. Informed by STS studies, I consider scientific knowledge as a political, cultural and social product (Knorr-Cetina 1981, Haraway 1989), and its production is a situated practice (Jasanoff 2004). Scholars of this constructive approach regard science as being produced in social worlds, where knowledge is inseparable from the practices and culture of the knowledge producers. For example, scientists were found to deploy their own ways of thinking and practices to develop scientific inquiries, interpret evidence, and provide answers. Scientific knowledge thus may be contested due to experts’ distinct epistemic cultures, methods, and approaches (Lamont and Molnar 2002, Knorr-Cetina 1999, Lélé and Norgaard 2005, Hagan et al. 2006). In addition to epistemic cultures, previous research found that social context also affected researchers’ worldviews and the knowledge being produced. For example, institutions have shaped scholarly work (Savelsberg and Flood 2004), interactions among researchers (Miller and Edwards 2001), and standards (Miller 2007). We therefore cannot understand the production and ordering of avian flu knowledge without accounting for the sociopolitical context in which researchers are situated.

I argue that avian flu researchers have negotiated the importance of scientific inquiries and evidence, by establishing the policy relevance of their work. In the case of avian flu science, prominent laboratory researchers often allied with international agencies to establish their authority and influence. Therefore, to account for the relative weight of different research inquiries and evidence, we have to investigate how knowledge producers debated, negotiated, and interacted in the process, and how they allied with international agencies to legitimize their research or resolve their tensions.

As I explained in previous chapters, the WHO, FAO and OIE tended to rely on and support professions that represented their organizational expertise: the WHO relied on medical experts, and the FAO and OIE drew from veterinarians. These agencies thus became crucial actors in mediating scientific knowledge and relationships between scientists. In the following sections, I will depict how relations between avian flu
researchers gradually changed as policies were discussed. I first illustrate how scientists were disconnected and antagonistic due to their dissimilar epistemic cultures (Knorr-Cetina 1999). Following that, I illustrate that scientists developed a hierarchy of knowledge based on their research objectives and methods. Researchers who studied animals and who conducted work in the field strove to prove the merit and practicality of their knowledge. Next, I reveal the close alliance between laboratory scientists and institutional actors that has contributed to the preponderance of biotechnical laboratory science. International agencies and laboratory scientists jointly reinforced the “biotechnicalization” of disease knowledge. I then move on to demonstrate how the FAO and OIE eventually connected laboratory scientists by promoting the sharing of samples and genomic information. Boundary crossing between researchers, therefore, mostly fell within laboratory science and reinforced this kind of research.

**Heterogeneous and disconnected research communities**

Avian flu researchers had been very few and disconnected. Before the worldwide avian flu outbreaks in late 2003, understanding of avian flu was limited. Lack of understanding was mostly due to disciplinary professionalization. Because avian flu rarely infected humans, its studies were conducted by different kinds of researchers. Influenza experts paid little attention to avian flu because they did not expect avian flu to spark a human pandemic. Knowledge about this disease thus has been mostly accumulated by veterinarians. However, because poultry was less valuable than other livestock, most veterinarians were incapable of detecting and controlling this disease (Capua and Alexander 2006). Researchers and international agencies frequently admitted that limited understanding of avian flu undermined global capacity for response and preparedness.

43 In the past few decades, research interests in infectious diseases had been replaced by that in civilized diseases such as cancer, diabetes, and obesity. Public health experts once believed that humanity has concurred infectious diseases, shifted their attention to other diseases. The outbreaks of SARS, BSE and avian influenza demonstrated that humans did not win the battle with infectious diseases, and emerging infectious diseases gradually re-attracted global attention.
Further, because influenza viruses mutate, predicting whether and when an avian flu virus strain would become capable of human-to-human transmission is difficult.

Occurrences of human infection by highly pathogenic avian influenza (HPAI) fueled research interests. After HPAI was identified as a major pandemic threat, this disease quickly became a “sexy topic” for global institutions, pharmaceutical companies and researchers (the phrase is quoted from my interview with F12-2009). Interested virologists, microbiologists, veterinarians, epidemiologists and other relevant experts rushed to study this disease from different angles. Avian flu knowledge mushroomed.

Avian flu researchers recognized that they were not only heterogeneous but also disconnected. Four communities have been most salient in conducting avian flu research – medical experts, veterinarian experts, wildlife experts, and epidemiologists. They identified avian flu problems differently, and they also produced different pieces of evidence to support their concerns. Their dissimilar epistemic cultures, i.e., arrangements and mechanisms in a given field that make up how we know what we know (Knorr-Cetina 1999), resulted in distinct research questions, priorities, evidence, methods, and policy preferences. Table 4.1 summarizes the heterogeneity of avian flu knowledge produced by these research communities. It should be noted here that conventional discipline boundaries are still inherently permeable and unstable, and my categorization only illustrates ideal-typical characteristics of these research groups.

As the table 4.1 illustrates, researchers are knowledge producers and carriers of different policy frames. Influenza experts, veterinarians, wildlife experts, and epidemiologists approached the problems from different lenses. Among them, medical experts, including influenza experts, virologists and microbiologists, have been dominant. Medical experts obtained this dominance by warning that avian flu viruses might spark a human pandemic. Their primary investigation interests therefore have been in the virus’ infection mechanisms, host susceptibility determinants, diagnosis and treatments, and vaccine and drug development. A number of prominent influenza experts were particularly salient, such as Robert G. Webster and Ab Osterhaus. For example, Webster, who leads a research
team at St. Jude Children’s Research Hospital in the US, became famous for his research on the 1918 Spanish flu and the 1997 Hong Kong H5N1 outbreak. Webster was a pioneer in warning of the pandemic potential of bird flu, and his advice was frequently cited by the media and government authorities. In the mass media, influenza experts like Webster and Osterhaus were often portrayed as heroic flu hunters, who incessantly hunt the invisible and ever-changing lethal viruses to protect mankind.

Table 4.1 Main research groups

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<tr>
<th>Main questions</th>
<th>Influenza experts/ Virologists</th>
<th>Veterinarians</th>
<th>Wildlife experts</th>
<th>Epidemiologist</th>
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<td>Whether it is a pandemic treats</td>
<td>Diagnoses and treatments for poultry</td>
<td>The role of wild birds in disease transmission</td>
<td>How was the disease transmitted</td>
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<th>Valid evidence/ Knowledge</th>
<th>Molecular, biotechnological, genetic information vaccinology</th>
<th>Molecular, biotechnological, genetic information epidemiology, vaccinology</th>
<th>Ecology of the host, Mapping</th>
<th>Epidemiology</th>
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<th>Scale of focus</th>
<th>Virus</th>
<th>Virus poultry Interactions</th>
<th>Virus – wild birds – environment dynamics</th>
<th>Virus Human (and sometimes poultry) Interactions</th>
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<th>Primary methods</th>
<th>Experiments in the laboratory</th>
<th>Experiments in the laboratory</th>
<th>Epidemiological investigation in the nature</th>
<th>Epidemiological investigations in affected societies</th>
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<th>Policy relevance/ Normative values</th>
<th>Public health</th>
<th>Animal Health</th>
<th>Environmental drivers of the disease, Conservation</th>
<th>Public Health</th>
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<th>Policy frames</th>
<th>Technical/Biomedical Frame</th>
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<th>Ecological conservation Frame</th>
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<th>One World One Health Frame</th>
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<th>Societal Frame</th>
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Most medical and virological research focused on investigating molecular or genomic characteristics of viruses in a laboratory. For example, medical researchers explained the mutation of virus by comparing viral genomes, accounted for H5N1 virus’ capacity to cross species-specific constraint by examining the antigenic characteristics of virus’ envelope glycoproteins (the hemagglutinin (H) and the neuraminidase (N)), and determined host immune responses by examining how viruses bind to human cells. To these experts, molecular and genomic knowledge of virus informs disease prevention and treatment, particularly via vaccines and anti-viral drugs. These experts therefore became salient knowledge carriers of the technical/biomedical frame.

Another crucial research community is composed of veterinarians, whose focus was essentially on animal disease control. Laboratory veterinarians are also carriers of the technical/biomedical frame, although they sensed their relative lack of power compared to medical experts. To prevent and control avian flu outbreaks in poultry, veterinarians focused on advancing disease diagnosis and developing poultry vaccination strategies. Veterinary experts attempted to accurately and quickly identify farm outbreaks, which was challenging because the symptoms of H5N1 flu virus are not significantly different from many other poultry diseases. Although veterinarians visited infected farms to collect samples, their attention was mostly given to confirming the viral strains rather than identifying the sources of infection. Whenever an outbreak was confirmed as H5N1 viruses, veterinary experts typically recommended biosecurity measures, such as mass culling of infected birds and strictly controlling the movement of personnel and vehicles for infected farms, regardless of the transmission routes. Therefore, veterinarians’ focus was mostly on the virus, and only occasionally on how poultry flocks got infected and poultry rearing behaviors.

Veterinary research tended to focus on advancing diagnostic techniques. Other pragmatic disease control techniques were advanced, such as how to vaccinating poultry on a large
A few veterinarians were known for revolutionizing poultry vaccination strategies. For example, Ilaria Capua, who headed an Italian national veterinarian laboratory, developed the Differentiating Infected and Vaccinated Animals (DIVA) vaccination approach which makes vaccinated poultry easier to identify.

A third research community was composed of wildlife researchers and ornithologists, whose primary concern was to protect migratory birds and their habitats. Their major question was whether and how wild birds contributed to the global spread of HPAI. Although scientists had agreed that wild birds are a reservoir of low pathogenic avian influenza (LPAI), there was no consensus as to whether wild birds can carry highly pathogenic avian influenza (HPAI) over long distances. A large-scale outbreak of HPAI among wild geese in Lake Qinghai, China in 2005 stirred debates and concerns. This outbreak was the first time that H5N1 virus significantly spread among wild birds. The OIE and FAO organized an international conference to evaluate the role of wild birds in 2006. To understand whether wild birds spread diseases, a few international and national authorities funded wild bird surveillance programs. For example, with the funding provided by the USAID and other agencies, in 2006 the Wildlife Conservation Society (WCS) began to coordinate the Wild Bird Global Avian Influenza Network for

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44 Previously, poultry vaccination was not considered favorable due to several inherent difficulties. For instance, vaccinating poultry by using needles was impractical for large poultry populations. In addition, some veterinarians worried that improperly implemented vaccination may drive the virus to circulate without showing any symptom; therefore it may contribute to the spread of the disease. Furthermore, some experts argued that poultry vaccination may impact trade of poultry product, making a country difficult to claim its disease-free status.

45 DIVA uses a closely related strain as the vaccine strain, which only differs slightly on the neuraminidase protein from the targeted virus. Vaccinated animals thus could still be distinguished from infected ones.

46 That is to say, healthy wild birds are capable of shedding LPAI virus for months to years.


48 The conference convened more than 300 veterinarians, virologists, and conservationists to discuss issues such as migratory bird flyways, poultry-farming systems and global trades, and virus introduction and spread. It is concluded that the answer to avian flu outbreaks lies in a combination of all these factors. Experts also agreed that learning wild birds’ role in disease ecology is crucial.
Surveillance (GAINS).\textsuperscript{49} The GAINS developed a web-based surveillance database to map disease outbreaks. In addition, the FAO led efforts to track migratory wildfowl with satellite transmitters to understand their movement and identify association with avian flu outbreaks. These surveillance programs were intended to identify H5N1 reservoir species, i.e. birds that can carry and spread the virus without getting sick; and to elucidate the dynamics between the virus, wild birds, and the environment. Research was on the dynamics between the virus and its animal hosts. By employing modern technologies, such as installing satellite tags on birds and developing geographic information systems (GIS) to map migratory routes and outbreaks, wildlife experts strove to understand whether wild birds contributed to disease transmission. Researchers in this community represented an ecological conservation frame. The WCS, in particular, was the first group to advocate for an OWOH approach. In 2004, the Director of WCS’ Field Veterinary Program, Dr. William Karesh, publicly promoted the One World, One Health (OWOH) approach by organizing related conferences and workshops. The WCS argued that the veterinary community, ecology community, environmental community, and public health community should collaborate to jointly reduce the burden of disease control.\textsuperscript{50}

A fourth research community is composed of epidemiologists, whose interest is in identifying how the virus spread, what factors contribute to its case fatality, and how to prevent its occurrence. Because epidemiologists’ major task was to understand the incidence, prevalence, and determinants of human outbreaks, they investigated human activities and interactions, and compared the susceptibility of the population. Researchers either conducted field investigation or worked with collected epidemic data. For example,

\textsuperscript{49} The GAINS was funded by several international or national agencies, including the United States Agency for International Development (USAID), U.S. Centers for Disease Control and Prevention (CDC), U.S. Department of Agriculture (USDA), and the United Nations Food and Agriculture Organization (FAO). The WCS also collaborated with the Center de Coopération Internationale en Recherche Agronomique pour le Développement (CIRAD, French Agricultural Research Centre for International Development) and Wetlands International to track wild bird migrations.

\textsuperscript{50} The American Veterinary Medical Association (AVMA), American Medical Association (AMA), and American Public Health Association (APHA), also approved and promoted a similar concept called “One World, One Medicine.” This approach also encouraged cooperation between the public and animal health researchers, but the focus was more on sharing knowledge on medicines.
some researchers attempted to predict the course of development and effectiveness of control measures by computer modeling.\textsuperscript{51} Epidemiologists, though calling for technical and biomedical interventions such as quick delivery of anti-viral drugs, at times also promoted societal interventions such as changing poultry rearing and marketing behaviors.

These four major research communities were disconnected due to their professional expertise, dissimilar interests, methods, focus, and normative concerns. Figure 4.2 illustrates the distribution of research focus by profession. Scientists were not motivated to collaborate. The One World, One Health approach promoted by the WCS, as a result, was a movement to transform scientists’ disconnected relationships. In the following sections, I will explain how researchers perceived their influence and hierarchy in the knowledge and policy domain. I argue that the perception of tension and competition gradually shaped the way avian flu researchers interacted with one another. Researchers often negotiated their authority, influence, and resources with and through governance authorities. They strove to convince other researchers and governance authorities that their knowledge was important to disease control.

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{research-focus-by-researchers.png}
\caption{Research focus by researchers}
\end{figure}

\textsuperscript{51} For example, a few computer modeling studies were conducted by the Imperial College London and Emory University in Atlanta to predict disease transmission rate at a global scale if a pandemic occurs. This kind of research, based on assumption of viral infectivity and vaccine efficacy, often reconfirms the essentiality of timely biomedical interventions such as deploying vaccines and anti-viral drugs. Most computer models take into population factors such as population density but not cultural factors.
Negotiating the weight of disease knowledge

Avian flu researchers frequently recognized that knowledge carried different weight. By analyzing scientists’ claims and arguments in *Science* and *Nature*, I identified two crucial factors that affect the weight of evidence—whether the knowledge is (claimed) contributing to disease control, particularly in humans; and whether the evidence is considered credible. For the former factor, medical experts enjoyed a superior position over veterinarians. Influenza experts and vaccinologists seemed less compelled to defend the significance of their work. By contrast, veterinarians and wildlife experts often had to claim that their activities “also” made significant contribution. Some veterinarians and wildlife researchers pointed out that their work was less appreciated, and therefore funding and interests had been insufficient. For the latter factor, laboratory evidence has been considered more credible, compared to research conducted in the field. Researchers who felt their work was slighted striven to renegotiate with other actors—scientists and politicians. Let me explain these two factors in details.

1. Public health outweighed other concerns

Experts and international officials frequently highlighted the disconnect between two major camps—medical experts and veterinarians. Specifically, the perception that public health concerns outweighed animal health prevailed. Several experts observed,

“There is a mistrust between the two castes—the doctors and the vets. It has prevented lots of collaboration. There is a slight complex of inferiority among the vets. And there is a big complex of superiority among the medics” (interview quotes, Scoones and Forster 2010:48).

“There is a distinction. I think somehow treating the animal is less…yes, less noble, than treating people. So you just wait for the people to get infected” (interview quotes, Scoones and Forster 2010:48).
“The thinking between vets and medics is really, really separate. It’s challenging. That is a big one to overcome. It assumes there is no crossing over. The minds are still that way, even if they are working on something like avian influenza. We have to overcome these challenges. Everything is a problem. Human doctors think it’s a human disease. But they have to be reminded it is an animal disease! On the animal side, they forget the human element…There is this huge diversity of thinking. The lab bench people get along quite well. But getting others in the room…that’s hard. When people do get together, people tend to have very political discussions. We need better technical collaboration.” (interview quotes, Scoones and Forster 2010:48).

Veterinarians and wildlife experts sensed the inferiority of their positions, hence in scientific publications, they frequently underscored their contribution and the significance of understanding the disease in animals in order to contribute to disease control in humans. For example, Ilaria Capua, a famous Italian veterinarian, has continuously argued that veterinarians can and should contribute to pandemic preparedness and control (see e.g., Capua and Alexander 2006).

2. **Producing more credible knowledge in a laboratory**

Besides the human and animal dichotomy, research methods and sites also affected the weight of evidence. Generally, knowledge produced in a laboratory was considered more credible than epidemiological knowledge collected in the real world. One primary reason for the power of laboratory knowledge is the invisibility of virus. Without modern biotechnologies, confirming the presence of the virus and its specific strains was challenging. Therefore, laboratories equipped with state-of-art technologies became a crucial site for avian flu knowledge production. In contrast, epidemiological evidence produced by wild bird experts was much less conclusive. While molecular and genetic information of viruses is easily regarded as scientific fact, epidemiological evidence was often presented as informed speculations. Wildlife experts and epidemiologists struggled
to pinpoint how the pathogen behaves outside of the laboratory, i.e., how it is transmitted in nature or in/across populations.

The power of laboratory knowledge has been well discussed by Latour (1983) in accounting for Pasteur’s success. Laboratory experiments allowed Pasteur to prove his germ theory, as well as to successfully translate other stakeholders’ interests in support of his germ theory and solutions. According to Latour, a laboratory destabilizes “the very difference between the ‘inside’ and the ‘outside’, and the difference of scale between the ‘micro’ and ‘macro’ levels” (Latour 1983: 143). Within a laboratory, researchers can control and manipulate their research objects in a controlled environment. Since Pasteur’s time, laboratory capacities have greatly advanced. Modern microbiological and biotechnical tools permit contemporary laboratory scientists greater influence. Nowadays, scientists not only can cultivate and experiment on viruses, but they can also manipulate their viral molecular and genetic components by using cutting-edge biotechnology. For instance, naming of influenza viruses is only made possible by the ability to identify their hemagglutinin (H) and neuraminidase (N) combinations, the types of surface proteins viruses carry (e.g. H5N1 or H1N1). A recently developed reverse genetics method for vaccine development illustrates the revolutionary ability to manipulate and coin viruses at the genetic level. In addition, laboratory scientists, whether influenza or veterinarian experts, can explain the pathogenicity and evolution of avian flu by examining viral structures, genetic information, and receptor reactions. Laboratory scientists therefore claim contributions to disease control by providing an understanding of the pandemic potential of viruses, the virus’ rate of infection, and why viruses become stronger.

In contrast to the certainty of laboratory science, field researchers such as wildlife experts and epidemiologists encountered greater challenges in identifying causal relationships. Most epidemiological and wildlife research appeared controversial, partly due to the fact that this research was conducted in the real, thus uncontrollable, world. Often times, how the virus emerged, how it was transmitted, and what factors influenced its behaviors
could not be answered satisfactorily. Epidemiologists recognized that “epidemiology never proves. It only highly suggests” (Sipress 2009: 276). Researchers reflected,

“Uncertainty is what often separates public health from laboratory science. Lab researchers select questions they believe they can answer and bypass those they can’t. They design experiments to produce definitive proof. Success means generating results that can be reproduced by other scientists in other labs. Public health, by contrast, rarely gets to choose the questions it must answer. People get sick. Doctors try to diagnose. They prescribe treatment and hope it will work. Symptoms, family history, and even test results are suggestive but often not definitive.” (interview quote, Sipress 2009: 252-253)

Even experts who worked with second-hand epidemiological data recognized the imperfection of their data. For instance, a disease management consultant highlighted the unreliability of avian flu epidemiological data:

“I work as a disease management consultant mainly, so do not do university/research lab-style research. My ‘research’ is much simpler and looks at what is known, what is not known but which we can make reasonable assumptions about, and gaps that need to be filled by further studies that others will conduct. One of the biggest issues with avian influenza research is that a considerable quantity of the epidemiological research, and in particular modeling studies, has been conducted using poor quality data based on reported outbreaks. But reported outbreaks represent only a small proportion of the total cases” (S29-2010).

Similarly, wild bird researchers were challenged by great uncertainty and controversies. Several challenges prevented these researchers from establishing solid conclusions on how wild birds fit into the H5N1 story. First of all, studying live animals is time-consuming and resource-demanding. An FAO official noted that wild bird surveillance programs were difficult and complicated, and these studies required a large, coordinated
planning team (F6-2009). The effort, time and resources required to catch wild birds and take samples made extensive sampling almost impossible.

Even if such data were collected, it was difficult to draw a solid conclusion on the global temporal and spatial patterns of disease outbreaks and migratory routes due to the limited quantity of data. Studies yielded different conclusions: While some studies indicated wild birds played a role, others failed to confirm this. Because HPAI viruses were rarely detected in wild birds, and then only in very sick or dead birds, it was still uncertain whether birds were able to travel long distances after contracting the infection. Therefore, although most live wild birds tested negative for H5N1, scientists were not certain whether the findings were simply due to limited numbers of samples. Furthermore, scientists have not yet identified wild reservoir species, i.e. wild bird species which can carry the virus without showing symptoms. FAO officials therefore admitted that it was difficult to know whether there is no wild bird reservoir or whether researchers had just not sampled enough.52

Moreover, it was difficult to identify the sources of infection in the field. Even if H5N1 virus was detected in wild birds, the evidence did not prove whether the virus was generated from reared poultry or the natural environment. While some scientists pointed out that major flyways of migratory birds corresponded with disease outbreaks, wildlife experts, ornithologists, and conservationists often refuted this argument by highlighting that the timing of poultry outbreaks did not correspond with migrations. Wildlife experts argued that migratory birds were victims of poultry outbreaks rather than vectors, and HPAI was in fact generated in poultry rather than from the wildlife. Some researchers argued that it was commercial poultry trade that was responsible for cross-border transmissions. For example, a wildlife expert argued,

“Overall, the discussion still is not where it should be: the main issue for current and future highly pathogenic avian influenza outbreaks is the poultry industry. It's the thousands of genetically almost identical birds that make AI dangerous. Wild birds well can cope with Avian Influenza - not a single real (!) big outbreak was found even with a specially strong strain like H5N1. Although we have close contacts between human and poultry there, backyard poultry also is not the main source of danger. Genetic variability (as we have it in all the breeds in backyard groups) is the best way to select high pathogenic virus down to LPAI. This is a very easy principle of parasite-host-evolution. It's the industrial poultry that matters - and this needs to be made much more clear. Solutions / alternatives are not easy at all, but currently I don't even see someone looking for them seriously” (S44, 2010).

Due to the difficulty in making straightforward causal conclusions, field researchers continuously debated the risk posed by migrating wild birds. Partly due to the relative credibility of evidence, avian flu science generally veered toward the world of virology and biotechnology. This phenomenon constitutes what I call biotechnicalization of disease knowledge. Here I expand Clarke et al.’s (2003) definition of biomedicalization, which refers to growing importance of technoscience in medical fields, such as “innovations like molecular biology, biotechnologies, genomization, transplant medicine, and new medical technologies” (2003: 162). The way I use biotechnicalization, though similar to Clarke et al.’s (2003) definition of biomedicalization, expands the scope of application. While Clarke et al. (2003) refer to biomedicalization as investigating and defining human diseases by genomic and biomedical technologies, I use biotechnicalization to explain the investigation and treatment of not only humans but also the pathogen. Biotechnical investigations also resulted in technical tools, therefore they were more appreciated than research on identifying the root causes of disease.

Two factors – perceived credibility and practicality of knowledge – jointly contributed to the biotechnicalization of avian flu knowledge. Laboratory science was prioritized over
field investigations in identifying root causes and transmission modes of the disease. Researchers in inferior positions, such as veterinarians, wildlife researchers and epidemiologists, continuously highlighted research gaps and the need for their expertise.

In sum, avian flu researchers developed a sense of hierarchy of knowledge among themselves. Generally, knowledge that contributed to public health and was produced in a laboratory was regarded as more valuable. Scientists in more inferior positions therefore often attempted to defend their contributions. In the following section, I explain how researchers attempt to increase their influences by allying with international agencies.

**Advancing technical expertise of governance agencies**

Researchers not only negotiated the weight of evidence among themselves, but they also did so by interacting and allying with governance agencies, because international agencies were crucial actors in prioritizing knowledge. As we have discussed in the chapter three, the WHO, FAO and OIE represented two areas of technical expertise – public health and animal health. Tension between these agencies often revolved around the contribution of different professionals. The FAO and OIE frequently defended the contributions of veterinary experts to counter balance WHO’s dominance in policy making.

International agencies intended to strengthen global capacity for disease surveillance. The WHO, FAO, and OIE frequently identified research priorities as diagnosis, vaccine development, drug therapies and epidemiology/population science. International agencies emphasized the need to improve early warning, early detection, and early responses by improving laboratory capacity. They were interested in obtaining universal technical tools to strengthen their governance capacity. Researchers, regardless of their professional backgrounds, competed for their contribution to pandemic preparedness and disease control.
Laboratory scientists, whether medical or veterinary experts, developed closer relationships with international agencies by highlighting their practical solutions, such as diagnostic kits or vaccines. Prominent flu and vaccine experts stated that their research made the world “much better equipped with technologies and reagents to rapidly identify and respond to pandemic influenza threats” (Webby and Webster, 2003: 1521). The WHO, FAO and OIE actively consulted with prominent laboratory researchers, such as Webster and Capua, to assess disease knowledge and formulate policy solutions.

International agencies further intervened in the making of laboratory knowledge: The WHO focused on vaccine development, and the FAO and OIE promoted laboratory science in the animal health domain. For example, the WHO and public health experts worked on improving vaccine manufacturing capacity during a pandemic. The WHO encouraged new laboratory biotechnologies and production methods. For instance, researchers tested a “reverse genetics” method to make inactivated vaccines; used adjuvant to boost vaccine quantities and efficacy; and studied a universal vaccine to stimulate immunity to different kinds of influenza A viruses. With WHO’s assistance in circulating viral strains among its affiliated laboratories and vaccine manufacturers, biotechnicalized avian flu knowledge and tools greatly advanced.

In the animal health domain, the FAO and OIE’s GLEWS and OFFLU networks also facilitated the exchange of genetic, antigenic, and epidemiological data. The OFFLU network attempted to cultivate links between laboratories in developing countries and

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53 For example, one of the technical barriers for vaccine production is the use of eggs as the culture medium, which was time-consuming and dependent on consistent egg supply. Besides, the H5N1 virus was found to kill chick embryos, which made this traditional method unworkable.

54 The reverse genetic technique use two genes code for HA and NA and six genes from a safe flu virus to assemble the suitable vaccine. However, it still requires the use of mammalian cell lines that mainly owned by pharmaceutical companies. The St. Jude Children’s Research Hospital licensed the patent for the reverse-genetics process to MedImmune Inc., a major vaccine manufacturer. Since 2006, the MedImmune Inc. has licensed its reverse genetics technology to vaccine manufacturers such as CSL Limited of Australia, sanofi pasteur, Novartis, and GlaxoSmithKline.

55 These methods include inactivated subunit, inactivated surface antigen, inactivated split virus, inactivated whole virion, live attenuated, whole virion & virosomal.

56 For example, a Belgian drug company, GlaxoSmithKline’s report on successful clinical trials on adjuvants in 2007 was quickly confirmed by the WHO regarding the usefulness of the findings.
those in developed countries. The WHO, FAO and OIE also invested in standardizing laboratory techniques and tools. Even in the officially endorsed One World One Health policy document (2008), only one recommendation out of six addressed concerns for the livelihood of the poor and poverty alleviation. Others involved technical interventions and cooperation. One FAO policy report (FAO 2011) acknowledged that most ongoing projects in 2010 were, “still largely focused on the veterinary disciplines of surveillance, response, strengthening of veterinary services and laboratory expertise” (FAO, 2011: 27). Figure 4.3 below reveals that two years after One Health was adopted, most of FAO’s avian flu projects still focused on technical tasks such as surveillance and responses.

![Thematic composition of HPAI projects](image)

Figure 4.3 1 thematic composition of HAPI projects (Source of the figure: FAO 2011: 26)

Vaccine development and disease surveillance, therefore, were prioritized in developing avian flu science. Improving global surveillance capacity grew to be a common interest of governance agencies and avian flu experts. Global attention was mostly on upgrading laboratory capacities. Researchers with different backgrounds all claimed that their work contributed to disease surveillance. Not only laboratory scientists, but also epidemiologists and wildlife experts, argued that they strengthened diagnostic capacity
and timely responses. These field researchers developed collaborative relationships with laboratory scientists who had H5N1 diagnostic capacity.\textsuperscript{57} International agencies, by demanding knowledge that improved surveillance, laboratory capacity, and technologies, reinforced the preponderance of laboratory knowledge.

Therefore, international agencies were co-producers rather than merely receivers of knowledge. For example, the FAO and OIE channeled considerable international funds and held numerous training workshops to improve diagnostic capacity in developing countries.\textsuperscript{58} Compared to their confidence in and demand for laboratory disease knowledge, international agencies seemed uncertain about how to make use of epidemiological knowledge. Among these three agencies, only the FAO directly invested in wild bird surveillance programs.\textsuperscript{59} One OIE official reflected on why the OIE initially lacked interest in advancing this knowledge, during an interview conducted in 2008. He commented, “But what can we do with wild birds? It has nothing to do with trade. You cannot shoot all wild birds” (O5-2008). Many experts similarly commented that “wild bird studies have not yet delivered information that assisted disease management…and models generally are based on weak foundations”\textsuperscript{60} (Fieldnotes, One Health Congress 2011). Partly due to the difficulty of translating the knowledge into practical policies, wildlife experts frequently argued that their research was either poorly funded or only

\begin{itemize}
\item \textsuperscript{57} I would like to note here that although international agencies put more emphasis on surveillance, they also invested in epidemiological or wild bird research. Only that the investment was much less.
\item \textsuperscript{58} For example, a 12-day regional European Training Course on “Advanced Molecular diagnosis and characterization of Avian Influenza (Bird Flu)” co-sponsored by EU ConFluTech Project was held in 2009 at the IAEA Laboratories in Vienna. See \url{http://www-naweb.iaea.org/nafa/aph/bird-flu-training.html} (retrieved February 28, 2013).
\item \textsuperscript{59} None of the FAO, OIE and WHO was dedicated to monitoring animal diseases in wildlife, or to identify infections between wild animals and domestic animals. The Scientific Task Force on Avian Influenza and Wild Birds, established in 2005, was organized by the United Nations Environment Program (UNEP) Convention on Migratory Species of Wild Animals (CMS), and the Agreement on the Conservation of African Eurasian Migratory Waterbirds (AEWA). This Task Force established research collaborations among policy agencies and non-governmental organizations such as the WCS and Bird Life. In early 2006, FAO sponsored a surveillance study of wild birds in several countries of Eastern Europe, the Middle East, and Africa. However, in the beginning, the OIE and FAO were merely observers in the Task Force. In 2007, FAO finally became an active member and shared the organizing work with the UNEP and AEWA. However, the UNEP was not a partner during the institutional promoters of One Health.
\item \textsuperscript{60} The expert did recognize that such research had other spin-offs, such as bringing about better understanding of migratory pathways, despite his doubts in its practicality.
\end{itemize}
funded by less resourceful authorities such as the fishery or environmental departments (Fieldnotes, One Health Congress).

Growing emphasis on contribution to practical disease policies illustrated that avian flu knowledge is by no means independent of policy deliberations. Policy attention to quick and efficient technical resolutions contributed to the biotechnicalization of disease knowledge. An expert’s comment vividly illustrates the importance of political relevance for avian flu research:

“Much of the AI importance has been driven by political connections. No true risk evaluation or assessment has been done, and policy makers have only been interested in ways to ensure they obtain the most exposure to media, and this has corrupted science as well which jumped onto this syndrome. As scientists quickly found, to ensure funding, you have to maintain political relevance of your subject” (S43-2010.)

To summarize, laboratory influenza experts and veterinarians who conducted laboratory investigations gained prominence, due to their capacity to provide knowledge that was pragmatic and supported governance agencies’ technical expertise. Scientists strategically underscored the political relevance of their research to secure funding and influence.

**Tension reduction between laboratory scientists**

Previous sections revealed that researchers actively negotiated the weight of their knowledge. Politics and relations between research communities thus were by no means static, but constantly shifting. In this section, I illustrate how the WHO, FAO and OIE were involved in adjusting the relationships between researchers. Some scientists attempted to resolve tensions with and through international agencies, specifically on battles over research material

For avian flu laboratory researchers, obtaining viruses for investigation could be challenging because of professional competition and institutional constraints. In addition
to viral strains, the genome sequences of viruses also provided valuable information for studying viral evolution and developing vaccines. Researchers were not accustomed to sharing these research materials for several reasons. First, sharing research material was against researchers’ interests because they are inherently in competition. Researchers refrained from sharing viral strains or viral genomic information with other groups. Pressure for publication and for vaccine innovation discouraged scientists from sharing material and genomic information with others. Resourceful researchers often hoarded viruses and sequence data, sometimes for years, until their paper was published. Moreover, interest in vaccine patents encouraged “a tendency to view viruses in the freezer as money in the bank.” Institutional constraints limited who can receive precious and sensitive research materials – viruses. Due to the lethality of H5N1 viruses, handling of avian flu viruses has been strictly regulated. Under international regulations, only laboratories with Biosafety Level (BSL) 3+ are qualified to investigate this lethal strain of virus. Concerns about political sensitivity, national pride/interests, biosafety, and bioterrorism made sharing viral samples across national borders difficult.

Gradually, tension between medical experts and veterinarians regarding research materials escalated. For example, one animal health expert criticized that “the genomic sequences of some diseases are not shared. From my point of view, we’re too much intellectual property-driven. At some level we are failing on capacities. We are emphasizing biosecurity rather than sharing these materials more freely.” (Fieldnotes, One Health congress, 2011).

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61 For example, the St Jude’s Research Hospital in Memphis, Tennessee (US) is well-known for collecting and evaluating influenza in animals.
63 For biosafety reasons, WHO and OIE both provided guidelines for transmission and investigation of viral material. According to the requirements, only laboratories with biosafety level 3 (BSL 3) facility could investigate HPAL. WHO released regulations for the storage, transfer, and utilization of viruses. WHO and OIE/FAO developed prototype Material Transfer Agreement (MTA) to guide labs’ transfer of viruses to reference labs for epidemiologic and research purposes. This includes controlled access double door entry with change room and shower, use of respirators, decontamination of all wastes, and showering out of all personnel.
The WHO’s practice of sample sharing increased the tensions. In 2004, controversies over sample sharing bubbled over when the WHO requested that veterinary laboratories submit avian flu samples to its Global Influenza Surveillance Network (GISN) collaborative centers for human vaccine development. The WHO argued that receiving avian influenza viruses, data on gene sequences, and clinical and epidemiological information from FAO/OIE’s reference veterinary laboratories would help pandemic preparedness. However, WHO’s move intensified conflicts between medical experts and veterinarians. Veterinarians affiliated with the FAO/OIE argued that the WHO’s system was exclusive, only allowing a small network of researchers linked to the WHO to use the data.64

Capua, an Italian veterinarian who chaired the Institute Zooprofilattico Sperimentale delle Venezie, disagreed with this request strongly.65 She refused to share the data with WHO’s privately kept database.66 Subsequently, Capua therefore allied with the FAO and OIE in advocating for openly accessible influenza data to facilitate scientific investigation. She argued that the data should be available to any interested researcher who intends to contribute to the public good. Capua subsequently began a campaign for public assessment of genomic data by releasing an open letter in *Nature* in August 2006. Seventy scientists’ signed the open letter, including six Nobel laureates.

64 The WHO’s Global Influenza Surveillance Network (GISN), established in 1952, have practiced the collection and analysis of human influenza samples through international laboratory networks over a half century. However, there was no institutional linkage that requires FAO/OIE’s networked veterinarian laboratories to submit samples to the WHO. In 2004, the WHO created a special secured section at the Influenza Sequence Database (ISD) at Los Alamos National Laboratory in New Mexico, US to store influenza samples. Research institutes or collaborating centers analyzed and compared viral samples to trace of the evolution of virus. The GISN permits the WHO to release candidate vaccine viruses to institutions, companies and others interested in pandemic vaccine development. Initially, only 15 laboratories had passwords to access these data (later the number increased to 17), including WHO’s eight reference labs and a few other laboratories close to policymaking.

65 Capua’s laboratory was an OIE Reference Laboratory, and she served as the OIFLU secretary since its establishment in April 2005.

66 In Feb 2006, Capua deliberately deposited the sequence of a sample from Nigeria to Genetic Sequence Data Bank (GenBank), a transparent free-access database of genetic sequences from organisms, instead of to the WHO.
Capua successfully enrolled the FAO and OIE in her revolutionary movement. Being the secretary of the OIE/FAO network of expertise on avian influenza (OFFLU), Capua’s idea of public assessment of genomic data became one of the OIE and FAO’s policy priorities. The OFFLU subsequently began to promote the sharing of genomic data, as long as researchers acknowledged the use of the material in their subsequent publications or other resulting benefits from it. Capua and OFFLU’s campaign resulted in the establishment of Global Initiative on Sharing Avian Influenza Data (GISAID) in August 2006. With GISAID, scientists could voluntarily deposit genetic data in this platform after it was generated. Capua’s rebellion loosened the rigid hierarchy between medical and veterinary communities, lifting the status of veterinarians. This case illustrates that the WHO, FAO and OIE have directly and indirectly contributed to the knowledge and power of avian flu researchers. It also illustrates that scientists can challenge, align with, or work through international agencies to deal with their conflicts. By banding together, veterinarians and the OIE and FAO jointly challenged the status quo of information sharing and the ordering of avian flu knowledge. After One Health was endorsed, Capua also advocated for “One Flu,” which aimed to connect both human and animal health laboratories. This movement was again fully supported by the OFFLU.

The alliance lifted both veterinarians’ and the OIE and FAO’s status. Veterinarians established greater authority, comparable to physicians, and expanded their research

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67 Upon its establishment, OFFLU has been involved in sample sharing issue and to broaden research cooperation. It actively involved in establishing research a transnational network of avian flu studies that will “develop and harmonize synergistic research projects in different parts of the world thus avoiding duplications of activities and wastage of resources” (OFFLU leaflet.).

68 The GISAID was originally hosted by the Swiss Institute of Bioinformatics (SIB) in Geneva. In April 2010, the German government agreed to become the long-term host of its platform and EpiFlu database.

69 Data deposited to the GISAID would be deposited in the three publicly available databases participating as soon as possible after analysis and validation. These three international nucleotide sequence databases participate in the International Sequence Database Collaboration, including the DNA Data Bank of Japan (DDBJ), EMBL-Bank/ European Bioinformatics Institute (EBI) in Europe, and the GenBank/National Center for Biotechnology Information (NCBI) in the USA. Each of the three banks e collects a portion of the total sequence data reported worldwide, and all new and updated database entries are exchanged between these groups on a daily basis. The three banks collaborate through exchanging data and information on internet and by regularly holding two meetings, the International Advisory Committee and the International Collaborative Meeting. The data in GISAID is available immediately to all who signs on to use the database under the terms that they acknowledge the source of the data.
territories. The OIE and FAO strengthened their authority in global governance. International agencies played a role in shaping and adjusting researchers’ relationships. However, most institutional interventions, as we have seen, were made to align laboratory scientists of different disciplines. Less institutional effort has been devoted to engage wildlife field experts, epidemiologists, or social scientists. Less institutional funding was invested in understanding social determinants, impacts, and consequences of diseases.

Conclusion: Virus-centric avian flu knowledge

This chapter revealed the dynamics between science and policy. I illustrated that the relationships between avian flu researchers have gradually changed. My findings challenge a uni-directional understanding of how scientific advances lead to policy change. Rather, the evidence shows that avian flu policies and science have co-evolved.

Avian flu science and policies co-evolved in three ways. First, scientists negotiated and competed for the significance and influence of their knowledge product. Initially, researchers were disconnected due to their dissimilar interests, focus, and research methods. Gradually, researchers found it necessary to highlight the credibility and practicality of their knowledge to defend the significance of their activities and attract more resources. They strove to increase credibility, to provide practical solutions, and to network with governance authorities. Scientists defended the value of their work, worldviews and contributions to, with, and through policy agencies.

Second, international agencies’ emphasis on disease surveillance reinforced the “biotechnicalization” of disease knowledge and the authority of laboratory scientists. The WHO, FAO and OIE identified advancing laboratory capacities and techniques as crucial to disease control. Their emphasis on disease surveillance and vaccine development therefore reinforced laboratory inquiry. By shaping the institutional environment and practices for laboratory investigation, such as the standardization of research techniques, protocols, and tools, the WHO, FAO and OIE contributed significantly to the advance of laboratory investigations. In other words, policy emphasis on surveillance prioritized
laboratory science. Now, the OFFLU has established relationships with the WHO. The OFFLU and WHO’s Global Influenza Programme (GIP) has assigned representatives to participate in each other’s relevant technical meetings on influenza strategies. In addition, the OFFLU and GIP also jointly organized technical committees to harmonize the phylogenetic tree of H5N1 viruses and molecular biological techniques. The WHO, FAO and OIE have attempted to unify scientific interpretations across professions, laboratories, and national boundaries. The harmonization of the phylogenetic tree of H5N1 viruses is expected to let researchers track, isolate, and characterize influenza viruses in a standardized way. With these institutional interventions, a shared language between different research groups has gradually emerged.

Third, scientists also allied with governance authorities to resolve their tensions. For example, veterinarians allied with the OFFLU to resolve the sample and genomic information sharing controversy. In the process, previously disconnected laboratories began to interact, and a new data sharing platform was established.

This chapter concludes that avian flu science, as well as interactions among researchers, have evolved with policy. Scientific activities are not apolitical, value-neutral nor independent from policy. Not only do researchers negotiate the significance of their work by interacting and persuading governance agencies, they also align with these agencies to resolve their conflicts and reshaped their interactions. By showing the mutual influence of science and politics, my research illustrates that the WHO, FAO and OIE contributed to laboratory scientists’ authority, prioritized biotechnical evidence, and affected the interactions between researchers.

The development of avian flu science further demonstrates the limits of policy agencies on global solutions. Gradually, disease knowledge became more and more biotechnicalized. Scientists thoroughly understood the microbiology of viruses but are rather indeterminate about its epidemiology. With the intensifying interaction between laboratory scientists and international agencies, virus-centered scientific questions are framed, knowledge claims justified, and laboratory evidence valued. Laboratory-
dominated questions, models, and methods have been advanced. With policy emphasis on efficient technical interventions, most avian flu knowledge produced before 2008 fell into virology and biotechnology, while the understanding of its ecological, social, and economic impact has been limited. The WHO, FAO and OIE recognized the incomplete understanding of HPAI epidemiology and the complex dynamics between humans, animals, and the environment. Social, cultural and economic roots of diseases and consequences of control measures, though considered, were often marginalized. Field and socioeconomic investigation is scarce and under-developed. Most researchers did not consider factors such as demographic pressure, the use of natural resources, climate change, globalization, increased demand for protein by a growing global middle-income class, and intensification of farming systems. As one article of the Third World Network put it,

“...peel back causality to the biomedical. Influenza can indeed be defined by its molecular structure, genetics, virology, pathogenesis, host biology, clinical course, treatment, modes of transmission, and phylogenesis. Such work is, of course, essential. But limiting investigation to these topics misses critical mechanisms that are operating at other, broader levels of socioecological organization” (Wallace 2009b).

We should, therefore, be aware of how dominant evidence and policies are shaped, what evidence is privileged, and what alternatives are neglected. In the next chapter, I will examine who had the authority to define and produce One Health knowledge, once this framework received political attention.
Chapter 5 Making One Health Experts: The Formation, Reinforcement, and Transformation of Epistemic Communities

Introduction: How did One Health experts emerge?

In February 2011 in Melbourne, the Commonwealth Scientific and Industrial Research Organisation (CSIRO), Australia's national science agency, hosted the first One Health Congress. The CSIRO, overseeing the Australian Animal Health Laboratory (AAHL), also serves as OIE and FAO’s reference laboratory for highly pathogenic avian influenza (HPAI). This congress took place roughly three years after the formal endorsement of the One World, One Health (OWOH) policy framework by international agencies in 2008. Since the endorsement, a series of meetings have been held to deliberate the concept of One World, One Health – in Winnipeg (2009), Stone Mountain (2010), and other regional and international meetings. In addition, the FAO, WHO, and OIE rephrased OWOH to One Health to recognize its alteration from the original concept coined by the Wildlife Conservation Society (WCS). Being the first publicly accessible One Health conference, the One Health Congress attracted about five hundred researchers, national delegates, and officials of international or national agencies to congregate in Australia.

Enthusiasm for One Health prevailed at this conference in Australia. The congress opened with a performance of Australian indigenous dance, symbolizing the theme of One World. Afterwards, senior officials of the Australian host agencies, United Nations, FAO, WHO, OIE welcomed participants by stating their determination to “take One Health to the next

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70 In contrast to prior exclusive meetings, this One Health Congress in Melbourne was the first time international authorities openly called for paper submissions and expert participation, therefore attracting some researchers who were not previously identified by the WHO, FAO, and OIE as experts. The first One Health Congress, however, was not the first meeting to deliberate One Health. Several exclusive political or consultation meetings had been held before the Congress. The phrase of One Health was first brought on the table in the New Delhi Ministerial Conference, which was held in New Delhi, India on 12/04-06, 2007. OWOH became a crucial theme in the International Ministerial Conference on Avian and Pandemic Influenza in the following year, which was held in Sharm El-Sheikh, Egypt in 2008. During the Sharm El-Sheikh Meeting, international agencies jointly endorsed the One World, One Health framework.
level” (Fieldnotes, 2011). For example, David Nabarro, the Senior UN System Coordinator for Avian and Human Influenza (UNSIC), congratulated the escalation of the “One Health movement.” Other speakers also reiterated the growing global commitment to One Health. During this three-day conference, participants from all over the world showcased possible directions of One Health knowledge and successful policy examples in their speeches, presentations, and posters. Shared enthusiasm about One Health created “collective effervescence” (Durkheim, [1912] 2001) among these “One Health experts and practitioners.” In a keynote speech, a World Bank representative remarked on the significance of One Health by joking about his unusual conference experience at this congress – he participated in most of the presentations rather than leaving after giving his speech. Most participants seemed to share a strong commitment to One Health.

As previous chapters have revealed, no knowledge was labeled as “One Health science” before the endorsement of the policy framework. Specifically, lack of interdisciplinary collaboration in avian flu science has been widely recognized and pinpointed as a major problem. One Health therefore emerged more as a response to the limitation of knowledge than a result of the accumulation of knowledge. Since no scientist was a One Health expert by training and profession, who are One Health experts? How did some experts acquire the identity of being One Health advocates and practitioners? Who got to define the knowledge foundation of One Health and relevant policy exemplars? How were these experts identified, recruited, and networked?

I argue that the development of a One Health international epistemic community (Haas 1990, 1992) cannot be understood without looking into the active roles of international agencies, which shaped the institutional environment, mechanisms, and interactions between experts. I therefore trace the networks and the shift of avian flu experts before and after the endorsement of One Health, in order to explain the emergence of One Health experts. Below, I first show the interaction of experts in affiliated reference laboratories and collaborative centers before One Health. I then describe how the WHO,

71 Quotes from field notes of the speech made by the Chair of the Congress, Martyn Jeggo, CSIRO.
FAO and OIE attempted to establish links between diverse experts after One Health by organizing exclusive consultation meetings. Finally, I explain how institutional exclusive consultation customs reinforce the participation and power of those experts who were dominant in the pre-One Health stages. By examining the active roles of the WHO, FAO and OIE in identifying and establishing One Health experts, I demonstrate that these agencies have constructed, sustained, and reshaped international epistemic communities along with the evolution of global disease policies. They vigorously enrolled experts to discuss, interpret, and define this new policy agenda. The chapter concludes by discussing the nature and limitations of the emerging One Health community.

Theories on epistemic community

The influence of elite experts and advocacy networks on global policy making has been documented in the literature (Haas 1990, 1992; Keck and Sikkink 1999). International agencies frequently consult with experts to inform, evaluate, and legitimize their problem identification and policy solutions (Barnett and Finnemore 2004, Goldman 2005, Miller 2007). Consultants therefore contribute to these agencies’ technical expertise and authority. Haas’ (1990, 1992) widely accepted theory of epistemic community explains the power of experts by their shared cognition, including ways of knowing, patterns of reasoning, a normative framework, and an associated policy agenda (Hass 1990). According to Haas (1990), epistemic communities are transnational networks of like-minded experts who define the problems and solutions for decision-makers. Members of a community apply their causal knowledge to a policy enterprise due to shared normative objectives, even though they may not have the same disciplinary backgrounds. In other words, experts of an epistemic community are both knowledge producers and norm entrepreneurs. Not only do they hold authoritative claims to relevant knowledge, they

72 According to Haas (1992), experts in an epistemic community have 1) a shared set of normative and principled beliefs, which provide a value-based rationale for the social action of community members; 2) shared causal beliefs, which are derived from their analysis of practices leading or contributing to a central set of problems; 3) shared notions of what knowledge is credible and what is not; 4) a common set of policy enterprise in a shared normative framework. That is, a set of best practices that will presumably enhance human welfare (Haas 1992).
also create consensus that facilitates international collaboration across nation states. For instance, when national governments consult with their in-house experts on issues with great uncertainty, experts of the same epistemic community usually provide similar explanations and solutions. As a result, they help individual states shape similar policies, through which the knowledge and policy agenda are diffused across countries.

Haas’ theory, though insightful in showing the influence of transnational networks of experts, does not elucidate how an epistemic community, like that forming around the avian flu issue, emerges or is constructed. First, Haas’ (1990, 1992) theory underlines cognitive and cultural components of a transnational epistemic community, thus it tends to downplay conflict and competition among experts. Haas called these experts’ shared perspectives and worldviews “intersubjective understandings” (Haas 1992:3). The theory of epistemic community, therefore, cannot completely explain how a One Health epistemic community would emerge on a contentious policy issue. Because Haas assumes that consensus on the problem, knowledge foundation, and policy agenda is a prerequisite of epistemic communities, he overlooks the rivalries and conflicts that are common between and among professionals. Various studies have challenged Haas’ assumption about consensus knowledge. Grundmann (2006), for example, argues that it was scientific uncertainty rather than scientific consensus that drove the process of adopting environmental regulations. Researchers found that competition and disagreements among experts are common, and expert communities are often fractured due to cognitive divergence (Dezalay and Garth 1998), disciplinary distinction (Boehmer-Christiansen 2003, Keck 2008), national identity and personal experiences (Lahsen 2004).

In addition, the epistemic theory assumes a linear direction from knowledge to policy. Haas presumes that experts obtain authoritative knowledge claims that are independent and ahead of policy negotiations. In this theory, scientists’ shared ideas and policy enterprise evolve independently, rather than under the influence of government authority. Scholarship in science and technology studies (STS) has questioned this linear assumption. For example, scholars argue that politics and knowledge are often co-
produced (Latour 1983, Jasanoff & Wynne 1998); that is, scientific knowledge is produced as an integral part of policy making processes. For example, Miller (2007) states that scientific or technical advisory committees often serve to generate policy-related knowledge, to settle transnational disputes over knowledge claims, and to provide reasons for policymaking.

Furthermore, the epistemic community theory emphasizes cultural elements shared by experts, thereby overlooking structural elements that constitute an epistemic community. Although Haas (1990 1992) recognizes that experts often occupy niches in advisory and regulatory bodies, he does not explain how these interactions emerge or are arranged. Although Haas states that the influence of an epistemic community depends on its ability to transmit knowledge to gain and exercise bureaucratic power, he does not elucidate why some experts obtain such ability. In studies on a number of global issues, such as climate change (Miller and Edwards 2001, Miller 2007), marine resources (Walsh 2004), and dam construction (Goldman 2005), researchers have found that institutional arrangements shape the relative power of experts. Scholars found that international agencies or regulatory institutions may affect scientific knowledge through selective consultation (Adler and Bernstein 2005), through manipulating contracted research (Goldman 2005), or by intentionally nurturing transnational policy networks to promote global programs (Goldman 2007). For instance, Walsh’s (2004) study of international regulations on marine resources illustrates how institutional mechanisms define the social practices, assigned roles, and interactions among experts. She identifies three critical institutional mechanisms, including position fix, the statutory fix, and the committee fix that affect the interactions of experts and therefore their beliefs. 

73 In Walsh’s (2004) definition, the position fix refers to the actions of key individuals who are able to use their positions to influence the beliefs held by members of their groups. The statutory fix describes a process in which beliefs are accepted because they are embedded in formal or informal rules. The committee fix is the arrangement by which scientists or groups of experts meet regularly and arrive at consensus.
My research attempts to explain who became One Health experts, and how these experts developed a shared identity. As I have shown in chapter four, a unified epistemic community did not previously exist. Avian flu experts had been divided by disciplinary backgrounds and their policy preferences. The emergence of One Health experts therefore provided a perfect case for examining how an epistemic community evolves and what factors influence this process. Building on aforementioned research, I investigate how international agencies identified One Health experts to deliberate One Health policies. I argue that One Health experts’ shared cultural norms have been constructed and reinforced during the policy process. The WHO, FAO and OIE selectively mobilized and deployed profession-based expertise to shape global avian flu knowledge and policies. My data drew from the online survey, interviews with six avian flu experts, and participant observation at two international conferences (2007 Paris and 2011 Melbourne). The survey was conducted online with identified international consultants of various backgrounds, which allowed me to assess experts’ participation and experiences in policymaking.

Pre-One Health Stage: North-centered laboratory networks

Since worldwide H5N1 avian flu outbreaks, the WHO, FAO and OIE have consulted with international avian flu experts largely from their affiliated national laboratories. Due to the separation of the public health and animal health domains, experts were situated in two independent fields – they either affiliated with the WHO’s influenza networks or the OIE/FAO’s avian flu reference laboratories. Below I show how international agencies worked with these experts, and how these institutionalized international laboratory networks reinforced the authority of experts in those networks.

1. Divided and predominantly laboratory-based

The WHO, FAO and OIE organized expert networks for specific diseases based on laboratory capacity. Typically, the three agencies identify a few proficient laboratories as reference laboratories of specific diseases, mostly national laboratories with expertise on
these diseases. Initially, only a handful of reference laboratories and collaborating centers were regarded proficient enough in conducting solid and advanced laboratory tests on avian influenza. These laboratories were divided between animal health and public health areas. In 2003, the OIE and FAO had only six designated reference laboratories for avian influenza, which are located in Canada, Germany, the UK, Australia, Italy and Japan. The WHO consulted with four collaborating centers for influenza surveillance in the United States, Australia, Japan, and the UK, which were mainly dedicated to human influenza. Undoubtedly these reference laboratories and collaborating centers are resourceful and technically-advanced. They constitute international agencies’ technical expertise. For instance, the OIE refers to its specialized reference laboratories as its “centers of expertise and standardization of diagnostic techniques for a designated disease.”

Reference laboratories and collaborating centers are duty-bound not only to their own countries but also to international agencies. Once recognized as reference laboratories or collaborating centers, experts in these laboratories are obligated to provide a number of services to international agencies. For example, the OIE/FAO’s reference laboratories are required to store and distribute biological reference products or reagents (such as H5 antigens) for diagnosis; to develop new procedures for disease diagnosis and control; to gather and

74 A reference laboratory for a specific disease was recognized by these agencies for their specialty in diagnosing and investigating the pathogen or the disease. OIE’s International Committee evaluates and updates the lists of reference laboratories each year. A national laboratory has to pass institutional evaluation to be qualified as a reference laboratory or collaborating center. For instance, to become an OIE’s reference laboratory, a laboratory needs to apply and demonstrate its capacities and expertise in certain diseases. OIE’s reference laboratories dedicated to HPAI research include the laboratory of the Canadian Food Inspection Agency (CFIA), National Center for Foreign Animal Disease in Winnipeg, Canada; the National Reference Laboratory for Highly Pathogenic Avian Influenza and Newcastle Disease, Institute of Diagnostic Virology, Federal Research; the Center for Virus Diseases of Animals (BFAV) in Riems, Germany; the Veterinary Laboratories Agency at Weybridge, United Kingdom; the Australian Animal Health Laboratory (AAHL) in Geelong, Australia; the National Veterinary Services Laboratories in Ames, Iowa, USA; the Istituto Zooprofilattico Sperimentale delle Venezie, Laboratorio Virologia in Padova, Italy; and the Graduate School of Veterinary Medicine, Hokkaido University, Department of Disease Control, in Kita-ku, Sapporo, Japan. National Laboratories in China and India later were also recognized as reference laboratories.

analyze the pathogen and its epidemiological data; to develop prevention and intervention strategies; to place expert consultants and provide training at OIE and FAO’s disposal.\textsuperscript{76}

To strengthen communication among avian flu experts, the FAO and OIE also established the OIE-FAO global network of expertise on avian influenza (OFFLU) in 2005, which aimed to incorporate experts from different veterinarian fields such as virology, epidemiology, bioinformatics, vaccinology, and animal production. Since its establishment, the OFFLU has attempted to recruit and link more experts by widely inviting CV submissions and references. Still, only nine experts were listed in its international expert list for highly pathogenic avian influenza.\textsuperscript{77}

Similar to the networks on the animal health side, the WHO’s relevant networks – the Global Influenza Surveillance Network (GISN) and the Global Outbreak Alert and Response Network (GOARN) were responsible for disease surveillance and response.\textsuperscript{78}

The GISN’s main task is to accumulate and examine influenza virus strains collected by National Influenza Centers around the world. Established in 1952, it is comprised of four Collaborating Centers and 112 WHO National Influenza Centers that collect and analyze human influenza viral strains. These four Collaborating Centers are responsible for conducting advanced genetic analysis and selecting candidate strains to manufacture seasonal flu vaccines. In addition, the GOARN, set up in 1997 and formalized in 2000, connects the world’s famous laboratory scientists, clinicians, and epidemiologists.

\textsuperscript{76} For example, the Istituto Zooprofilattico Sperimentale delle Venezie, Padova, Italy consists of three units: one unit that carries out diagnostic activity; another unit that produces diagnostic reagents and evaluates vaccines; and the other unit that performs research. Serving as a reference laboratory for Avian Influenza and Newcastle disease for the OIE and FAO, this Italian laboratory annually has hosted scientists from other countries for training and collaborative research projects on poultry diseases.

\textsuperscript{77} These experts include Dr John Pasick from the Canadian Food Inspection Agency, Dr Hualan Chen from the Chinese National Avian Influenza Reference Laboratory, Dr Timm C. Harder from the Federal Research Centre for Virus Diseases of Animals in Gemerny, Dr Ian Brown in VLA Weybridge in the United kingdom, Dr Paul W. Selleck in the Australian Animal Health Laboratory (AAHL), Dr Janice Pedersen in the National Veterinary Services Laboratories in the US, Dr Ilaria Capua in the Istituto Zooprofilattico Sperimentale delle Venezie in Italy, Dr H. Kida at the Hokkaido University in Japan, and Dr S.C. Dubey in the Indian Council of Agricultural Research.

\textsuperscript{78} The GOARN was established in 2000, when delays in revising International Health Regulations (IHR) frustrated the WHO. It aimed to create a global network which could verify disease outbreaks and send fieldwork response teams to the outbreak site quickly.
specialized in a wide array of diseases including influenza. Due to concerns about a
global pandemic threat since SARS and avian influenza outbreaks, these WHO networks
grew rapidly. By now, the WHO has expanded its A/H5 reference laboratories and
collaborating centers from four to eleven laboratories. Most of these laboratories,
however, are still located in the Global North, like the US and Europe. Only a few
laboratories from infected countries later gained status as Collaborating Centers for avian
flu, including the Department of Microbiology at the University of Hong Kong and the
National Institute of Virology in India. Generally, experts at these laboratories topped the
WHO’s advisory hierarchy.

Despite international agencies’ attempt to expand their expert pool, global consultation
has often been implemented selectively and exclusively. Previous affiliation with
laboratory networks and professional/personal relationships proved crucial. Experts from
previously described reference laboratories and collaborating centers frequented
international consultation and technical meetings. For example, experts from the CDC
(US) and CISRO (Australia) have been influential in WHO technical committees,
working groups, and ad hoc working groups for vaccine manufacture. In the survey I
conducted in 2010, about two thirds (64.91%) of respondents who were consulted on
avian flu issues reported that they had previously worked with one of these organizations
on other policy issues. When I asked a WHO official how they identified avian flu
experts for consultation, she responded, “You just know who the experts are in this area”
(W1-2008). One OIE official explained, “We asked national delegates, the CVOs [chief
veterinary officials of member states], or our reference laboratories to recommend

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79 Laboratories in Hong Kong, France, Egypt and India also attained the status of reference laboratories
subsequently. The WHO now has 11 collaborating centers and reference labs to diagnose highly pathogenic
avian influenza.

80 Affluent countries’ investment in infectious diseases science also reflects their historical colonial and
political interests. US military overseas laboratories, for example, became crucial sites to diagnose avian flu
H5N1 viruses when the disease hit developing countries in Asia and the mid-east. In 2005, the US Naval
Medical Research Unit-2 (NAMRU-2) in Jakarta helped to detect avian influenza in Indonesia. The
NAMRU-3 in Cairo, Egypt, also identified avian influenza in birds in central Asia at roughly the same time.
experts” (O8-2009). Another FAO interviewee also considered professional and interpersonal networks critical:

“It’s all about networks. I know you are looking for some social factors, but I tell you, things do not work in that way. In reality, you know someone and you think he is a good fit; then you contact the person and ask if he is interested in working on this” (F4-2008).

Similarly, WHO’s biannual meetings, in which they select seasonal vaccine strains, are restricted to public officials from its collaborating centers and pharmaceutical representatives. One WHO official recognized that expert committees tend to consist of a rather fixed group of people. “It was not as open,” she admitted (W10-2009). The survey I conducted also revealed this tendency. About eighty percent (78.95%) of the respondent experts were sought as consultants because they were representatives of their organizations/institutions/governments; and 42.11% of respondents recognized their relationships with international agencies were due to the recommendations of other experts/colleagues affiliated with these international agencies. Scientific conferences were also exclusive. When I asked an OIE official (O6) if I could attend a scientific meeting on poultry vaccination in 2009, he politely denied my request and seemed to truly regret that the meeting was only for invited experts.

Despite claims of “just know[ing] who the experts are,” international officials recognized that they had limited knowledge on experts in the Global South, as most reference laboratories and collaborating centers were in the Global North. Most international officials attributed the representation imbalance to the fact that only a few laboratories in developing countries obtained the status of designated reference laboratory or collaborating center. They explained that most influenza and vaccine research had been conducted in developing countries, and gaps in participation between developed and developing countries were enormous. The WHO, FAO, and OIE identified lack of laboratory capacity in developing countries as a huge barrier for international disease control. For example, these agencies pointed out that during worldwide avian flu
outbreaks, most affected Asian counties such as Thailand, Vietnam and Cambodia, did not have adequate laboratory facilities to diagnose H5N1 viruses. In addition, the only OIE reference laboratory in Africa had to deal with too many animal diseases. The WHO, FAO and OIE therefore frequently warned that lack of diagnostic ability in poor countries was problematic.

Lack of modern equipment and recognized expertise prevented experts from the Global South from attending technical or consultation meetings to formulate global strategies. One OIE official reflected on the challenge: “In the past, roughly only 25 developed countries had been involved in standard development” (O1-2008). She pointed out that despite OIE’s attempt to balance geographical and national representation, the task was difficult. “A certain level of technical expertise is still required to become a member of technical committees,” she emphasized (O1-2008). The official agreed that structural gaps existed and should be changed.

Experts from affiliated laboratories in developed countries thus have dominated global diagnosis, standard-setting and responses. In 2005, when the WHO discussed guidelines for human influenza pandemic vaccine development, the agency first asked experts from the collaborating centers in the US, the UK and Australia, along with pharmaceutical representatives, to produce background papers. After that, only 13 experts were invited to discuss and comment on the papers via a teleconference to formulate the final guidelines. Among them, ten were from WHO’s collaborating centers, including five affiliated with the CDC in the US, three from UK agencies and laboratories, and two from national laboratories in Australia. The remaining three experts included one representing the European Medicine Agency and two representatives of the International Federal of Pharmaceutical Manufacturers and Associations (IFPMA). This small and select advisory group of experts determined WHO’s flu vaccine strategies.

The expert networks at the pre-One Health stage therefore do not conform to Haas’ original definition of epistemic communities. First, the fact that most consulted experts were from national laboratories reveals a more complex policy/knowledge dynamics than
Haas’ theory suggests. In Haas’ (1990, 1992) definition, epistemic communities evolve independently from the influence of national authorities. Haas claims experts of a community develop consensual, knowledge-driven policy enterprise which, in turn, drives international policy change. However, in the case of avian flu, most avian flu experts consulted by these international agencies actually wore multiple hats – as both scientists and as public officials of their home countries. Their positions therefore reflected not only their technical expertise and normative beliefs, but also their national interests and political responsibilities.

In this stage, existing professional boundaries undermined the ability of these experts to establish a consensual knowledge base and policy enterprise regarding avian flu defined by Haas (1990 1992). The two laboratory networks – WHO’s influenza surveillance network and OIE/FAO’s veterinarian laboratory network – seldom interacted. Experts therefore differed in their concerns and recommendations for avian flu control. While scientists affiliated with OIE/FAO laboratory networks attempted to advance diagnostic techniques in poultry, experts of the WHO influenza network were more interested in developing effective vaccines and drugs for humans. Global avian flu experts initially were less united than Haas assumes.

Further, avian flu experts are influenced by their affiliations. Experts without institutional affiliations tended to sporadically participate in global disease policy discussions and have less influence. When I conducted the online survey in 2010, I was struck by how rarely international agencies had worked with experts other than laboratory scientists. I identified consultants broadly by listing participants of various avian flu-related consultation meetings, technical meetings, and conferences with publicly accessible participation lists, while excluding international officials. However, several experts, including a few academic researchers and social scientists, responded to my invitation by politely explaining their reluctance to take the survey, because they did not consider themselves “consultants.” One expert explained that he only gave a presentation at a
scientific meeting, thus he doubted that he had influence on policies or strong affiliation with international agencies.

In general, at the pre-One Health stage, expert networks were divided and predominantly laboratory-based. Professional segregation, resource disparity, and technical capacity affected the influence of experts from different global social spaces. The disconnect and laboratory-based attribute of the global advisory body revealed that international epistemic communities were more fractured and less consensual than Haas’ theory would predict, at least in the pre-One Health stage. Below I elaborate how these experts’ authority gradually grew due to their affiliation with international agencies.

2. Institutionally reinforced authority

Since the pre-One Health stage, institutional affiliation through established laboratory networks has affected experts’ significance in global policymaking. Serving at affiliated laboratories increased experts’ prominence and authority, because these experts assist international agencies in processing the risks, determining what counts as evidence, and prioritizing strategies.

Several institutional mechanisms crystalized these affiliated experts’ authority. First, experts at reference laboratories or collaborating centers have an advantage due to access to viral strains. Owing to biosafety concerns, only laboratories meeting safety requirements can investigate lethal infectious diseases. Both WHO and OIE require laboratories to meet biosafety level 3 (BSL 3) to conduct research on H5N1 viruses. If an infected country has no capable laboratory, the government is to send the samples to regional or international reference laboratories/collaborating centers for diagnosis. These safety regulations therefore determine who has access to viral samples, who has the authority to confirm outbreaks, and who could develop pharmaceuticals from the

81 The transmission of viral samples should also follow international guidelines for transmission and investigation of H5N1 material. These guidelines include WHO’s regulations for the storage, transfer, and utilization of viruses, and OIE/FAO’s prototype Material Transfer Agreement (MTA).
material. Providing international service grant experts in these reference laboratories and collaborating centers easier access to research material and latest information. As a result, the Centers for Disease Control and Prevention (CDC) and National Institutes of Health (NIH) in the United States all held patents for avian influenza genes or laboratory technologies on derivatives of viruses collected through the GISN.

Second, these experts contribute to the shaping of the institutional environment for disease research. For example, the OIE developed standards, guidelines and manuals in consultation with experts of various working groups and ad hoc groups. These meetings were mostly exclusive and by invitation only. That is to say, international guidelines, manuals, and standards are initially discussed behind closed doors by selected experts before drafts were circulated among national delegates. Selected experts therefore determine how avian flu science should be produced, interpreted, and disseminated. For example, international agencies strove to achieve comparable diagnostic results across laboratories and countries by standardizing diagnostic procedures on avian flu virus investigations. These agencies therefore asked experts in affiliated laboratories to assist in diagnoses, to provide standardized assays, and to develop manuals. The OIE and WHO both published documents that detailed procedures for inoculating, examining and interpreting molecular and biological test results on alleged H5N1 specimens.82 Similarly, in collaboration with the Wildlife Conservation Society, the FAO also published manuals for standardized sample collection in wild birds.83 These protocols and standards, constructed by international agencies’ affiliated experts, became the foundation of avian flu science.

82 Some global policy decisions need to be democratically approved by national delegates during assembly meetings. For example, revisions of OIE’s Terrestrial Animal Health Code need to be discussed and decided during Assembly Meetings based on “a “one state, one vote” principle”. Some policy statements, like recommendations or strategic documents released by FAO and WHO, may not need to be approved by member states. In either case, the executive bodies of these intergovernmental agencies function to conduct the technical groundwork.

83 Although the Wildlife Conservation Society is not in international agencies’ affiliated laboratory networks, it collaborated with international agencies to conduct the Global Avian Influenza Network for Surveillance (GAINS).
Third, experts in affiliated laboratory networks are privileged in determining what strategies should be prioritized. For example, to address affected countries’ concerns on poultry vaccination, the OIE organized an ad hoc group to discuss Avian Influenza Vaccination Guidelines in March 2006. This group, consisting of four experts from selected national laboratories in Italy, the Netherlands, China, and South Africa, and one representative of the International Federation for Animal Health (IFAH), shared poultry vaccination experiences and reviewed information from two vaccine companies – Merial Intervet and Fort Dodge. Their discussion resulted in a draft of poultry vaccination guidance, which was subsequently revised and endorsed by OIE’s Scientific Commission for Avian Influenza, and later officially approved by national delegates in the subsequent General Session. In 2007, the Differentiating Infected from Vaccinated Animals (DIVA) strategy developed by the OIE’s Italian reference laboratory has gained international recognition during consultation meetings. Affiliated laboratories not only assisted international agencies in organizing meetings or conferences on specific topics, but they also developed policy strategies, through which, experts advocated for their national practices and strategies.

Fourth, the authority of experts in the laboratory networks is often reinforced by providing training and technical transfer to developing countries. For example, the FAO and OIE attempted to minimize the discrepancy between laboratories in developing and developed countries through OFFLU’s twinning projects. Northern experts’ technical excellence has been consolidated in this process. Experts and laboratory technicians in the Global South seemed to consider themselves more as technique receivers rather than

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84 For example, IZSVe, one OIE/FAO Reference Laboratory in Italy, hosted the OIE/FAO/IZSVe Scientific Conference to discuss avian flu vaccines in March 2007. The conference, titled “Vaccination: a tool for the control of avian influenza,” was held in Verona, Italy. Experts discussed poultry vaccination strategies as well as relevant international standards, which resulted in an update of OIE’s vaccination recommendations.

85 The OFFLU initiated laboratory twinning projects to strengthen networks among laboratories on investigating animal diseases including avian flu. A twinning project partners an OIE reference laboratory (for certain particular diseases) with another in a developing country to facilitate technical and experience transfers. The strengthening of networks among laboratories aims to transmit knowledge and advanced techniques from North to South.
counterparts of their Northern colleagues. For example, one Filipino public official, who had been funded to participate in short-term laboratory training on avian flu diagnosis at an Australian national laboratory, was impressed by the advances of the Australian laboratory. During a private conversation, she described to me how she felt astonished by the high-tech equipment and strict biosafety procedures in Australia. She moved on to admit the difficulty in applying these techniques to her national laboratory due to lack of equipment (Fieldnotes, One Health Congress, 2011). Obtaining technical skills and updated equipment does not necessarily guarantee scientists from developing countries the ticket to international expert meetings. Instead, they often remain at the receiving end of the network and exchange.

It is evident that the authority of experts affiliated with the laboratory networks has been strengthened and reinforced during their frequent consultation opportunities. These opportunities have contributed to a mutual reinforcement of the power of international agencies and experts. Consultation increases international agencies’ legitimacy, for they can claim the state-of-the-art science as their policy foundation. At the same time, these experts also advance their authority by being a part of global decision-making (Winickoff and Bushry, 2010). Experts from affiliated laboratories gain access to viral samples, update latest science, and to some extent direct the attribution of global research interests and resources. Such “committee fix” (Walsh 2004), i.e., the arrangement by which scientists or groups of experts meet regularly and arrive at consensus, allows them to advance both their research capacity and therefore their policy influence. Networks among these experts were also cemented through their participation in technical meetings, consultation meetings, conferences, or funded projects. To conclude, in the pre-One Health stage, the exclusiveness and hierarchy within the international laboratory networks made practices and opinions of experts in core laboratories, such as the US, British, and Australian national laboratories, the standard.

**Making a One Health epistemic community**
The One World One Health policy framework could be seen as an institutional response to previous discord and division between agencies and between professionals. Despite general acceptance of this framework and its emphasis on inter-agency and multidisciplinary collaboration, the WHO, FAO and OIE struggled to translate the idea into practical programs. Therefore in 2008, they began to organize One Health consultation meetings and conferences. I found that this institutional formulation of One Health corresponds with experts’ identity transformation. Some experts changed from disciplinary-bounded to One-Health-minded professionals in this process.

Below I depict how this identity transformation took place with intensive institutional interventions. I particularly focus on the activities taking place at the global scale. Although a few US-based professional associations, such as the American Veterinary Medical Association (AVMA), American Medical Association (AMA), and American Public Health Association (APHA), also approved and promoted a similar concept “One World, One Medicine, One Health,” their activities have mostly occurred in the US. Besides, these professional associations primarily aimed to acknowledge the contribution of veterinarians’ work. They were less interested in generating policy enterprises. I hence focus on investigating international meetings designed to translate One Health into strategies, which were mostly funded or organized by international agencies.

Officials of the WHO, FAO, and OIE often refer to their work as being a secretariat, a catalyst, and a platform for coordinating other global actors’ activities. To encourage multidisciplinary collaboration, these agencies have encouraged connections between specialized public health and veterinary laboratory networks. Specifically, they promoted links through and between the FAO/OIE’s OFFLU network and WHO’s Global Influenza Programme (GIP). A shared identity of One Health experts has generally emerged and been consolidated through a series of international consultations.

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86 Human medicine is often considered more privileged. Hence, the American Veterinary Medical Association (AVMA) strongly claimed that veterinarians are in a better position to discover public health threats than are physicians, which is the root driver of the One Medicine initiative. .
1. The crucial role of expert meetings

Claiming that the slogan One Health should not be owned by anyone, the WHO, FAO, and OIE have become the most invested and enthusiastic actors to articulate and promote this idea. They officially named their global strategy One Health instead of One World One Health, to differentiate their version from WCS’ original proposition. In addition, the three agencies funded or organized various meetings to discuss One Health strategies. Table 5.1 summarizes consultation meetings relevant to One Health. These conferences and meetings proved to be crucial sites for building consensus on One Health. Participants of these meetings primarily included national representatives, officials at these international agencies, and identified experts from reference laboratories or collaborating centers. Continuing discussion and enormous institutional effort to operationalize One Health demonstrated the mounting political will for this new global agenda.

<table>
<thead>
<tr>
<th>Year</th>
<th>Event/Place</th>
<th>Host/Organizers</th>
<th>Objective</th>
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<tr>
<td>December 4-6, 2007</td>
<td>New Delhi International Ministerial Conference on Avian and Pandemic Influenza</td>
<td>Government of India with cooperation from the United States of America (IPAPI chair), the European Commission, WHO, FAO, OIE, World Bank, UNICEF and the UNSIC</td>
<td>To create a unique platform among governments to fight against Avian and Pandemic Influenza.</td>
<td>Exclusive to stakeholders such as Ministers of Health and Agriculture (Animal Husbandry/Livestock) from countries, and representatives from regional and international organizations</td>
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<tr>
<td>October 7-9, 2008</td>
<td>FAO-OIE-WHO Joint Technical Consultation on Avian Influenza at the Human Animal Interface, Verona, Italy</td>
<td>European Commission, US Centers for Disease Control, Canadian International Development Agency, EU-funded project FluTrain, the Government of Italy, and the Comune of Verona</td>
<td>To indentify Human and Animal Interfaces</td>
<td>Exclusive to a group of influenza experts from the animal and public health sectors to gather and discuss purely technical topics of joint interest that exist at the human-animal interface.</td>
</tr>
<tr>
<td>October 24-26, 2008</td>
<td>International Ministerial Conference on Avian Influenza, Sharm El Sheik, Egypt</td>
<td>Government of Egypt, the International Partnership on Avian and Pandemic Influenza, and the European Union, with the support of the US Government, European Commission, FAO, OIE, WHO, UNICEF, and the World Bank</td>
<td>Develop a joint framework. Release the document “Contributing to One World, One Health - A Strategic Framework for Reducing Risks of Infectious Diseases at the Animal-Human-Ecosystems Interface”</td>
<td>Exclusive to stakeholders such as Ministers of Health and Agriculture (Animal Husbandry/Livestock) from countries, and representatives from regional and international organizations</td>
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<tr>
<td>Year</td>
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<tr>
<td>2009, March 16-19</td>
<td>Winnipeg, Canada</td>
<td>The Public Health Agency of Canada’s (PHAC) Centre for Foodborne, Environmental and Zoonotic Infectious Diseases (CFEZID)</td>
<td>Operationalize One Health</td>
<td>Exclusive to invited experts</td>
</tr>
<tr>
<td>April, 19-21, 2010</td>
<td>Inter-Ministerial Conference on Animal and Pandemic Influenza, Hanoi, Vietnam</td>
<td>The Government of Vietnam in coordination with the European Union and the United States of America, with the support of the UNSIC, FAO, OIE, the Asian Development Bank, and the World Bank.</td>
<td>Set a new global milestone by providing a way forward on animal and pandemic influenza, and endorsing the need for further international collaboration to address emerging health threats arising at the interface between animals, humans and our changing environment.</td>
<td>Exclusive to stakeholders such as Ministers of Health and Agriculture (Animal Husbandry/Livestock) from countries, and representatives from regional and international organizations</td>
</tr>
<tr>
<td>2010, May 4-6</td>
<td>Stone Mountain, Atlanta, USA</td>
<td>Centers for Disease Control and Prevention, USA</td>
<td>Operationalize One Health</td>
<td>Exclusive to invited experts</td>
</tr>
<tr>
<td>2011, February</td>
<td>One Health Congress, Melbourne, Australia</td>
<td>Australia’s Commonwealth Scientific and Industrial Research Organisation (CSIRO)</td>
<td>Operationalize One Health, showcase One Health research and policies</td>
<td>Open to paper submission</td>
</tr>
<tr>
<td>2011, November 15-17</td>
<td>High Level Technical Meeting to Address Health Risks at the Human-Animal-Ecosystems Interfaces, Mexico city, Mexico</td>
<td>The Government of the United Mexican States</td>
<td>Assessment and mitigation of risks due to animal influenza, rabies, and antimicrobial resistance</td>
<td>Participation is by invitation only.</td>
</tr>
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Through these meetings, international agencies intended to connect previously divided expert networks. However, they seemed to be more successful in linking professionals between the public health and animal health areas than overcoming established consultation hierarchy. Although participants’ backgrounds were broadened in One Health meetings, most One Health experts still came from existing laboratory networks. In addition to public officials of international, regional, or national agencies, a significant proportion of participants of One Health meetings were affiliated experts in prominent laboratories, such as experts of the European Commission, CDC of the United States, and CISRO of Australia.

Affiliated laboratories in the pre-One Health stage still enjoyed key status by hosting One Health meetings. For example, in 2008, one of the Italian national veterinary laboratories hosted a consultation meeting to discuss human and animal interfaces. In 2009, the Public
Health Agency of Canada’s (PHAC) Centre for Food-Borne, Environmental and Zoonotic Infectious Diseases (CFEZID) hosted the One World One Health Expert Consultation in Winnipeg. In 2010, the CDC of the US hosted the second One Health consultation meeting in Stone Mountain. The first One Health Congress in 2011 was hosted by the Australian government and its national laboratory. Experts in these collaborating centers and reference laboratories, like CDC and CSIRO, thus are influential in the construction of One Health. Experts of these hosting laboratories/government agencies could decide who to invite and what topics were relevant to One Health.

I also found that recognition of One Health experts was mostly exclusive, similar to the process at the pre-One Health stage. For example, the OWOH conference hosted in Canada in 2009 only invited a little more than 100 identified experts and public officials from 23 countries. Most participants were from affluent countries, such as Canada, the US, European countries, and Australia. Considering that a significant proportion of participants were from the host country, Canada, other participants were still professionally and geographically imbalanced. Very few participants were from Asia and Africa. Besides, most of these meetings were held behind closed doors, except the first One Health Congress held in 2011. For instance, the CDC hosted the Stone Mountain Meeting in 2010 to develop concrete practical One Health strategies. The CDC only invited 54 experts and public officials. Its selection of invitees, according to Dr. Carol Rubin of the CDC’s One Health office, was carefully implemented. Nomination of experts was first made by the CDC and international agencies to balance disciplinary and geographical representation. After discussion and voting to narrow down the list, the CDC and international agencies eventually invited the 54 experts, including specialists from national Ministries of Health and Agriculture, the European Commission, the United Nations, the World Bank, and other diverse institutions from the academic, policy and economic sectors. The Stone Mountain Meeting was implemented in a workshop format, and participants agreed on a common version of One Health, including culture change, increased visibility, designated funding, and improved coordination. They also prioritized seven Critical Enabling Initiatives (CEI) among twenty identified initiatives,
including training, One Health global network, information clearing house, needs assessment, capacity building, proof of concept, and business plan. Corresponding to these CEIs, participants formed seven working groups to discuss implementation plans and timelines. According to Dr. Rubin, these invited experts showed high commitment to One Health in the meeting.

Following the Stone Mountain Meeting, in 2011, the first Congress hosted by the Australian government finally openly invited paper submission and registration from researchers to advance One Health knowledge. Compared to previous activities, this One Health Congress was more open and broad in scope, including topics such as infectious diseases, food safety, and a One Health curriculum. However, despite its relative openness to the public, its expensive registration fee (more than a thousand US dollars for professionals) and boarding cost (a few hundred US dollars per night) made it somewhat restrictive to possible participants and audiences. Not all countries could afford to send a delegate. Thirty national delegates from Asian and African countries made it to the Congress because of the sponsorship of the European Commission.

As I have shown, despite One Health’s principle of bottom-up participation, the selection, manufacture and dissemination of policies was still relatively top-down. Rather than naturally emerging from devoted experts, this international One Health community was more or less networked by international agencies and affiliated national laboratories. International agencies and affiliated laboratories exercised the power to determine who the experts were and how to operationalize One Health by determining the locations and activities for discussion.

2. Group membership becomes the identity of One Health experts

Frequent participants of One Health meetings gradually obtained an identity of One Health advocates or practitioners. Examining the participants at these meetings, I found

87 An established strategic alliance with Iowa State University (ISU) and the ISU One Health consortium has located the headquarters for the Commission at Iowa State University.
that One Health experts, similar to the pre-One Health stage, tended to wear multiple hats – as both researchers and public officials at the national, regional or international levels. Some of these One Health experts also seemed to shift between different policy positions at different levels. For example, several officials responsible for avian flu issues at the WHO, FAO and OIE had been sponsored or borrowed from influential laboratories or governments. WHO’s Global Influenza Programme recruited several public officials from the US CDC, the Canadian Public Health agency, and other wealthy national governments. Two officials at the WHO I interviewed in 2009 finished their terms and returned to serve in the ministries of public health in their home countries. These officials acted as carriers of the One Health concept. Their identities and interests subsequently shifted.

Being identified as experts of One Health, consultants seemed to gradually convert to One Health. They were not only asked to identify One Health policies but also relevant knowledge and successful examples. These experts’ activities centering around One Health became, in Jasanoff’s words, “a hybrid activity that combines elements of scientific evidence and reasoning with large doses of social and political judgment” (Jasanoff 1990). Experts I interviewed and surveyed often recognized the complexity and hybrid nature of their work. Some stated that they were not only interested in scientific facts but also in policy implications. These advocates served as boundary spanners, who translated knowledge or created dialogue spaces across the boundaries of science and politics. As one food safety expert enthusiastically commented, “Scientists and politicians have different cultures and languages. However, between scientists and policy officials, there is a translation space, where mutual understanding could be attained” (Speech, fieldnotes, the One Health Congress, 2011). Another salient example is the enthusiasm showed by the head of an Italian national veterinary laboratory and chairperson of the OFFLU Executive Committee, Dr. Ilaria Capua. She advocated the sharing of genomic data of viruses across disciplines, arguing that mapping gene movement across species and national boundaries is crucial for surveillance and pandemic preparedness. Leading the campaign for making genomic information publicly accessible won her a Scientific
American 50 award in 2008. During our interview, she commented, “I think scientists’ social responsibilities are more important than personal interests [by which she meant publications.]” Capua has promoted a “One Flu for One Health” concept since 2010, calling for a permanent observatory to analyze the influenza gene pool from different species.

The more deeply officials/researchers had been involved in defining and constructing One Health, the more likely they self-identified as One Health advocates. Many experts reaffirmed their support for One Health during sessions, breaks, and arranged social events at these meetings. For example, about eighty percent (80.70%) of survey takers recognized that interacting with international agencies has influenced their work in more than one way. The top three influences they identified included: subsequent participation in collaborative projects (52.63%), shaping their research to be more interdisciplinary-oriented (47.37%), and initiating their concerns on policy decisions (38.60%). To summarize, these experts reported that they collaborated with other professionals more, and some found that they became more involved in policymaking. More than half of the survey takers (52.63%) expressed that they know clearly how to contribute to One Health. A few experts, for example, identified themselves as facilitators, encouraging communications across disciplines or between academia and politics.

Generally, converted One Health experts agreed on a systematic understanding of disease drivers and collaborative response approaches. One Health experts increasingly emphasized understanding a larger picture of the globalization of diseases. They seemed to wholeheartedly agree on the complexity and dynamics at the human-animal-ecosystem interfaces. For instance, more than sixty percent (61.40%) of the survey takers highlighted studies on the interface between humans and animals in the future. At the first One Health Congress, a significant portion of presenters displayed graphs to show complex causal arrows and multiple factors in their slides.88 Some experts pointed to the

lack of appropriate One Health knowledge to explain their devotion to filling the gap. One keynote speaker said, “We underestimated the bi-directional route, especially that from human to animals. Previously, we [public health experts] only looked at transmission from animal to human. Now we have learned better” (Speech, fieldnotes, One Health Congress, 2011). Another keynote speaker used the work of physicians to illustrate the complexity of One Health knowledge: “The task of physicians is almost impossible, because the human body is very complex. Similarly, what we are doing now is to make global clinical judgments, so the theoretical underpinning becomes very important” (Speech, fieldnotes, One Health Congress, 2011). Another presenter expressed similar concerns, “I don’t think we have been there [getting at the needed science],” he said.

“What kept me up at night was that science is not robust enough. For example, during a conference I heard a minister of public health from Latin America talking about how logging reduced malaria infections. It did not occur to him that logging was creating other problems. Currently, research on how environmental degradation affects public health is still only a handful, and the public health community is still unconnected…We have to recognize that much of the information we have today is not convincing enough to bring about change” (Speech, fieldnotes, One Health Congress, 2011).

As these speeches indicate, self-identified One Health experts unanimously supported the exploration of new frontiers of knowledge to reveal the complexity of global problems. Similarly, most survey takers recognized the importance of inter-disciplinary collaboration, despite their differences in policy priority.

One Health experts also developed a shared set of normative beliefs. They emphasized not only interdisciplinary but also normative values such as social justice, environmental protection, and social responsibilities of scientists. Some experts claimed that One Health was “a cultural shift.” For instance, on the second day of the One Health Congress, at an EU-hosted breakfast session, a European Commission presenter stated that the concept
was an approach suitable for our time of globalization. He commented that even though One Health was not a revolutionary concept, it called for “a change in mind and practices.” The EU presenter stated,

“One Health is not a religion. Neither is it a monopoly owned by anyone or a property of any sector. Rather, it is a conceptual framework, a state of mind, a federating process, an evolving concept, a tool for thinking and action, an opportunity. It is when you think out of your region. And it is a practice” (Speech, fieldnotes, One Health Congress, 2011).

Many One Health experts were aware that they did not merely discuss scientific facts but also normative suggestions, such as whether costs of control measures were justified, how society is affected by the threat and intervention strategies, and who the beneficiaries are. For them, One Health suggests the necessity of adjusting programs for different societies. For instance, one European veterinarian recognized that when he served on FAO/OIE mission trips to provide control recommendations in Asian countries, he realized that the western way of culling and biosecurity measures were not completely applicable in other cultural and societal contexts. “Here people go to supermarkets to buy chicken. But in Asia, there are traditional markets. Certainly not all the strategies used in the western world can 100% apply there” (E3-2010). Some of the One Health experts also began to discuss inequality issues. For example, an Australian keynote speaker with microbiology and immunology background made a strong statement that, “A more sustainable world has to be a more just world” (Speech, fieldnotes, One Health Congress, 2011). Another expert commented in the survey: “Despite my cynical comments about OWOH, I support the push but have grave concerns about 'pre-emptive' strikes, especially in developing countries” (S12-2010). Yet another consultant of disease management replied in the survey:

“On cross disciplinary collaboration, it is a given when developing control and preventive strategies that the effects of measures developed have to be understood,
and this can only be done if you understand the industry and the people in it” (S-23, 2010).

As the above evidence suggests, participating in international One Health discussions consolidated these experts’ shared knowledge foundation and normative beliefs, which are crucial for an epistemic community. They not only showed interest in developing One Health knowledge but also some shared normative concerns on policy strategies. However, the emergence of this community cannot be completely explained by Haas’ theory. Experts’ shared cognitive elements, rather than emerging independently of policy process, have been institutionally cultured and reinforced over a series of international consultation and scientific meetings. In the next section, I will illustrate how this emerging community is still evolving and fragile.

The fragility of the One Health epistemic community

Despite shared enthusiasm, One Health experts’ identity seemed still unstable. Not only did One Health experts hold different ideas about the scope and direction of One Health, but some of them also doubted the very representation of this institutionally constructed group.

1. Heterogeneous perceptions of One Health

First and foremost, experts held heterogeneous perceptions of One Health. During the opening plenary speech at the first One Health congress, one FAO senior official candidly acknowledged,

“One Health means different things to different people. If you ask ten people here, you may get ten different ideas. We may not eventually obtain an agreement on One Health in this room. However, all of us believe that it is important…During the following three days, we will discuss and conceptualize One Health in order to put our words to practice” (Speech, fieldnotes, One Health Congress, 2011).
This perceived vagueness of One Health was certainly not new, as it appeared over and over again at meetings at the Winnipeg (2009), Stone Mountain (2010), and the first One Health Congress (2011). These meetings have driven One Health in manifold directions. The majority of experts admitted that the definition of One Health was not mature. For example, one conclusion of the Winnipeg meeting was that trying to obtain a universal definition of OWOH was problematic. Participants agreed, “It is more important to have a common understanding of the general goals and purpose of OWOH than a universal definition” (Public Health Agency of Canada 2009) 89

Years after the initial attempt to conceptualize One Health, this quest for a common definition persisted in the One Health Congress in 2011. Experts still disagreed on whether a clear definition is desirable, what it should be, what valid One Health knowledge is, and how to prioritize policies. While some experts and officials believed that leaving the concept broad and inclusive was more constructive, others considered a clear definition necessary. For the former group of experts, the vagueness of One Health was constructive. Vagueness of definition broadens One Health’s implications, expands policy networks, potential audiences and alliances, and at the same time prevents the idea from falling back to segmented disciplinary-based silos. By contrast, for experts who insisted a clear definition, the vagueness prevents this concept from being disseminated. One participant questioned, “If we can’t communicate the idea clearly beyond this group of people, how can we convince others to practice One Health?” (Fieldnotes, One Health Congress, 2011). A few experts thus expressed concerns and doubts regarding One Health. For example, one expert at a European country’s national veterinarian laboratory commented that he would rather keep distance from One Health. He said, “I’m not sure what One Health is. It is too abstract and I personally don’t see where it goes” (E3-2010).

Specifically, debates among experts frequently returned to the scope of One Health. Generally, One Health experts agreed that the concept should extend beyond H5N1 avian

89 Video transcripts of the meeting can be found at http://www.phac-aspc.gc.ca/owoh-umus/vid-eng.php (Retrieved February 28, 2013).
influenza to other infectious diseases that affect both humans and animals. However, experts debated whether One Health should include issues beyond infectious zoonotic diseases, such as general health-related issues. A heated debate on the last day of the One Health Congress vividly demonstrated the difficulty of having a consensual definition. Jørgen Schlundt, a former Director of the WHO’s department on Food Safety, noted this major problem of obtaining a clear definition. Being a frequent participant of One Health meetings and one of the drafters of the OWOH policy document, he pointed out that most meetings were reluctant to come up with a definition. To advance political actions, Schlundt suggested a concrete definition that “keeps it simple and stupid,” because being too complex and abstract prevented One Health from having any real strategy. Schlundt argued, “We need to set very clear goals so that we can discuss how to achieve these goals.” Therefore, he proposed a narrow definition of One Health – “to deal with infectious diseases at the human and animal interfaces” (Fieldnotes, One Health Congress, 2011).

Schlundt’s argument, however, did not settle the debate. Some experts still preferred including more phenomena and issues, and they seemed dissatisfied with such a disease-centered definition. Some experts pushed for an all-inclusive definition, covering issues of (mal)nutrition, food-borne diseases, chronic diseases, environmental degradation, global climate change, sustainable agriculture, or even as broad as “saving the lives on earth” (Fieldnotes, One Health Congress, 2011). David Nabarro of the UNSIC, for example, commented that One Health thinking includes all kinds of illness that directly or indirectly affects humans’ livelihood.

These debates also affected experts’ attitude toward how to organize themselves. On the last day of the congress, a discussion on establishing the International Society for One Health again brought the vagueness of One Health into the open. This session took place at seven o’clock in the morning, but around 50 experts were motivated enough to attend this early session. For one hour, these experts discussed the purpose and structure of this society, if it was established. Opinions were divided regarding whether a society was
necessary, how it should be structured, whether a One Health journal should be published, and the goals of the society. Discussions ranged from very practical strategies of advertisement to abstract thoughts about the scope and purpose of the society.

In general, experts agreed that everyone should reach out to his or her own research community and bring more researchers and experts on board. Several experts said, “We should not lose the momentum to move One Health forward,” but they disagreed on how to do so and where they were planned to go (Fieldnotes, One Health Congress, 2011). Several experts of existing professional societies, such as the International Federation of Veterinarian Health and the Journal “Ecohealth,” expressed willingness to publish and market One Health. But they asked, “The question is what goals One Health is going to achieve and what to market?” Another expert questioned the idea of having a society: “Maybe we are too early for that. We are not mature enough to establish an organization” (Fieldnotes, One Health Congress, 2011).

Despite the fact that some experts proposed developing One Health curriculum to cultivate multidisciplinary thinking, a few experts doubted the foundation and feasibility of interdisciplinary collaboration. Most experts admitted that professionals in different fields seldom cooperate. For example, one expert believed that the main challenges of One Health were “differences in world views and values not discussed, but [these differences are] fundamental to how we understand the world, the system and our place in it” (S17-2010). Another expert expressed similar doubt about One Health by stating that he:

“agree[s] [to One Health] in principle, but virtually [it is] impossible to achieve/implement at all levels (local, state/ provincial/ national/ regional/ international), because it takes generations to build up human resources (veterinary/animal health, public health) and laboratory gap” (S35-2010).

Several strategies were proposed, for example, creating transdisciplinary networks for information sharing, developing a “Global Health” university curriculum, engaging grass roots involvement in animal, human and ecosystem health initiatives, and developing a One Health curriculum.
Ongoing discussions, challenges, and doubts of One Health experts show that this community is still in the making and unstable. Debates among experts over the definition of One Health revealed that this institutionally-facilitated community was struggling to develop shared cognitive elements. In contrast to Haas’ definition of an epistemic group, the identity of One Health experts was not entirely independent of or ahead of policy discussions. Rather, it was established and developed through ongoing negotiations. Because One Health experts defined the knowledge foundation and corresponding policy enterprise differently, it was evident that it was not consensus and established knowledge among experts that led to One Health. Rather, it was the policy shift that led to efforts to develop group identity and a shared knowledge foundation. After One Health was recognized and promoted, One Health experts began to re-interpret and re-categorize current scientific work, to align knowledge with One Health. Through their discussions and activities, a wide array of research and policies have now fallen into the category of One Health knowledge. This constructing and negotiating process therefore shows that shared One Health knowledge, identity, and objectives are subject to debate, and therefore are unstable.

2. Unbalanced representation of the elite epistemic community

Besides being heterogeneous and unstable, this One Health community has also been accused, even from within its ranks, of being unrepresentative. Though the group of experts has gradually expanded beyond laboratory networks, it still suffers from uneven representation. For example, at the first One Health Congress, participants stood for a wider range of backgrounds than those at the pre-One Health stage, including some ecologists, ornithologists, communication specialists, and social scientists. However, unbalanced professional and geographic participation of experts persisted. Medical experts and veterinarians with laboratory affiliation continued to dominate the One Health epistemic community. Leading professional associations for One Health are still mostly from the veterinarian and medical fields in northern countries, such as the American Medical Association, American Public Health Association, American
Veterinary Medical Association, Association of Academic Health Centers, Association of American Medical Colleges, and Association of American Veterinary Medical Colleges. Experts with other professional backgrounds are limited.

To some extent, the disproportional representation of One Health experts reflected the constraints of international agencies, as they have been crucial actors in forging the One Health community. International agencies found it challenging to cross sectoral, professional, and geographic boundaries, and to explore new frontiers of knowledge and policies. These agencies themselves are still learning and experimenting with novel cross-agency cooperation. For example, Dr. Schlundt identified the reluctance of international agencies to cooperate with one another as a crucial barrier for advancing One Health: “I know it [resistance of agencies]. I came from the WHO, but now I am not. So I can say it.” (The audience laughed.) He proposed, “realigning old systems by creating linkages, instead of creating new systems.” However, he also acknowledged that the linkages were still loose. (Fieldnotes, One Health Congress, 2011).

In addition, international agencies’ networks remain specialized. The WHO, FAO, and OIE therefore found it difficult to identify experts outside of their technical expertise. For example, the WHO, FAO, and OIE are not charged with the responsibilities to manage diseases in wild animals, therefore they had less experiences in collaborating with wildlife experts. With very few established technical committees on ecosystems or wildlife health, only a handful of ornithologists and wildlife experts had interacted with these agencies, specifically those at the Wildlife Conservation Society (WCS).

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91 By mandates, the FAO is responsible for monitoring livestock production, but it had not previously been interested in tracking diseases among wild animals before avian flu epidemics. OIE only had a committee that considers wildlife-related diseases, which only met three days a year. Similarly, WHO has only been involved in cases with human infections and its interventions are only implemented upon request of member counties. (Karesh and Cook, 2005, Foreign affairs: p40).

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wildlife expert noted that professionals in wildlife had been underrepresented in policy discussions (E6-2009). Despite international agencies’ changing attitude toward wild birds, he was still dissatisfied with their consultation mechanisms. He elaborated, “A big problem with OWOH is that they [international organizations] still don’t know who they can work with in the wildlife domain” (E6-2009). Another senior official of the International Federation of Red Cross and Red Crescent Societies (IFRCRCS) was also concerned about the imbalance of expert representation (E2-2009). He noted that the IFRCRCS was at times the only nongovernmental organization representing local (or non-expert) voices at behind-the-door consultation meetings:

“The danger is that experts dictate pandemic preparedness responses…These operations are more and more professionalized, because disease surveillance is only conducted by a few national focal points; participation of the civil society is limited” (E2-2009).

Many officials also recognized that professional specialization was the root of the limited capacity of international agencies. For example, an official said experts were neither interested in the subject matter nor policies beyond their expertise. An OIE official commented,

“There has always been some program-level coordination [between wildlife experts and OIE.] However, it was not at national or international levels. I think it is probably because wildlife experts are more academic. They are not working at the policy level. I think they are also more spread out, they don’t have an established network” (O10-2009).

This official moved on to explain that wildlife experts “have their own lives.” She said, “Most wildlife experts are not devoted to veterinary services, so they may not be

anthropologists, and social scientists through contracted research and on a case-by-case basis. In addition, the FAO has funded and participated in wild bird surveillance programs since 2005. Under a US$6.8 million plan, wild birds were captured, their tracheal swabs and blood and feather samples were tested, and some of the birds were radio-collared. Scientists then tracked their movement via telemetry devices.
interested in being involved in OIE’s work” (O10-2009). One FAO official similarly commented that social scientists generally were not interested in animal health topics. She said, “You have to admit that very few social scientists studied animal diseases” (F3-2009).

Another structural constraint that officials frequently pinpointed was the disconnect between government departments within a country, which limits international agencies’ capacity to identify experts through national governments. One FAO official found it difficult to identify wildlife experts due to specialization between government units and the differences across countries. He pointed out that wildlife affairs are managed by dissimilar ministries or departments in different countries, sometimes environmental agencies, sometimes forestry agencies, sometimes agriculture ministries. If the responsible departments were not under the ministries affiliated with the FAO and OIE, these two agencies could not reach them through their corresponding national agencies. It was not until 2009 that the OIE started to establish focal point networks of wildlife affairs and training in countries. OIE officials admitted that identifying suitable competent focal points from member countries had not been easy.

Besides professional boundaries, international agencies also seemed to struggle with recruiting experts from developing countries. Some participants of the first One Health Congress also argued that there should be other aspects of One Health. For example, one expert claimed that the conversation had been dominated by veterinarians, “But those experts are not here. There are not so many economists and medical experts here” (Fieldnotes, One Health Congress, 2011). Other experts similarly reflected on the geographical imbalance of expert representation. For example, during discussion on establishing an international society for One Health, one expert directly declared, “this is a very ‘white’ community.” Another expert questioned: “Where is Latin America, Africa, and Asia? Maybe we are a group that’s missing some parts?” (Fieldnotes, One Health Congress, 2011). Their comments highlighted the persistence of the geographic and disciplinary imbalance.
Due to the crucial roles that international agencies played in forging the One Health epistemic community, their structural limitations resulted in the unbalanced representation of One Health experts. Despite the slight increase in diversity of professional backgrounds at the One Health Congress in 2011, experts who were not in the medical and veterinary professions seemed to feel pressured to legitimize their contribution. For example, a presenter with a social science background exclaimed, “We need social scientists too!” She, being one of the very few social scientists presenting at the Congress, argued for the necessity and benefit of having social sciences. “As social scientists, we have contributed to the knowledge and debates by understanding and empowering people.” She then argued that social science studies offer a portal to the meta level, such as value chains, risk analysis, and identification of layers in the process, including producers and consumers of poultry (Fieldnotes, One Health Congress, 2011). One expert argued, “the One Health approach did not engage very well with the social cultural perspective. We shouldn’t have just veterinarian and medical experts” (Fieldnotes, One Health Congress, 2011). Another expert echoed these points, commenting in the survey:

“Public sector has not sufficiently understood the significance of economic and socio cultural factors of poultry especially at the village level. The public policy for eradication and control of AI has thus sometimes been unrealistic for the rural dwellers. Social science research should be conducted alongside the science research in a multidisciplinary manner to achieve a preferable outcome and appropriate policy options for AI control” (S50-2010).

These comments and responses made by more marginalized experts illustrate their attempt to legitimize their perspectives and expertise. Although my survey shows that most respondents had worked with other professionals, most collaboration took place between medical experts and veterinarians, rather than with social scientists, economists, or anthropologists. Most of the time, it was international officials or delegates of developing countries who spoke for social, cultural and economic differences and the
importance of community participation in disease management. As the Figure 5.1 illustrates, compared to the wide recognition of the improvement in laboratory capacities and strategies (73.68%), fewer experts considered that socioeconomic strategies and ecological conservation strategies were improved (57.89% and 36.84% respectively). Unbalanced representation seemed to be reflected in the policy strategies that international agencies developed and promoted.

<table>
<thead>
<tr>
<th></th>
<th>Laboratory-based Strategies</th>
<th>Socioeconomic Strategies</th>
<th>Ecological Strategies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increased</td>
<td>Increased</td>
<td>Increased</td>
<td>Increased</td>
</tr>
<tr>
<td>The Same</td>
<td>The Same</td>
<td>The Same</td>
<td>The Same</td>
</tr>
<tr>
<td>Decreased</td>
<td>Decreased</td>
<td>Decreased</td>
<td>Decreased</td>
</tr>
<tr>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
</tbody>
</table>

Figure 5.1 Perceived investments by strategies

**Conclusion: manufacturing a new epistemic community**

To conclude, by tracing the evolution of epistemic communities before and after One Health, this chapter challenges and extends Haas’ (1990, 1992) theory of epistemic community. Specifically, my study shows how “new” epistemic community develops a shared knowledge foundation and a normative framework. Haas (1990, 1992) defines an epistemic community by their shared cultural cognition, such as shared normative beliefs, causal explanations, criteria of knowledge validity, and policy enterprise. However, he did not elucidate how these cultural elements emerged. Here, I go further to explain how
international agencies were involved in the construction and consolidation of these cultural elements. International agencies are by no means passive receivers of scientific knowledge and advice. Rather, the WHO, FAO and OIE have reinforced, legitimized and expanded consultation networks to serve their governance interests. Their institutional mechanisms determine the selection, formation, expansion, harmony, and stratification among experts. They also affected the shared cultural beliefs, interests, and interactions among these experts.

My research therefore firstly highlights that the One Health epistemic community has been constructed and institutionally-based. One Health experts did not emerge out of the blue; rather, they were transformed from pre-One Health avian flu experts. Before One Health, experts from affiliated collaborating centers and reference laboratories dominated the consultation processes. Laboratory networks provide a relational structure in which knowledge is developed with, produced for, and translated into policies. These experts, though divided in medical and veterinarian fields, accumulated their authority and credibility by developing technical protocols, recommending policies, and conducting advanced research that enabled and advanced laboratory-based technical and medical interventions. After One Health was officially endorsed, previously divided medical and veterinary expert networks were transformed into a somewhat unstable One Health epistemic community, which is still evolving. Although expert networks were expanded, this new “united” community was fundamentally built upon established laboratory networks. Thus, One Health experts have been criticized, and self-critical for being unrepresentative. By organizing international meetings to contemplate One Health, international agencies still control who to consult, how to define, and what policies embody One Health.

Second, my research shows that an epistemic community may evolve along with or be shaped by emerging policy enterprise. It revises Haas’ theory by showing that consensus on One Health did not naturally emerge among experts but was constructed, nurtured, and reinforced by organized interactions. International political and technical meetings
functioned as hybrid zones in which new knowledge and policy frame was affirmed. Through these meetings, experts developed and promoted “shared” normative beliefs and policy enterprise. This process illustrates Jasanoff’s (2006) co-productivist approach to understanding the relationship between knowledge and politics.

Third, the heterogeneity of experts’ cognition and normative frames of One Health undermined the assumption of similar mindset among members of an epistemic community. Elastic meanings of One Health broadened expert participation, but its multiple agendas also generated some confusion and tension. Most consultants I interviewed and surveyed expressed appreciation and support of One Health. These experts, however, have continued to negotiate and debate the definition and scope of One Health. The difficulty in obtaining a shared definition of One Health revealed structural and cultural barriers international agencies face in uniting divided experts.

Lastly, my study reveals the limitations of consultation mechanisms, illustrating the power dynamics in knowledge and institutional arrangements. Scholars have pointed out that exclusive decision-making has negative implications for democracy, as they are mostly expert dominated with limited access by the public. For instance, policy debates on topics of genetic-modified food, global warming, or nuclear power have become “scientized,” granting certain experts a high level of political authority, and narrowing the policy regulations to matters that can be adjudicated on the basis of scientific information or “managed” by experts. The formation of One Health experts similarly revealed such a top-down process through which international agencies profoundly shaped the emergence and qualification of this community. We should thus be aware of the inherent bias in the recognition, classification, and representation of international expert networks on this emerging global agenda.
Chapter 6 Constructing the Biosecurity Paradigm

Introduction: Distinction of poultry rearing practices

This chapter examines how the FAO and OIE have constructed the global norm and applications of biosecurity, in spite of recognized flaws of the paradigm. I illustrate that the two agencies constructed and reinforced this unsatisfactory paradigm in support of market-based globalization. By constructing and reinforcing the biosecurity paradigm, international agencies also differentiated private-sector actors and subsequently shaped social order.

The spread of highly pathogenic avian influenza (HPAI) in poultry pressured the FAO and OIE to revise or develop international standards for poultry production and trade. These two agencies began to advertise biosecurity by identifying it as a public good and encouraging its application. Despite the fact that the FAO and OIE at times recognized that the spread of avian flu was associated with intensifying global flows of commodities and large scale food-animal production (FAO 2010a: 8), they considered industrial production a solution to the problem, rather than a likely source of disease transmission. Particularly, international agencies noted that biosecurity as modeled by modern industrial farming was a new paradigm for poultry production and trade standards.

International agencies began to categorize poultry rearing models by biosecurity risk. Additionally, they associated biosecurity with production scale. While HPAI affected various kinds of poultry farms, the WHO, FAO and OIE tended to attribute more responsibility to backyard farms than to industrial farms. For example, international agencies identified Asia as a hot spot, owing to the fact that most human infection cases occurred in Asian countries, such as Thailand, Vietnam and Cambodia. They blamed that

93 For example, the FAO and OIE frequently commented that farming systems had changed rapidly worldwide, and they admitted that the effect of these changes if farming system on disease emergence had not been well understood.
“the typical village or ‘backyard’ farm is problematic for bird flu control” (FAO, OIE and WHO 2005:5) due to lack of biosecurity. The WHO also noted that “control of disease in rural ‘backyard’ flocks will be the most difficult challenge” (WHO 2005b). International agencies frequently warned that village chicken production systems prevailing in certain Asian and African countries threatened the entire globe. In addition, the WHO and FAO pointed to live bird markets, or so-called wet markets, as contributing to disease transmission (for example, see FAO 2007). WHO’s official, Peter Cordingley, for instance, highlighted the threats brought by Asian farms:

“Europe is quite rightly taking measures to control the spread of the virus in poultry and to stock up on antiviral drugs in case of human infection, but the best defense for Europe or anywhere else against avian influenza is to help fight the virus in Asia,” said Cordingley.

…Cordingley added: “If the situation is not brought under control in the backyard farms in this part of the world, the virus will continue to spread around the world year after year. Asia is ground zero and still represents the greatest threat to global public health.”

In contrast, international agencies have generally perceived intensive poultry production safer, despite some evidence that this farming practice also contributed to the emergence and mutation of influenza viruses. For example, scientists, researchers, and animal rights activists warned that factory farms where animals are kept in close and crowded facilities provide an ideal environment for the rapid evolution of diseases (Greger 2006, Pew Commission on Industrial Animal Production 2008). Greger (2006), for instance, showed that high-density production and stressful living conditions in factory farms make disease spread faster to greater numbers of animals, and disease outbreaks in this environment

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94 The interview was cited from the article “Best defense against avian flu is to fight the virus in Asia,” in the Bulletin of the World Health Organization, 2005, 83(12): 887-889.
often resulted in more devastating mass culling.\textsuperscript{95} In fact, before HPAI worldwide outbreaks, many infected countries, such as Thailand, China, and Vietnam, had undergone quick expansion into industrial poultry production in the past decade, notably the gigantic CP Company’s commercial farms in Thailand. Researchers, activists, and commentators have pointed out that factory farming and global commodification may exacerbate global disease transmission (c.f. Wallace et al., 2009; Davis 2005, GRAIN 2006).

In spite of ample evidence showing the correlation between disease impact and globalized industrial farms, international agencies generally regarded industrial farming a solution to disease control. For example, after avian flu outbreaks in 2003, the FAO quickly developed a typology to categorize poultry rearing practices (FAO, 2004). By FAO’s definition, poultry farms are divided into four categories: sector 1 as an industrial integrated system with high level biosecurity; sector 2 as commercial poultry production with moderate to high biosecurity; sector 3 as commercial poultry production system with low to minimal biosecurity, and sector 4 as village or backyard production with minimal biosecurity (see Table 6.1).

The typology defines poultry sectors primarily by the farms’ biosecurity levels and production scale. It specifically associates production scale closely with biosecurity. The FAO’s definition presumes that industrial and integrated farms maintain the highest biosecurity level, while village and backyard farms are at the lower end of the biosecurity spectrum. Reasons for this association were primarily that industrial producers are thought to be more resourceful, capable, and interested in biosecurity. In addition, confinement of poultry is considered a condition of biosecurity. WHO’s Fact Sheet, for example, echoes this presumption:

\begin{quote}
For instance, 1.3 million chickens were slaughtered during H5N1 outbreaks in Hong Kong in 1997. In 2001, the Hong Kong government carried out another massive poultry slaughter, killing more than a million birds to eradicate an outbreak. An outbreak of the H7N7 highly pathogenic avian flu strain in 2003 led the Netherlands to destroy 30 million birds, about a third of its poultry flock.
\end{quote}
Table 6.1 FAO’s definition of production systems

<table>
<thead>
<tr>
<th>Sectors (FAO/definition)</th>
<th>Systems</th>
<th>Village or backyard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industrial and integrated</td>
<td>Commercial poultry production</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bio-security</td>
<td></td>
</tr>
<tr>
<td></td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td>Sector 1</td>
<td>Sector 2</td>
</tr>
<tr>
<td></td>
<td>Sector 3</td>
<td>Sector 4</td>
</tr>
<tr>
<td>Biosecurity</td>
<td>High</td>
<td>Mod-High</td>
</tr>
<tr>
<td>Market outputs</td>
<td>Export and urban</td>
<td>Urban/rural</td>
</tr>
<tr>
<td></td>
<td>Urban/rural</td>
<td>Live urban/rural</td>
</tr>
<tr>
<td></td>
<td>Rural/urban</td>
<td></td>
</tr>
<tr>
<td>Dependence on market for inputs</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td></td>
<td>Dependence on goods roads</td>
<td>High</td>
</tr>
<tr>
<td>Location</td>
<td>Near capital and major cities</td>
<td>Near capital and major cities</td>
</tr>
<tr>
<td>Birds kept</td>
<td>Indoors</td>
<td>Indoors</td>
</tr>
<tr>
<td></td>
<td>Indoors/Part-time outdoors</td>
<td>Out most of the day</td>
</tr>
<tr>
<td>Shed</td>
<td>Closed</td>
<td>Closed</td>
</tr>
<tr>
<td></td>
<td>Closed/Open</td>
<td>Open</td>
</tr>
<tr>
<td>Contact with other chicken</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Contact with ducks</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Contact with other domestic birds</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Contact with wildlife</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Veterinary service</td>
<td>Own Veterinarian</td>
<td>Pays for veterinary service</td>
</tr>
<tr>
<td>Source of medicine and vaccine</td>
<td>Market</td>
<td>Market</td>
</tr>
<tr>
<td></td>
<td>Market</td>
<td></td>
</tr>
<tr>
<td>Source of technical information</td>
<td>Company and associates</td>
<td>Sellers of inputs</td>
</tr>
<tr>
<td></td>
<td>Sellers of inputs</td>
<td></td>
</tr>
<tr>
<td>Source of finance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Breed of poultry</td>
<td>Commercial</td>
<td>Commercial</td>
</tr>
<tr>
<td>Food security of Owner</td>
<td>High</td>
<td>Ok</td>
</tr>
<tr>
<td></td>
<td>Ok</td>
<td>From ok to bad</td>
</tr>
</tbody>
</table>

“…the logistics of recommended control measures are most straightforward when applied to large commercial farms, where birds are housed indoors, usually under strictly controlled sanitary conditions, in large numbers. Control is far more difficult under poultry production systems in which most birds are raised in small backyard flocks scattered throughout rural or peri-urban areas” (WHO, original “Fact sheet” of avian influenza). 96

This perceived association between production scale and biosuacity level, however, may not be a reality. For example, both smallholder and intensive farming practices have shown to be affected and contribute to disease transmission. FAO’s typology does not include alternative poultry farming practices, such as free-range poultry production, a growing market in some countries like Germany: Birds are allowed outdoors but carefully managed. Further, being resourceful does not guarantee a corporation’s willingness to invest in biosecurity. Instead, researchers and activists have found that industrial farms are often crowded and unhygienic (cf. Wallace 2009a, Davis 2005). The FAO and OIE at times admitted the weakness of their assumptions regarding the connection between production scale and biosecurity. For example, these international agencies recognized that, “The current H5N1 HPAI panzootic cannot be attributed to any one type of production system alone: large and small farms have been affected and played a role in the spread and persistence of the disease.” (FAO, OIE and World Bank 2007:2). FAO also occasionally recognized that the risk of free-range poultry flocks is no greater than that of commercial flocks, or even less in some situations. However, FAO’s typology does not reflect this more refined understanding of farm risks.

This typology of poultry farms, despite being unsatisfactory, has had a great effect on policymaking. One FAO official acknowledged that their four-sector definition of poultry farms was not unanimously agreed upon by officials at internal meetings (F4-2008).

96 The paragraph appeared in WHO’s original fact sheet of avian influenza published in its website. In 2011, the WHO updated the fact sheet and removed the paragraph. This information can still be found at UN’s website, see http://www.un.org/staff/avianinfluenza/basicfacts.htm (Retrieved February 28, 2013).
During the construction of the typology, some officials questioned the categorization, arguing that it did not capture the diversity of farming practices worldwide, let alone the scant knowledge of poultry rearing in different corners of the world. Nevertheless, FAO’s poultry typology was eventually adopted in spite of disagreements. This FAO official explained that technical simplification was necessary because it was conceptually useful. He articulated,

“I know it is not always applicable, but we need to make these categories for the sake of communication. With these sector categories, when I talk about the sector 1, you know I refer to industrialized farms with higher biosecurity level; when I say the sector 2, you know that it refers to commercial farms with certain levels of biosecurity” (F4-2008).

That is to say, to international officials, simplification and presumption, regardless of not being always applicable, is necessary and convenient.

Reasons for constructing this paradigm, however, go beyond organizational preference for simplification and convenience. In addition to international organizations’ limitations of worldviews, I argue that we should also examine the political economic environment in which they are embedded. This chapter will answer the following questions: Why has biosecurity grown to be such a powerful technical tool and paradigm? Why did the FAO and OIE actively construct a global biosecurity paradigm? Who benefits from this paradigm? I argue that the OIE and FAO crafted the biosecurity paradigm to protect market-based globalization, and to control diseases without negatively impacting national and international economy. Additionally, the construction of this paradigm presented an opportunity for transnational agribusiness to affect its standards and practices. Since they share the goal of protecting global economic stability with international agencies, transnational private-sector actors have become increasingly involved in establishing global biosecurity paradigms and standards.
In the following section, I first show how international agencies protect economic stability and global trade, in addition to disease control. Next, I describe how the OIE and FAO transferred the concept of biosecurity, originally applying to laboratory settings, to agricultural operations. Following that, I illustrate how “compartmentalization” that OIE promoted for international trade regulation encouraged a confined laboratory-like farm environment. Lastly, I illustrate how institutional emphasis on biosecurity increased transnational agribusinesses’ ability to shape the paradigm. These private-sector actors established partnerships with international agencies to promote an industrial model of poultry rearing. This chapter concludes that international typology, standards, and regulations have political and social effect. During the construction of a global biosecurity paradigm, the possibility that globalization and “development” may threaten self-sustained food safety, and disease control is often disregarded.

**Supporting market-based globalization**

International agencies use biosecurity to achieve more than one goal; biosecurity is supposed to balance health risks and economic interests associated with globalization. Both FAO and OIE have multi-faceted commitments, such as reducing disease transmission, improving food safety, and protecting the poor. Commitments to disease control and to economic interests, at times, contradict one another. For example, to prevent the spread of disease, the FAO and OIE recommended mass culling of birds during H5N1 virus outbreaks, which negatively affected small poultry farmers in developing countries. Mass destruction of poultry also threatened the globalized poultry market. Outbreaks of avian flu resulted in enormous economic loss, mostly due to massive culling of poultry and eggs. The World Bank estimated that the economic loss due to HPAI between 2003 and 2010 was in the tens of billions dollars (FAO 2010b, Fieldnotes of World Bank presentation at the One Health Congress 2011). In addition to direct monetary loss in agriculture, associated economic impact was massive in industries like meat, trade, and travel. The World Bank predicted that if a pandemic hits the world, it would cost about $3.13 trillion during the first year (Sipress 2009: 70). International
agencies therefore prioritized not only disease control but also impact reduction to national and international economies.

Maintaining global trade consistency is explicitly codified in OIE’s mandate, because OIE is a standard-setting agency. OIE’s standards and recommendations have great effect on international trade of animals and animal products. OIE standards are also integrated in the World Trade Organization (WTO)’s Agreement on the Application of Sanitary and Phytosanitary Measures (SPS Agreement), a primary regulation for international trade. States sometimes were reluctant to comply with the OIE’s mandate to report animal disease outbreaks. Several FAO and OIE officials mentioned that states were reluctant to report disease outbreaks because they sought to protect their export status and prevent damage to their economic interests.

The OIE has attempted to balance health risks and economic interests. To ensure that states report animal disease outbreaks to the agency, the OIE forbids its members to impose unjustified barriers to trades of animals and animal products. By “unjustified barriers,” the OIE refers to any trade ban for reasons other than disease risks defined in OIE’s Codes and Manuals. To reshape states’ interests, the OIE revised its legal/technical definition of avian influenza, as well as relevant states’ obligations. For example, to strengthen disease surveillance, the OIE extended the definition of notifiable avian influenza in its Terrestrial Animal Health Code. Previously, member states were only obligated to notify OIE about HPAI viruses present in domestic poultry, while low pathogenic avian influenza (LPAI) was not notifiable. Worried that LPAI may mutate

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97 Several OIE’s standards and principles are relevant to poultry rearing, including methods for eradicating and disposing of poultry, declaration of the disease-free status, and principles for international trade of live poultry and poultry products.

98 The meaning and usage of avian influenza also differs by regions. Originally, in the US, avian influenza means any infection of birds with an influenza virus, whereas in the EU, the term means infection with a highly-pathogenic influenza virus. The definition of High Pathogenic Avian Influenza (HPAI) was first discussed during the First International Symposium on Avian Influenza in Beltsville, USA. In this symposium, veterinarians agreed on a definition that HPAI are viruses “result in not less than 75% mortality within 8 days in at least 8 healthy susceptible chickens, 4-8 weeks old, inoculated by the intramuscular, intravenous, or caudal air sac route with bacteria free infectious allantoic or cell fluids.” The OIE subsequently adopted this definition in 1983. This original OIE classification of avian influenza
into HPAI, the OIE extended the definition of notifiable avian influenza to all H5 and H7 viruses (including low virulence ones) in 2005,\textsuperscript{99} thus extending its monitoring radar.

Corresponding to the definition change in notifiable avian influenza, the OIE adjusted its definition of disease-free status to convince states to comply. Detection of HPAI virus in wild birds presented a dilemma to member states, because reporting it would harm their poultry exports. Detection also led to a practical difficult: No country can declare itself disease-free, if wild birds are carrying AI viruses across borders. The OIE thus proposed exempting some kinds of outbreaks from negatively affecting the health status of the country, including the detection of LPAI viruses in poultry and HPAI in wild birds. The revised \textit{Terrestrial Animal Health Code (2005)} hence clarified the application of avian flu notification to international trade:

"The new notification requirements include reporting on the presence of avian influenza, of low and high pathogenicity, in poultry. Poultry is defined to include all birds raised for commercial purposes, and the status of the country is determined only on the presence of AI in [domestic] poultry. This means that the presence of avian influenza in migratory water fowl should be notified without negatively affecting the health status of the country."

viruses in the Terrestrial Animal Health Code (1983) only distinguished “high pathogenic avian influenza (HPAI)” and “low pathogenic avian influenza, (LPAI)” depending on the virulence of the virus. HPAI causes high death rates among birds, and LPAI does not always cause obvious illness in birds therefore does not create research attention, even though it is believed that LPAI circulates freely within the global wildfowl population. The OIE revised the avian influenza chapter in the Code in 2004.\textsuperscript{99} According to OIE officials, decisions should be both scientifically sound and politically democratic. Proposals for guidelines and standards are first discussed and reviewed by specialized committees composed of knowledgeable international scientists (mostly veterinarians). After national delegates circulate and comment on the proposals, these delegates vote to make a decision during annual meetings. Through this democratic procedure, delegates representing national interests discuss and debate over international standards. If a new standard or a revision is not approved by democratic votes, revisions are requested. In the case of the AI chapter, the veterinary community and poultry industry experts agreed on the standards before the OIE member states jointly approved it.\textsuperscript{100} See the summery on the website of the World Veterinary Association: 
Exclusion of wild birds from export status therefore allowed the OIE to achieve two objectives – monitoring animal health status and minimizing the impact on poultry trade. Although one possible method of disease transmission is international trade of animal products, in no way would the OIE question this global market. Instead, the OIE is obligated to support globalized markets of animals and animal products; it had to take market continuity into consideration.

Similarly, FAO also attempted several potentially contradictory missions, such as securing food supply, ensuring food safety, and maintain the sustainability of natural resources. These multiple concerns sometimes made its stances unstable and subject to change. For example, due to concerns on disease transmission, the FAO changed its attitude toward the smallholder mode of poultry production. Before avian flu outbreaks, the FAO had encouraged the rural poor in developing countries to rear poultry, because poultry is the cheapest source of nutrition and economic return. After worldwide avian flu outbreaks, however, the FAO reversed its stance, calling this smallholder practice dangerous and lacking biosecurity. Despite FAO’s occasional expression that intensifying food production is antithetical to disease control, and warnings that the expansion of global markets threatened local farming systems, FAO officials mostly maintained that international trade stabilizes food supplies and is beneficial. They argued that the stability of a globalized food market is particularly important when vulnerable food systems and high food prices threaten food safety.

FAO and OIE’s definition revision and attitude change illustrate the manifold objectives of international agencies. To fulfill multiple, and sometime contradictory commitments, these agencies have to find a balance or compromise. Essentially and most importantly, international agencies seldom challenge market-based globalization, because they were established to advance globalization and international cooperation. With regard to avian flu, although the OIE and FAO were very concerned about disease control, they also needed to protect economic stability and global trade. This consideration is a primary reason for their promotion of biosecurity. In the next section, I will illustrate how the OIE
and FAO transfer the application of biosecurity to food production in order to govern pathogen transmissions.

**Transferring “biosecurity” from laboratories to food chains**

The concept of biosecurity is a modern technical tool, which was not originally associated with food production. The FAO and OIE actually transferred “biosecurity” from laboratory settings to agricultural and marketing of food production. Generally, biosecurity refers to containing or exterminating pathogens and other perilous organisms by employing a set of modern preventive measures. For the FAO and OIE, as long as the product can be guaranteed disease-free, international trade can operate without restraint. Biosecurity therefore becomes a perfect tool for balancing health risks and economic benefits.

In the past decade, the FAO and OIE actively reshaped the definition and scope of biosecurity to govern food production. Originally, “biosecurity” was conceptualized to regulate laboratory practices. It emerged due to increasing global concerns about man-made microbes, such as bio-terrorism and living-modified or genetically-modified organisms.\(^{101}\) “Biosecurity” was used interchangeably with “biosafety,” both of which referred to careful handling of pathogenic microorganisms and infectious substances in a laboratory. For instance, in early relevant manuals made by the WHO and OIE, including the *Laboratory Biosafety Manual* (WHO 1983, first edition),\(^{102}\) *Biosafety and Biosecurity in the Veterinary Microbiology Laboratory and Animal Facilities to Maintain Safety*\(^{103}\), and *Biosecurity in the Laboratory* (Clavel and Grimaldo 1998),\(^{104}\) biosecurity has no distinct definition from that of biosafety. The WHO once clarified that biosafety refers to

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\(^{101}\) Another international agreement on biosafety is the Cartagena Protocol on Biosafety, adopted in 2003. This biosafety protocol seeks to protect biological diversity from the potential risks posed by genetically modified organisms resulting from modern biotechnology.

\(^{102}\) The second edition was released in 1993 and the third edition in 2004.

\(^{103}\) It is the chapter 1.1.2 in OIE’s Terrestrial Manual.

\(^{104}\) This OIE document defines biosecurity as “to reduce the exposure of laboratory staff to pathogens, and to prevent potentially dangerous agents from leaving the laboratory. See: [http://www.oie.int/doc/ged/D5643.PDF](http://www.oie.int/doc/ged/D5643.PDF) (retrieved February 28, 2013).
working safely (in a laboratory), while biosecurity includes keeping (laboratory) work on valuable biological material from being misused (WHO, Manual 3rd edition 2004a:47).\footnote{WHO compares the two concepts by stating that “‘Laboratory biosafety’ is the term used to describe the containment principles, technologies and practices that are implemented to prevent unintentional exposure to pathogens and toxins, or their accidental release. ‘Laboratory biosecurity’ refers to institutional and personal security measures designed to prevent the loss, theft, misuse, diversion or intentional release of pathogens and toxins.” (WHO 2004a).} Despite WHO’s claim that biosecurity “extends beyond the traditional approach of biosafety” (WHO, 2004:47), both biosafety and biosecurity applied only to laboratory practices.

Recent food safety crises such as bovine spongiform encephalopathy (BSE, also known as mad cow disease) and avian flu outbreaks drove international agencies to transfer the concept of biosafety from confined laboratory settings to food production and market activities. Preventing pathogens from being carried along the food chain has become increasingly important in modern agriculture. After HPAI outbreaks, the FAO, OIE and World Bank (2007) jointly produced a paper, *The Importance of Biosecurity in Reducing HPAI Risk on Farms and in Markets*, which explicitly expanded the scope of the concept:\footnote{The paper was produced for the Inter-Ministerial Conference on Avian and Pandemic Influenza in New Delhi in 2007.}

“Biosecurity refers to those measures that should be taken to minimize the risk of incursion of HPAI into individual production units (bioexclusion) and the risk of outward transmission (biocontainment) and onward transmission through the production and marketing chain” (FAO, OIE, and World Bank 2007: 1).

FAO advised poultry farms to employ segregation, cleaning, and disinfection to contain malicious organisms transmitted through vehicles, equipment and personnel. The FAO also published the *Biosecurity Toolkit* (FAO 2007a). In the following year, the FAO, OIE and WHO (2008) jointly released another document “*Biosecurity for Highly Pathogenic
"Avian Influenza: Issues and Options," emphasizing not only the behaviors but also attitudes when handling animals and animal products:

“Biosecurity is the implementation of measures that reduce the risk of the introduction and spread of disease agents. Biosecurity requires the adoption of a set of attitudes and behaviours by people to reduce risk in all activities involving domestic, captive exotic and wild birds and their products” (FAO, OIE, and WHO 2008: 1).

To international agencies, introducing biosecurity to food chain activities provided a solution for balancing the benefits and threats of intensifying global exchanges (FAO 2007: x). FAO’s Biosecurity Tool Kit (2007) now defines biosecurity as a “strategic and integrated approach that encompasses the policy and regulatory frameworks (including instruments and activities) for analyzing and managing relevant risks to human, animal and plant life and health, and associated risks to the environment” (FAO 2007a:3).

The FAO itself recognized that “the scope of biosecurity is continuously expanding” (FAOa 2007: 14). This agency further proposed an integrated biosecurity strategy across sectors to replace previous fragmented approaches – in food safety, animal health, plant health, environment and protection. The FAO encouraged agricultural and natural resource practitioners to apply the mindset and practices to prevent the spread of dangerous biological agents in natural and managed environments. This gradual expansion of the scope of biosecurity has been in line with the emerging One Health theme in the global policy arena, revealing the international agencies’ capacity to promote new global norms and paradigms.

Transferring a technical tool “biosecurity” into food chain activities, however, has shortcomings. Biosecurity is more suited to well-controlled laboratory settings: It is not easy to implement biosecurity in intricate dynamic agricultural activities where the environment is much less controllable. In addition, biosecurity requires creation of independent and strictly-controlled production entities, which is only possible in capital-
and technology-intensive modern farming. FAO officials therefore frequently pointed out the lack of biosecurity in other farming practices, as one official commented, “The current poultry production system is messed up” (F10-2009).

FAO officials began to investigate local agricultural systems and realized how diverse poultry rearing practices were. They found that duck rearing was often mobile rather than stable due to the necessity of water in the rearing environment. In addition, some traditional agricultural modes incorporate animal rearing and harvesting, such as releasing ducks to paddy farms to control pests and nurture the field, or moving ducks from land to land over long distances. These are now considered dangerous due to difficulty of applying biosecurity. FAO officials admitted that even in an “integrated” industrial poultry production system, a clear-cut distinction between poultry sectors may not exist. For instance, so-called integrated systems often involved complex subcontracts and production chains. One FAO official noted that big poultry companies have been found to provide incubated eggs or chicks to smaller farms for rearing, without strictly monitoring the operation of the contractors. Officials frequently admitted that knowledge of complex poultry production had been limited before the global H5N1 epidemics, and the FAO’s sector typology may not accurately capture the diversity of poultry rearing.

I thus argue that production systems were not “messed up;” rather, the emerging technocratic lens of biosecurity used by officials was inappropriate for viewing the systems. The emerging biosecurity paradigm, transferred from laboratory practices, inevitably imagines and expects modernized, confined, independent, and preferably large-scale agriculture and animal rearing. In the next section, I will move on to discuss how international agencies and other global actors gradually constructed and shaped the applications and standards of biosecurity.

**Promoting compartmentalization for the continuity of trade**

The emerging biosecurity paradigm obviously serves for the maintenance of international trade of poultry. Since global avian flu endemics, the OIE has begun to promote an
implication of biosecurity in trade regulations – compartmentalization. Compartmentalization essentially refers to separating poultry populations by biosecurity measures. In so doing, a nation’s export status is defined by the health status of animal populations instead of by national borders. Compartmentalization differs from another concept, “zoning,” although both strategies seek to separate animal subpopulations. Zoning, also called regionalization, separates animal populations by geographical and natural barriers.\(^{107}\) Compartmentalization, by contrast, distinguishes animal subpopulations by man-made segregation, by “management and husbandry practices related to biosecurity” (OIE Terrestrial Code, Chapter 4.3). That is to say, with compartmentalization, the export status of animal products is not necessarily applied to an entire country; rather, it is the health status of animal subpopulations that matters.

Many experts and officials commented that OIE’s ratification of compartmentalization was long overdue. For example, Dr. Alex Thiermann, the President of OIE’s Terrestrial Animal Health Code, stated that “The concept [compartmentalization] has been a part of the Code for years. Until H5N1, it didn’t get the consideration that it does now” (Grogan 2007: 35). OIE’s ratification of compartmentalization proceeded rather smoothly, due to member countries’ shared concern for sustaining international poultry trade. Compartmentalization was first discussed in the WTO-SPS meeting in 2003. In the following year (2004), before the concept was incorporated in OIE’s Terrestrial Animal Code, the agency drafted its application for this particular disease – Checklist on the Practical Application of Compartmentalization for Avian Influenza and Newcastle Disease. This checklist highlighted crucial procedures such as ensuring necessary sanitary measures and confining domestic animals to keep them away from wild birds. Soon afterwards, Thailand enthusiastically became the first country to apply compartmentalization to exported poultry. Officially, it was not until 2007 that the OIE’s

\(^{107}\) Zoning applies to an animal sub-population defined on a geographical basis by using natural, artificial, or legal boundaries. Applying regionalization means that countries can consider trade bans only for regions with an animal health disease, not for the entire country.
General Session discussed and incorporated zoning and compartmentalization into the *Terrestrial Animal Health Code*.

Essentially, compartmentalization contributes to the continuity of international trade of animal products. Historically, when outbreaks of notifiable animal diseases occurred, products from the entire country would be embargoed by other countries. Compartmentalization, however, allows countries to establish “disease-free” compartments by separating poultry populations with different health status. The OIE claimed that compartmentalization helps to prevent market shock and sustain global trade of poultry given the occurrence of poultry disease outbreaks. Poultry products from uninfected zones and compartments can be considered safe for trade, even if avian influenza is found in the rest of the country. In other words, trade bans no longer have to apply to products, as long as the producers can prove that their poultry is reared in biosecure farms.

The ratification of compartmentalization has shaped actors and rules of the game in international poultry trade. Exporting countries were more than happy to protect their trading business. Producers with business across borders were more willing to escalate the level of biosecurity in their farms. Because most trading products came from large-scale farms, transnational meat producers were those more interested and resourceful in reinforcing the biosecurity paradigm, as they would benefit more from their compliance.

Compartmentalization therefore advanced the transformation of poultry farming. It demands a laboratory-like setting so that biosecurity practices can be implemented. It also requires constant involvement of veterinarians to monitor and detect the presence of pathogens. As a result, integrated systems have become an ideal setting, where poultry

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raising, slaughtering, and processing is managed vertically. The OIE recognized that compartmentalization is “particularly applicable in intensive industries where production systems are vertically integrated” (OIE, 2004: 1). Establishment and maintenance of high biosecurity compartments requires efforts from both national authorities and the private sector. The OIE therefore encourages partnerships between the private poultry industry and national veterinary services. On one hand, compartmentalization requires poultry farmers to detail plans for farm practices, such as how to limit traffic and visitors, maintain strict hygiene measures, and detect pathogens. On the other hand, the OIE let each nation establish its own certificates for auditing notifiable avian influenza (NAI)-free compartments. To implement compartmentalization, the national veterinary authority is responsible for auditing the plan and certifying the status of compartments. When it comes to trade, importing countries still reserve the right to review and determine whether they accept the exporting country’s certificates, practices and products.

To some extent, the application of compartmentalization decentralized responsibility, encouraging the private sector’s self-regulation. For example, the FAO encouraged all stakeholders to “accept the need to do so (biosecurity) and see the benefits in doing so” (FAO 2008: 6). Dr. Thiermann, President of the commission of OIE’s Code, also praised compartmentalization as “a concept that really shifts responsibility, involving new players – the private sector. For this concept to work and gain international credibility, veterinary services will have to be comfortable with the audits they perform and trust what the industry is doing” (Grogan 2007: 37).

Generally, the emergence of biosecurity and compartmentalization supports the continuity of poultry trade, even in the midst of disease outbreaks. This new concept and regulations provided a great opportunity for interested private sector actors to participate

109 Consider, for example, Cargill Thailand’s integrated operations comprises every element in the product chain, including breeder facilities, hatcheries, feed mills, pullet and grow out farms, primary processing plants for raw meat preparation, and further processing plants for cooking and a product development facility. Cargill Thailand also owns in-house veterinary laboratories with the capacity for microbiology testing.
in the norm-shaping and implementation of the biosecurity paradigm. Giant agricultural companies were enthusiastic about this practice. Vested agribusinesses proactively reached out to promote biosecurity and compartmentalization. Transnational poultry breeders and exporters quickly welcomed compartmentalization and enthusiastically advocated for this concept, praising its contribution to economic and food safety. Cargill, an international meat producer, stated that compartmentalization would allow “well-managed poultry businesses to continue to operate while poorly managed ones in the same region would not” (Klein 2006: 18). Mike Roache, Cargill vice president of Corporate Food Safety Regulation Affairs, said, “As the world becomes a global family of economics, we need to seek out new ideas for disease management that safeguard animal and human health without crippling economics and unnecessary waste” (Klein 2006: 18).

These interest groups demonstrated their agency in the process of global paradigm formation. Export-oriented producers pressed national authorities to establish compartmentalized certification. For example, in the US, the Primary Breeders Veterinary Association (PBVA) pressed for the approval of new compartmentalized certification for notifiable avian influenza in the National Poultry Improvement Plan (NPIP). The PBVA President stated,

“Recognising [recognizing] the political implications in many decision making processes, we hope pre-approval of primary breeder compartments and a scientifically sound method, based on the biosecurity of the poultry operations, will enable us to mobilise [mobilize] our product without excessive delays” (Grogan 2007: 37).

In addition, export-oriented producers attempted to shape global policies and standards by lobbying national and international agencies. An executive director of a French breeding company commented, “We have a big job to do now in ‘marketing’ the concept
and lobbying for the global support we need.” In May 2008, the International Poultry Council (IPC) published a letter expressing their full support of compartmentalization.

Due to enormous demand and interest, a few export-oriented countries quickly implemented compartmentalization, including the UK, Brazil and Thailand. Thailand, specifically, was often praised as a pioneer of compartmentalization. For example, the Sun Valley Thailand company, owned by Cargill, produces millions of broiler chickens per week. After HPAI outbreaks, Sun Valley Thailand not only quickly shifted from exporting raw to cooked products, but it also quickly issued AI-free compartments after the Thai government established certificate systems. Charoen Pokphand (CP), one of Asia's largest poultry producers, also issued AI-free compartments. Both Sun Valley Thailand and CP exporters were able to continue business despite HPAI outbreaks. Cargill therefore praised Sun Valley Thailand as “a testimony to the power of biosecurity measures for controlling the current manifestation of the disease.” (Conlon: 2006: 9)

Not only breeders’ but also states’ roles subsequently changed. Countries that were slow to adopt compartmentalization soon felt pressured to comply. For example, a report by a Taiwanese expert demonstrates that OIE advocated for compartmentalization. His report summarized an OIE training meeting he attended in the spring of 2005, attended by national veterinary authority officials from several Asian countries. The expert commented on how the OIE vigorously introduced the idea of compartmentalization and poultry vaccination to participants, despite some concerns raised on the spot. During the training session, the OIE also invited representatives of Thailand's Charoen Pokphand Foods to demonstrate the efficacy of compartmentalization. This Taiwanese expert concluded in his report, “It is expected that this Thai industry will regain the status of

disease-free compartment based on this concept. We Taiwanese should also prepare for its impact and respond proactively.” This incident illustrates that compartmentalization, conceived by the OIE for the continuity of global trade, has reshaped the interests of associated global actors. In the next section, I move on to explain the dissimilar influence of private-sector actors in constructing and shaping the global biosecurity paradigm.

**Initiating coalition with private-sector actors**

Increasingly institutional emphasis on biosecurity altered the relationships between international agencies and private-sector actors. Export-oriented poultry breeders actively and voluntarily joined in the implementation of compartmentalization. Nonetheless, not all private-sector stakeholders had vast influence on standard-formation and policy-making. In this section, I contrast two ways through which international agencies interacted with different stakeholders in promoting biosecurity. On the one hand, industrial poultry producers, so-called sector-one producers by FAO’s definition, have actively established closer relationships with the OIE and FAO. They managed to establish direct partnerships with international agencies. On the other hand, small-scale producers often played passive roles, merely receiving biosecurity recommendations. They lacked the ability to bypass national governments to be directly involved in the global paradigm formation. This contrast in influence between producers of different scales illustrates the relative power and leverage of global actors.

1. **Organized SSAFE – Partners that promote biosecurity**

After avian flu outbreaks, influential transnational agribusiness quickly established a network to advocate for the model they desired. In 2004, several international corporations and academic actors, including Cargill, McDonalds, and the University of Minnesota’s Center for Animal Health and Food Safety, jointly established a campaign called “Safe Supply of Affordable Food Everywhere” (SSAFE). They argued that avian flu outbreaks illustrated the lack of alignment between food industry, governments, and researchers: These actors intended to change the status quo. These corporations and
researchers claimed a common interest with international agencies – to allow all people “access to safe, nutritious, and affordable food” (see SSAFE website).

The SSAFE was initiated in March 2005. It began with a small group of Cargill and McDonalds executives and scholars, who organized to visit OIE’s headquarters. They proposed sharing the work of surveillance, risk analysis, emergency preparedness and responses with FAO and OIE. Their initial visit resulted in a follow-up meeting with the OIE Director General, representatives from the OIE Administrative and Code Commissions, and SSAFE’s representatives during the World Veterinary Congress in July 2005. These international officials and corporate representatives agreed to support an uninterrupted, sustainable food supply chain between all countries. Afterwards, the SSAFE also participated in the global H5N1 HPAI and pandemic influenza strategy-setting meeting in Geneva in November 2005, discussing their partnership with FAO, UNSIC, and the World Bank. Since then, the SSAFE has grown into an alliance of intergovernmental organizations, food industry (of which Cargill and McDonalds are the main actors), and a few interested researchers. Now, the SSAFE has not only developed memoranda of understanding with both OIE and FAO, but it also obtained formal observer status with both organizations.¹¹²

The SSAFE claimed that they changed the role of the private sector with international agencies “from advisory to partnership.”¹¹³ For example, one expert at Cargill, an international food corporation based in the US, stated that “traditionally, there wasn’t much collaboration between intergovernmental agencies and private industry….The members of OIE, for example, are governments, not businesses” (Klein 2006: 18). Referring to themselves as “emerging leaders with a global supply chain mindset”¹¹²

¹¹² In May 2008, The FAO and SSAFE signed a Memorandum of Understanding with the main objective of enhancing the capacity of developing countries to prevent and redress the increasing risks associated with food safety and animal health, and their impact on public health and consumer protection.
¹¹³ This is from a presentation “Public private partnership: the SSAFE initiative” to the OIE, made by Ms. Will Hueston (University of Minesota) and Mike Robach (President of SSAFE). See http://www.oie.int/fileadmin/Home/eng/Conferences_Events/sites/OIE-WB_Conference_1007/speakers%20corner/Speaker%20Corner%20-%20SSAFE.ppt (Retrieved February 28, 2013).
(SSAFE website), the SSAFE participants urged that all actors step out of their own silos and establish partnerships. The SSAFE and OIE subsequently noted that they shared an emphasis on veterinary services, an understanding of the urgency of the problem, and commitment to collaboration.

Since its establishment, the SSAFE has participated in global problem-framing, standard-setting, and norm-diffusion, specifically centered around biosecurity. For example, the SSAFE strategically reframed the problem, claiming that avian flu not only threatened public health but also global food safety. By framing the problem from a different angle, the campaign incorporated the concerns of several international agencies, such as the OIE, FAO, World Bank, and UNSIC.

In addition, the SSAFE’s technical superiority, financial resources and networks made it a desirable partner of international agencies. The SSAFE claimed that “each entity [the public and private sectors] provides part of the knowledge, finance, and/or labor toward a shared interest and by which each sector benefits in the outcome.” In 2006, SSAFE began to actively introduce compartmentalization to Africa, South America and Asia, where producers were unfamiliar with this concept. The SSAFE initiated two programs accordingly – the Global Food Safety Systems Initiative and the Global Initiative of Food Safety Leadership. Through these programs, the SSAFE co-sponsored international conferences, organized biosecurity training seminars and workshops for local producers, government, industry and academia in developing countries, and donated avian flu diagnostic kits to these governments. One OIE official therefore praised these initiatives, saying that the SSAFE was a good example of “how academia, governments, and the private sector could work together” (O5-2009).

114 See its website: http://www.ssafe-food.org/
116 One example is a conference in Bangkok that brought in 60 representatives from food companies to discuss avian flu control.
Furthermore, the SSAFE also attempted to establish a new international standard for cooked poultry, setting it at a temperature of 70°C. This standard was expected to facilitate international trade of broiled poultry. A Cargill director claimed that “this would allow movement of cooked poultry globally, and it will help get the message out that cooked poultry is safe to eat” (Klein 2006: 18). After international agencies endorsed One World One Health, the SSAFE quickly coined a new phrase “One World, One Standard” to further advocate for cooked poultry.

The SSAFE’s promotion of the biosecurity paradigm contributed to the change of interests and roles of national governments and local poultry producers. Integrated poultry producers have seemed willing to share their equipment, expertise, and services, such as in-house laboratories or test kits, in exchange for political influence and economic profits. Cargill, in particular, developed a portable package of production models and delivered it to developing countries by closely working with international agencies. For example, Cargill reinforced the belief in integrated meat production systems by voluntarily providing its laboratory test services to neighboring smallholders. The president of Cargill Thailand proudly claimed, “All the steps of the supply chain, from feed through to the export of our products are controlled within world class biosecurity and food safety standards.”

Cargill’s Sun Valley Thailand also introduced the real-time polymerase-chain reaction (PCR) to test H5N1 viruses, and it promised to share its PCR equipment and to train Thai government officials. In so doing, Sun Valley Thailand established partnerships with the national authorities and producers.

International agencies also wholeheartedly welcomed these actors’ interests in and commitment to biosecurity, particularly in countries where public veterinary services were not well established. Officials considered the provision of veterinary services from the private sector desirable. For example, David Nabarro, the Coordinator of UNSIC, encouraged the increasing reliance on private veterinary services at the One Health

Congress. He asked, “Why do we approach veterinary service as a public good? Why can’t we see it as a private good? Why don’t we see them as some paid … goods?” (Fieldnotes, One Health Congress, 2011). Although his idea was immediately challenged by another expert speaker, arguing that privatization of veterinary services, promoted by the World Bank, had devastating consequences due to the authorities’ lack of interest in further investing these services. International officials’ welcome of the private sector’s self-regulation was evident.

SSAFE’s advocacy for biosecurity gradually restructured production and market chains toward an integrated system. In June 2011, Cargill Thailand announced a US$110-million (3.34 billion baht) expansion of its integrated poultry processing operations, including the hatchery, breeder farm, processing plant and egg farm operations. The SSAFE’s program in Mozambique also encouraged the integration of the family sector into the commercial sector for the sake of biosecurity. In Indonesia, where live bird markets were identified as problematic, the government has closed private slaughter houses and only permitted six slaughter facilities around Jakarta.

The above evidence all indicates that organized transnational meat producers can now affect international norms and standards directly, without necessarily having national delegates speak for them. Their participation in shaping and diffusing the biosecurity paradigm not only benefited themselves but also profoundly shaped the interests and behaviors of national and local actors.

2. Poultry farmers on the ground – Affected by the biosecurity paradigm

In contrast to the SSAFE, most private-sector stakeholders had no opportunity to construct the global paradigm. To improve avian flu control and promote the biosecurity concept and practices, the FAO initiated public-private partnership (PPP) projects to enroll poultry producers. Since 2009, the FAO has conducted PPP projects regarding avian flu control in Bangladesh, Indonesia, Thailand, and Egypt. Recently, PPP projects were also conducted in Vietnam and China. These projects aimed to create a link between
the authorities and poultry producers in these countries. The primary object of FAO’s PPP projects was to assist national authorities and producers in jointly identifying their needs and concerns, and improving national disease control policies. One FAO official explained,

“Often in countries, ministers have their own unimplemented decisions, and poultry producers have their own discussion, but they usually are not well connected. They may have personal links, but there has no platform for them to discuss together. PPP is a process to make dialogue…You have to let stakeholders discuss what producers can do, what is the benefit for them to do so; and because it's voluntary-based, their involvement is crucial. We have to let them know what can be done and what should be done, to make them interested in practicing biosecurity, and to design some mechanisms to make their collaboration possible” (F9-2010).

However, FAO officials recognized that identifying players in these countries (Egypt, Indonesia, Bangladesh, and Thailand) was challenging, as livestock stakeholders vary greatly in their motivation and relationship:

“We tried to identify who are the players – who are in the public sector, and who are in the private sector, trying to understand what's the relationship between the two sectors.”

“The idea of PPP is to bring public and private sectors [in a country] together to find solutions. But this didn’t work, because many actors were not interested in doing this” (F9-2010).

One reason smallholders were not interested in participating was that non-exporter smallholders felt biosecurity was less relevant. Another FAO official pointed to the imbalanced power of producers:
“They (PPP participants) were often identified through poultry producer associations and market seller associations. In Egypt, only big companies participated; small producers did not have a voice; as a result, they (small producers) are often against biosecurity regulations” (F17-2010).

Most of the time, producers participating in PPP projects were representatives of poultry associations. At times it was difficult to distinguish the public sector and the private sector. In some countries, the government stands for the interests of a few powerful private actors, for example, the poultry sector in Thailand has a strong affiliation with Prime Minister Thaksin Shinawatra.

Biosecurity was a primary concern of most FAO’s pilot PPP initiatives. From experience, the FAO found that “biosecurity on farms was often the common interest (for both the public and private sectors)… because both producers and governments wanted to reduce the spread of the virus…Therefore, 80% of PPP are related to biosecurity” (F9-2010). Another official added, “We tried to identify common interests. The most important topics have been: 1. biosecurity, 2. compensation, 3. vaccination, 4. diagnoses. Different countries have their own focus, and this is pretty much a trial-and-error process. Each country has its own interests.” (F17-2010)

Regardless of the expressed interest in biosecurity, conclusions of these PPP projects may not necessarily be adopted. One official pointed out, “Biosecurity did not work in Africa, such as in Egypt” (F17-2010). Officials regarded the PPP experience in Egypt a failure because solutions developed during the PPP discussions were not incorporated in Egypt’s national policies. Another FAO official added,

“We had a compensation workshop, in which we brought consultants, ministry of agriculture, consultants from the government, farms, and the poultry union. However, the poultry union in Egypt did not actually represent poultry companies, because it was established by the government. We worked out different components and presented the result to the CVO [chief veterinary official] and
agriculture ministry. But after a few days, the documents were put in shelves, covered by dust. The private sector was disappointed. They had high expectations, but the conclusion was not adopted.” (F17-2010)

This official thus concluded, “Sincere political willingness is crucial” (F17-2010). The FAO also pointed out tensions between the public and private sectors within countries are difficult to overcome:

“There are other challenges, particularly for the private sector. It's difficult for them to understand the benefit of PPP. The private poultry sector is very reluctant to share information: either they don't care, or they don't want to be controlled. The trust between private sector and public sector is often low. Another problem is that public sector is not well equipped to deal with the problem. They don't have enough knowledge. Sometimes the private sector knows more and has their own labs, but they don't want to share with the government, because this information is often used against them” (F9-2010).

FAO’s PPP experiences illustrated the challenges international agencies face in getting smallholder producers to implement the emerging biosecurity paradigm. Smallholders had less power and opportunity to participate in national policy discussions, let alone international ones. They were often blamed for not buying into the concept (e.g. FAO, 2008:3). The contrast in producers’ enthusiasm for adopting biosecurity demonstrates that the private sector is by no means a unanimous community. While export-oriented breeders and transnational corporations were more active in adopting the concept, small-scale producers had less interest or resources to do so. While generally private-sector actors have become increasingly involved in the construction and diffusion of global paradigms, actors played different roles and had dissimilar power. Transnational agribusiness has partnered with international agencies to promote these practices, while small-scale producers have mostly been simply receivers of the paradigm. General smallholder participation was limited.
Conclusion: Discourses and standards that shape social order

To summarize, this chapter examines how the FAO and OIE have constructed the norm and applications of biosecurity, which have been incorporated into many global, regional and national standards and significantly influenced poultry trade. I argue that the biosecurity paradigm’s emergence and consolidation was the result of the demand for a solution to intersecting problems associated with intensifying globalization, such as disease control, food safety, and food shortage. International agencies perceived biosecurity as the solution, for it allows them to reduce disease transmission without disturbing global food production/trade. In this sense, international agencies are actors who continue to seek compromises. Specifically, they are creations in support of market-based globalization. Their compromised solutions often serve to rather than challenge globalization. Although the OIE and FAO occasionally acknowledged mounting threats associated with intensifying production methods and globalization, they still saw market-based globalization as inevitable and constructive. These two agencies hence extended the scope of biosecurity from laboratory measures to food chain practices, and they used it as a standard to distinguish farms. This distinction subsequently profoundly affected the poultry exporters’ interests and status, since the ratification of compartmentalization allowed trading of poultry products from farms with certified biosecurity plans during disease outbreaks. By constructing the biosecurity paradigm, comprising of farm sector definition, compartmentalization, and associated standards, the FAO and OIE fulfilled multi-faceted responsibilities. Instead of questioning globalization, international agencies fulfilled the ever-growing need for food and security driven by intensifying international trade and agriculture production.

During the construction of the biosecurity paradigm, these agencies’ assumed association between industrial farms and biosecurity has been further actualized and reinforced by interested private-sector actors. Influential transnational meat corporations and associations, such as Cargill, organized to promote biosecurity for their own interests. They articulated their “shared interests” with international agencies, proffered their
capacity to provide safe and affordable food, and advocated for the private sector’s self-regulation. They partnered with the FAO and OIE to frame, construct, and diffuse biosecurity. Modern intensifying production hence was confirmed as an ideal model and solution. Industrial production is now perceived as a solution for disease control, rather than a likely source of disease transmission. By contrast, smallholders of livestock, lacking the abilities to shape global discourses and policies, were mostly perceived as problematic, backward, and less cooperative.

Biosecurity standards, though seemingly scientifically-grounded and apolitical, do have political, economic, and cultural implications. As Miller states, constructing these “global kinds” (categories) legitimizes some practices while classifying others as being deviant (Miller 2007). Researchers have found that seemingly neutral and universal discourses may hide contradictions, ambiguities, and complexities of socio-political reality (Lahsen 2004, Sikkink 2002, Rosenberg 1992, and Booth 2005). Originating in laboratory practices, biosecurity is recognized to be more suited to “large-scale commercial production systems in the so-called ‘developed world’” (FAO, 2008:2). Politically, biosecurity reinforced the power of resourceful private sector actors. Economically, the consolidation of the biosecurity paradigm has shown to result in the intensification of poultry production. Due to their abundant resources and confined production methods, intensive agribusiness producers have found it easier to fulfill these requirements. They benefited from this crisis by expanding their modern factories and poultry export business. By contrast, avian flu policy has driven many small-scale farmers out of business (GRAIN 2006, Davis 2005). Small-scale poultry farmers had more difficulties in getting product examined or securing cold chain supply infrastructure. Hence they may be forced to cooperate with big meat companies.

Miller (2007) summarizes three mechanisms by which IOs contribute to the epistemic ordering of world affairs: (1) by setting international knowledge standards; (2) by making global kinds (categories); and (3) by constructing new deliberative spaces in which claimants acquire standing through claims to knowledge and expertise (Miller 2007: 328).
Culturally, the biosecurity paradigm reinforced a binary understanding of human behaviors, such as backward vs. modern production systems, of dangerous vs. secure ways of living, and of developing and developed worlds. International agencies often praised intensive livestock producers for their compliance to biosecurity, but labeled rural residents selfish or uneducated. For example, officials continuously expressed frustration about the noncompliance of local producers and attempted to induce them to change their behavior. Only a few officials (W2-2008, F12-2009) reflected that implying “certain peoples’ behaviors should be changed” was rather judgmental. The preference for modern intensive farming in global avian flu policies therefore reinforced “a distinction between the ‘modern’ and the ‘primitive’ and certain ‘improper relations with animals in industrial farming’” (Braun 2007:23).

In conclusion, the chapter illustrates that international agencies are creations of globalization and therefore were constrained by the political economic environment. These agencies, by allying with certain states and private-sector actors, have constructed a biosecurity paradigm that fulfills their multiple, and sometimes contradictory commitments. The concept and practices are undeniably efficient and crucial for disease control, while at the same time supporting the market-based globalization. We should nevertheless pay attention to the power dynamics of the construction process and the effect of the paradigm. Biosecurity should not be taken as the exclusive solution because other root problems of disease transmission also require examination, such as agricultural intensification and imbalances in socio-economic development.
Chapter 7 Normalizing the Lack of Transparency in Pandemic Responses

Introduction: Controversies over WHO’s responses

This chapter aims to explain WHO’s controversial responses to the 2009 influenza A (H1N1) pandemic by examining its new institutional model for risk analyses and biomedical interventions. I illustrate how increasing organizational emphasis on influenza vaccines gradually normalized WHO’s lack of transparency in its pandemic responses.

In the spring of 2009, worldwide outbreaks of H1N1 flu replaced H5N1 avian influenza as the most high-profile threat. On June 11th, the WHO declared that this virus had become a pandemic in its peak (phase 6). Collaborating with the FAO and OIE on surveillance, the WHO detected and investigated this virus strain in a historically timely manner. The agency quickly labeled the outbreaks a pandemic, which initiated a series of aggressive international and national responses, such as rapid development and global deployment of the H1N1 vaccines. Its recommendations also compelled national governments to order millions of antiviral drugs and vaccines.

However, WHO’s responses received extensive scrutiny as the pandemic caused much milder casualties than the agency had predicted. Countries which proactively ordered vaccines were left with huge amounts of unused doses. In late 2009, the Council of Europe and the media began to disparage WHO for exaggerating the severity of the H1N1 outbreak. Critics suspected that the WHO, influenced by pharmaceutical companies, had inflated the risk. For instance, in his report, Paul Flynn of the Social, Health and Family Affairs Committee of the Parliamentary Assembly of the Council of Europe, criticized WHO’s decision for lack of transparency (Flynn, 2010). An

119 By now the WHO’s Global Influenza Program (GIP) has established working relationships with FAO and OIE’s OIE-FAO Network of Expertise on Animal Influenza (OFFLU). Both experts of the public and animal health sectors were consulted with during the so-called swine flu outbreak. Since the 2009 influenza A (H1N1) pandemic, the OFFLU has broadened its scope to address all types of influenza virus that infect animals, and its name was later changed to OIE-FAO Network of Expertise on Animal Influenza, instead of only on Avian Influenza.
investigation report conducted by the *British Medical Journal (BMJ)* also criticized WHO for failing to avoid conflicts of interest during its policy making, because several experts in WHO’s advisory body had done paid work for vaccine manufacturers such as Roche and GlaxoSmithKline (Godlee 2010, Cohen and Carter 2010). Activists also criticized the WHO and other international agencies for “using their international stature, access to governments and control over the flow of donor funds to advance corporate agendas” (GRAIN 2007).

WHO’s Director General, officials, and spokespersons robustly dismissed these accusations. They argued that the decisions, albeit imperfect, were soundly grounded in available epidemiological and virological data. Specifically, the WHO refuted these allegations by emphasizing the unpredictable nature of influenza:

“…influenza viruses are unstable and can undergo rapid and significant mutations, making it difficult to predict whether the moderate impact would be sustained. This uncertainty, which persuaded WHO and many national health authorities to err on the side of caution, was further enforced by the behaviour of past pandemics, which varied in their severity during first and second waves of international spread” (WHO 2009c).

Furthermore, the WHO insisted that safeguards were in place to prevent corporate influence and conflicts of interests, though the agency continued to conceal the information for months. Although the WHO asked members of its vaccine advisory group (SAGE) to declare all financial interests,\(^\text{120}\) this information was not made public. It was not until the pandemic was declared over that the WHO finally released the names of the members of the Emergency Committee, in August 2010.

\(^{120}\) The WHO request SAGE consultants to declare all their professional and financial interests, including funding received from pharmaceutical companies, consultancies or other forms of involvement in relevant commercial activities.
In response to external criticism, the WHO also launched an investigation conducted by its International Health Regulations (IHR) Committee. In its final report released in May 2011, this review committee concluded that, in general, the WHO performed well during the pandemic. It reported that the committee “found no evidence of malfeasance” regarding WHO’s pandemic responses (WHO, 2011: 11). However, the report also identified five factors that affected the events, highlighting the unpredictability of the disease and the limitations of this international agency which struggles to fulfill different roles. This report subsequently recommended the WHO strengthen its capacity for pandemic actions, and improve its guidelines and practices for future decision-making.

This chapter has no intention of debating whether wrongdoing occurred during the 2009 H1N1 pandemic. Rather, it aims to explain contradictory views between WHO experts and external critics on appropriated pandemic responses. Why did the WHO and its bureaucrats consider withholding the names of advisors unavoidable or even necessary? Why did they perceive consultants’ potential conflicts of interest acceptable or even unavoidable? I argue that WHO’s newly constructed pandemic response embodies expert dominance in risk assessment and solution provision, therefore the agency normalized lack of transparency in its consultation and deliberation processes. Additionally, I argue that the increasing importance of pandemic vaccines further reinforced centralized chain of command and lack of transparency. WHO’s controversial responses therefore were culturally and systematically made, due to its centralized and insulated decision-making model revolving around the artifact – influenza vaccines.

**Theoretical standpoint: Organizational decision-making and pandemic vaccines**

My perspective differs from a disease-centered explanation, as the WHO offered, which simply blames the inherent unpredictability of influenza viruses. My approach also

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121 The five factors include 1) Core values of public health; 2) Unpredictable nature of influenza; 3) Threat of avian influenza A (H5N1) and how it shaped general pandemic preparedness; 4) WHO’s dual role as a moral voice for health in the world and as a servant of its Member States; and 5) Limitations of systems that are designed to respond to a geographically focal, short-term emergency, rather than a global, sustained, long-term event. (WHO, 2011: 10)
diverges from a conventional individual-level explanation, attempting to discover whether any bureaucrat has deceived, distorted, or failed to conform to regulations. Rather, I intend to explain WHO’s controversial reactions by examining assumptions in its organizational decision-making process. Studies have found that organizational failures can be systematically made. For example, bureaucratic culture, blind spots, and routines can result in organizational inertia (Eden 2004, Vaughan 1996, MacLean 2008, Savelsberg 2010: 25-36).

I theorize an organizational approach and the concept of “inherently political technologies” (Winner 1986). I intend to show that technology and organizational decision-making models are interconnected. In addition to looking into the organizational decision-making process, I aim to highlight the characteristics of this process when it involves a specific artifact like pandemic vaccines. According to Winner (1986), technologies have political qualities: they can embody specific forms of power and authority. He argues that technologies and their use are inherently political because their very creation and operation requires specific social arrangements. Therefore, the conception, design and production of any artifact often create social order. In Winner’s explanation, the political qualities can be both intended and unintended. One example he provides to illustrate the unintended result is power generation. Nuclear power requires operations in large-scale centralized plants, while solar energy is more compatible with democratic, egalitarian social political systems (Winner 1986). Research suggests that centralized political authority corresponds to large-scale technologies, such as irrigation.

Linking an organizational approach with Winner’s concept of “inherently political technologies,” I argue that the WHO developed a centralized decision-making mechanism for responding to pandemic risk assessment and vaccine deployment. This centralization, though efficient, led the WHO to normalize lack of transparency and to neglect reinforcing safeguards. My analysis focuses on two consultation groups – the Emergency Committee which declared the pandemic, and the Strategic Advisory Group of Experts (SAGE) on Immunization which authorized vaccine development and
deployment. I will first illustrate how these mechanisms are designed to be centralized as the WHO gradually escalated its authority in pandemic preparedness. Following that, I will illustrate how the centralized and expert-dominated characteristics of WHO’s decision-making process rationalized the agency’s controversial pandemic responses during the H1N1 outbreaks.

**WHO’s escalating political authority in pandemic preparedness and response**

In the past decade, WHO generally elevated its role in health governance and pandemic responses due to increasing threats and crises from infectious diseases. Outbreaks of severe acute respiratory syndrome (SARS) and H5N1 avian influenza, for example, attracted enormous global attention to pandemic threats. These outbreaks also revealed WHO’s incapacity to track and demand crucial outbreak information in time to respond to these threats. To address these weaknesses, the WHO began to develop pandemic response guidelines intended to direct global actions. Its first *Influenza Pandemic Plan* was published in 1999. It identified the responsibility of the WHO and member countries in different phases of an influenza pandemic.

Besides the *Influenza Pandemic Plan*, the ratification of revised *International Health Regulations* (IHR) in 2005 increased WHO’s authority in global infectious disease surveillance and response by securing it a more forceful role.\(^{122}\) After the IHR (2005) took effect in 2007, the WHO could demand any information regarding global health threats from its member states, rather than begging for it. The WHO also twice revised its pandemic influenza plan, in 2005 (WHO 2005a) and 2009 (WHO 2009a)\(^{123}\)

\(^{122}\) The previous version of IHR (1969) only required member countries to report outbreaks of cholera, plague, and yellow fever. The IHR (2005) not only expanded the list of diseases but also permit the WHO to demand information crucial to the public health from member countries.

\(^{123}\) This 2009 revision went through nine drafts, from working group meeting, drafting, and revising, to incorporating comments. In November 2007, WHO convened the first meeting of the Pandemic Preparedness and Response Guidance Revision Working Group in Geneva, Switzerland. It convened experts in the field of communicable diseases and influenza, emergency and pandemic planning, and communications from national and international technical institutions, UN/international organizations and WHO staff from headquarters, regional and country offices to identify areas requiring updating. This
WHO’s continuous updates of the global pandemic response guidelines revealed mounting fear of a pandemic. These revisions not only reflected WHO’s increased authority, but also rapid technological and scientific developments, such as accumulated understanding of influenza viruses and new techniques for vaccine development and laboratory diagnosis.

With the revisions on the IHR (2005) and pandemic response guidelines, the WHO obtained substantial authority to coordinate global pandemic responses. The agency established a pandemic response model that utilizes a centralized deliberation and response mechanism. By centralized mechanism, I mean a mechanism in which only limited individuals make decisions and provide solutions for the entire system. For example, the WHO became the most influential actor, conducting surveillance and analyzing the risks for the world. The pandemic preparedness plan also allows WHO’s Director General to declare a “public health emergency of international concern” (PHEIC) and to issue temporary recommendations in extraordinary circumstances. According to the IHR (2005), the Director General can convene a meeting of the IHR Emergency Committee to assess situations of emergency and to advise on responses. Thus, the WHO established greater power in coordinating and directing pandemic responses.

Since IHR’s (2005) ratification, the WHO functions like what I call “the brain” in the global system. The agency processes surveillance data submitted worldwide, develops recommendations, and sends feedback to its nerve ends (member states). The WHO specified that pandemic responses aim to ensure societal and economic continuity, to provide essential services, and to contain outbreaks at early phases during a pandemic. Governments therefore were encouraged to draft their own national pandemic working group, by creating five task forces, developed the strategic policy document which emphasizes a “whole-of-society” approach to pandemic preparedness and communications.

124 Other crucial documents included the Global Agenda on Influenza Surveillance and Control of 2001 and the WHO checklist for influenza pandemic preparedness planning of 2005
125 Essential services include water, fuel, food, health care, telecommunication, and transportation, etc.
preparedness plans, following the scenario-based pandemic preparedness plans that the WHO’s advisors developed. WHO’s pandemic response logic illustrates what Lakoff (2010) calls a global health security regime that attempts to manage emerging infectious diseases by creating a global disease surveillance system as well as rapidly delivering vaccines.\textsuperscript{126} This global health security regime embodies WHO’s central role in both assessing pandemic risks and coordinating vaccination campaigns, which I depict in the following sections.

**Constructing and assessing pandemic risks**

Since the escalation of WHO’s responsibilities, this agency has begun to construct the social expectations and technical criteria of a pandemic. The WHO published and revised pandemic preparedness guidance, which defines pandemic phases and guides the WHO and national governments’ actions. Although the WHO claimed that the criteria for pandemics were objective and difficult to bend, these criteria proved to be man-made and subject to change. The pandemic phases have been adjusted twice to incorporate lessons learned from SARS and avian flu. Table 7.1 summarizes definitions of pandemic phases in different editions.

\textsuperscript{126} Lakoff (2010) contracts the global health security with a humanitarian biomedicine regime. While the first regime develops prophylaxis against potential threats, humanitarian biomedicine regime seeks to bring pharmaceutical interventions addressed to “neglected diseases.”
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<td>No human infection</td>
<td>Interpandemic Period: Phase 0</td>
<td>Interpandemic period: Phase 1</td>
<td>Phase 1 (preparedness)</td>
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<td>No indications of any new virus type</td>
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<td>No animal influenza virus circulating</td>
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<td>have been reported</td>
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<td>among animals has been reported to</td>
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<td>cause infection in humans</td>
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<td>Interpandemic period: Phase 2</td>
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<td>No human infections, but one animal</td>
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<td>influenza virus poses a substantial</td>
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<td>risks to humans</td>
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<td>Rare human infection cases</td>
<td>Interpandemic Period: Phase 0, level 1</td>
<td>Pandemic alert period: Phase 3</td>
<td>Phase 2 (preparedness)</td>
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<td>Rare human cases</td>
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<td>An animal influenza virus circulating</td>
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<td>in domesticated or wild animals is known</td>
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<td>specific potential pandemic threat</td>
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<td>Localized outbursts in</td>
<td>Interpandemic Period: Phase 0, level 2</td>
<td>Pandemic alert period: Phase 4</td>
<td>Phase 3 (preparedness)</td>
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<td>humans</td>
<td>Limited human transmission</td>
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<td>An animal or human-animal</td>
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<td>influenza reassortant virus has caused</td>
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<td>sporadic cases or small clusters of</td>
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<td>disease in people, but has not resulted</td>
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<td>in human-to-human transmission</td>
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<td>sufficient to sustain community-level</td>
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<td>outbreaks</td>
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<td>Several localized</td>
<td>Interpandemic Period: Phase 0, level 3</td>
<td>Pandemic alert period: Phase 5</td>
<td>Phase 4</td>
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<td>outbreaks in a country</td>
<td>Spread in general population</td>
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<td>Human-to-human transmission of an</td>
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<td>animal or human-animal influenza</td>
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<td>community-level outbreaks has been</td>
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<td>Outbreaks in</td>
<td>Pandemic period: Phase 1</td>
<td>Pandemic period: Phase 6</td>
<td>Phase 5</td>
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<td>several countries</td>
<td>Outbreaks in multiple countries</td>
<td>Spread in general population</td>
<td>The same identified virus has caused</td>
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<td>sustained community level outbreaks in</td>
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<td>two or more countries in one WHO region.</td>
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<td>Widespread</td>
<td>Pandemic period: Phase 2</td>
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<td>Phase 6</td>
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<td>outbreaks in</td>
<td>Outbreaks in multiple regions</td>
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<td>The virus has caused sustained</td>
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<td>several regions</td>
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<td>community-level outbreaks in at least</td>
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<td>one other country in another WHO region.</td>
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<td>Drops in outbreaks</td>
<td>Pandemic period: Phase 3</td>
<td>Post-Pandemic Period: Phase 4</td>
<td>Post-Peak Period</td>
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<td>The increase in outbreak activity in the</td>
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<td>Levels of pandemic influenza in most</td>
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<td>initially affected countries or regions</td>
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<td>countries with adequate surveillance</td>
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<td>has stopped or reversed, but outbreaks</td>
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<td>have dropped below peak levels.</td>
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<td>and epidemics of the new virus</td>
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<td>are still occurring elsewhere.</td>
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<td>Possibility of</td>
<td>Pandemic period: Phase 4</td>
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<td>Possible New Wave</td>
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<td>reoccurrence</td>
<td>Next wave</td>
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<td>Levels of pandemic influenza in most</td>
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<td>countries with adequate surveillance</td>
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<td>is rising again</td>
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<td>Disease occurrence at a</td>
<td>Post-Pandemic Period: Phase 5 (Return to</td>
<td>Post-Pandemic Period: Phase 5 (Return to</td>
<td>Post-Pandemic Period</td>
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<td>season level</td>
<td>interpandemic period Phase 0)</td>
<td>interpandemic period)</td>
<td>Levels of influenza have returned to</td>
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<td>the levels seen for seasonal influenza</td>
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<td>in most countries with adequate</td>
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<td>surveillance</td>
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Table 7.1 Pandemic phases in different editions of *Influenza Pandemic Plan*
Comparing the three versions of the pandemic preparedness guidance, I found that the WHO regrouped and redefined pandemic phases to increase alertness at ever earlier stages. Specifically, preemptive interventions became more and more emphasized through the revisions. For example, what were previously labeled as “interpandemic” or “pandemic alert” periods are currently labeled as an early phase of a pandemic cycle. Even if a pandemic is not yet announced, the WHO begins to prepare for and recommends its member states ready for pandemic occurrence at all times. In addition, the WHO recognized in the latest edition that its new phase definitions “only loosely correspond to pandemic risk” (2009a: 24), because the risk in the early stage is simply unknown.

In addition, during the revisions, severity gradually became less relevant for declaring a pandemic. In the original edition (WHO, 1999), pandemic phases were identified by geographical spread across countries, as well as the morbidity caused by a viral strain. The WHO would declare a pandemic when more countries than one experience outbreaks “with consistent disease patterns indicating that serious morbidity and mortality is likely in at least one segment of the population” (1999: 14). However, experiences with H5N1 virus strains influenced the WHO and influenza experts to presume that novel strains originating from animals to which humans are not immune were dangerous. Since the 2005 version, the WHO began to emphasize monitoring animal viral strains with human pandemic potential in “rate of transmission, geographical location and spread, severity of illness, presence of genes from human strains (if derived from an animal strain), and/or other scientific parameters” (2005: 6). WHO therefore began to assess the pandemic potential of animal influenza viruses by coordinating with the FAO and OIE. The 2009 edition primarily maintains very a similar pandemic threshold – outbreaks in two or more countries. However, multiple-factor criteria for a pandemic in previous versions seemed to fade away in this new edition. The virulence of the virus was presumed. The WHO claimed that its adjustment of pandemic phases made the criteria “easier to understand, more precise, and based upon observable phenomena” (WHO, 2009: 24). The WHO mentioned fatality rate, unusually severe morbidity, unexpected mortality patterns, and
unusual complications (2009: 23), but it was unclear how the WHO and advisory experts would assess pandemic severity based on these indicators. That a new virus strain has pandemic potential and requires preemptive response is taken for granted.

The WHO’s changes in pandemic criteria illustrates its escalating power in global pandemic preparedness, and its attempt to efficiently prevent a global flu pandemic. First, WHO constructed the social expectations of a pandemic. As Jasanoff states, “Risk is a product of human imaginations – disciplined and conditioned projection of archived historical memory onto the blank screen of the future” (Jasanoff 2010: 15); the WHO contributed to these human imaginations. WHO’s pandemic preparedness guidelines gradually consolidated the human expectations of a pandemic, primarily a H5N1-like lethal pathogen (Durodie 2011, Doshi 2011). Although WHO claims that the criteria of a pandemic are objective, what constitutes the threshold is actually man-made, shifting, and open to interpretation by WHO’s appointed advisors. Besides, these “observable” measures of a pandemic, such as transmission rate and geographical spread, can only be analyzed with congregated data, which is conducted and collected by the WHO through its surveillance networks across member states. The WHO has become the most authoritative actor in the assessment and declaration a global pandemic.

Second, since the 2005 edition, the Influenza Pandemic Plan has permitted the WHO to declare, upscale and downscale phases in nonsequential order. This agency has the authority to identify what to monitor, how to assess the risk, determine what phase it is in, and how the international society should respond to the perceived risks. Specifically, the IHR (2005) assigns the task of assessing risks and advising solutions to an Emergency Committee, selected by the WHO’s Director General during a pandemic situation. The phase of a suspected pandemic could not be determined without the WHO, which assigned experts to assess the situation for the rest of the world.

Third, the WHO’s guidance has increasingly made mass vaccination the first and foremost strategy for pandemic influenza. Vaccines are regarded as the most important device to prevent and control the spread of a pandemic. Although the WHO also
encouraged the involvement of all sectors and employed nonpharmaceutical strategies, it often admitted that these nonpharmaceutical strategies were mostly useful in that they allowed more time for vaccine development. Generally, the escalation of WHO’s responsibilities illustrates this agency’s substantive capacities and power in global governance. It shows WHO’s autonomy and learning ability. By revising the IHR (2005), the WHO became a powerful actor in global health governance which challenged national sovereignty during a pandemic. In addition, the WHO revised pandemic preparedness guidance to incorporate lessons learned from H5N1 outbreak control. This agency shows the capacity to renovate itself. In the next section, I discuss how rapid deployment of vaccines during a pandemic situation further reinforced WHO’s centralized decision-making mechanism in response to global pandemic threats.

**Deploying pandemic vaccines**

Not only does WHO’s pandemic assessment rely on a centralized and expert-dominated system, the desire for pandemic vaccines further reinforced this centralized model. Recent advances in biomedical technology increased WHO’s inclination to quickly deploy antivirals and vaccines during a pandemic. However, although seasonal flu vaccination has been implemented for decades, mass vaccination to prevent a pandemic is a fairly new strategy. Until a decade ago, technical difficulties and limited manufacturing capacity constrained its development. During H5N1 outbreaks, WHO and public health experts frequently warned that vaccines are the most important device for controlling a pandemic flu because few people would have immunity to a novel viral strain. Nevertheless, experts also warned that meeting global vaccine needs during a pandemic was unlikely due to technical barriers. For example, developing and manufacturing a vaccine used to take nine to twelve months. Influenza viruses continuously mutate, unlike microbes or other kinds of viruses that are relatively stable. For an influenza vaccine to be effective for specific viral strains, it can only be produced after the identification of these strains, thus after the pandemic hits. A pandemic vaccine therefore might only be available months after a pandemic started.
Another technical barrier involves conventional production methods and technologies. The traditional production method, using eggs as the culture medium, was inappropriate for avian flu viruses and time-consuming. The H5N1 virus, for one, was found to kill the chicken embryo. Even applying a new method, called “reversed genetics” to produce vaccine, it was still unlikely to produce enough vaccines for the entire global population in a short time. The WHO claimed that deploying pandemic vaccines was challenging, thus, in its early pandemic preparedness plan, the WHO recommended control measures other than vaccines (1999: 7)

Technical difficulties, however, have been greatly reduced due to tremendous investments in vaccine research since H5N1 influenza outbreaks. For instance, advances in biotechnology, such as reverse genetics and cell-based culture medium, allow for faster production of vaccines. Some researchers are also working on developing vaccines that stimulate cross-immunity for different influenza strains. Due to these advances, the WHO and public health experts consider global pandemic vaccines feasible. Scientific achievements encouraged the WHO to incorporate vaccine deployment plans into its later-published pandemic preparedness guidance. The WHO also released a number of documents regarding pandemic vaccines, such as *WHO Guidelines on the Use of Vaccines and Antivirals during Influenza Pandemics* (WHO 2004c).

Pandemic vaccines, as a technological artifact, therefore embody a centralized coordination and response mechanism. The attempt to immunize large populations in a short time reinforced WHO’s crucial role in vaccine production, distribution and administration. This agency has become heavily involved in pandemic vaccination programs. WHO’s pandemic vaccination campaign was built on its seasonal flu vaccination system – Global Influenza Surveillance Network (GISN). The WHO Global Influenza Surveillance Network (GISN), comprised of reference laboratories and collaborating centers of WHO’s member countries, monitors influenza viruses around the world throughout the year and selects candidate strains for seasonal flu vaccines. By design, the GISN is an exclusive and expert-dominated system. Since its establishment in
1952, the GISN has collected, analyzed and identified candidate viral strains for seasonal influenza biannually. Although all member states’ influenza centers submitted influenza strains to the WHO, only a few institutes participated in the analysis and selection processes in its bi-annual meetings. This included experts from four Collaborating Centers in Australia, Japan, the United Kingdom, and the United States, as well as representatives of a handful of national drug regulatory agencies (such as the CDC of the US), and influenza vaccine manufacturers.

To expedite vaccine development during emergencies, the WHO exploits this well-established Global Influenza Surveillance Network (GISN) model. During a pandemic, the agency can further accelerate the process of selection, development, review, and distribution of vaccine viruses. For instance, the pandemic response plan assigns the WHO the responsibility of recommending the switch from seasonal to pandemic vaccine production. It permits the WHO to transfer the candidate viral strains to manufacturers. To make vaccine production timely, the WHO can also recommend producing pandemic vaccines parallel to the declaration of a pandemic. That is, switching to pandemic vaccine production could be initiated independently of the formal declaration of a pandemic (WHO 2009).

In later pandemic preparedness guidance, the WHO takes a more active role in vaccine manufacturing and evaluation. For instance, the guidance obligates the WHO to coordinate the selection of the candidate strain for vaccine production. The WHO also developed Material Transfer Agreements (MTAs) for virus transfer to be used by manufactures. For example, during the H5N1 flu outbreaks, WHO’s collaborating centers were allowed to freely share candidate strains with vaccine producers without informing the countries where the viruses originated.¹²⁷ Neither did WHO regulate the patent claims of virus strains or for-profit products derived from the jointly collected viruses. After avian flu outbreaks, the WHO insisted it was necessary to “make available a vaccine

¹²⁷ This practice was challenged by the Indonesian government, for benefiting vaccine companies without sharing the benefits with developing counties where the virus was collected.
strain to all vaccine companies…and so to have a vaccine available should this species-hopping virus manage an even more alarming leap: from one human host to the next.\textsuperscript{128}

The centrality in the strain selection process increases the power and authority of not only the WHO, but also affiliated institutes and experts. For example, critics disparaged WHO for failing to assure equitable sharing of benefits from vaccine in GISN (Hammond 2009). Several WHO GISN collaborative laboratories and pharmaceutical companies, including the Centers for Disease Control (USA) and St. Jude’s Children’s Research Hospital, also claimed patents on virus strains or vaccines technologies.

Moreover, the WHO intended to fulfill urgent need for vaccines by expediting the requalification of pandemic vaccines during emergencies. For the sake of efficiency, the WHO assigned itself a crucial role in evaluating vaccine quality and assuring vaccines are produced under Good Manufacturing Practices (GMP). Based on the guidance, the WHO can expedite the process of review, selection, development, and distribution of vaccine viruses for production, vaccine potency, testing reagents, and preparations (WHO 2009).

Furthermore, to make vaccines available to the world’s most vulnerable populations, the WHO assigned itself the ability to mobilize vaccine donation and to coordinate global deployment of these vaccines during a pandemic. The WHO is the crucial mediator between production and consumption. On the one hand, WHO urged the handful of manufacturers to donate vaccines and antivirals during emergencies. On the other hand, during the influenza A (H1N1) pandemic, the WHO developed a Letter of Agreement to be signed by recipient governments as a condition for receiving vaccines. This Letter of Agreement includes being aware of limited liability granted to the manufacturers under the pandemic situation (WHO 2012b: 9).

\textsuperscript{128} The statement by Klaus Stöhr, Director of the WHO influenza program, in quoted from a news report in \textit{Science}, 299 (5612): 1504 in 2003.
In expectation of a shortage of vaccines and antivirals during a pandemic, the WHO recommended national governments stockpile antiviral drugs and initiate large-scale vaccination as soon as vaccines became available. The agency also recommended and encouraged that national governments determine priority populations to receive the vaccines and anti-viral drugs. To improve fair distribution and quick delivery of these biomedicals, the WHO also established a global stockpile of anti-viral drugs\textsuperscript{129} and a project to facilitate vaccine delivery by investing in temperature-controlled supply chains.\textsuperscript{130}

As I have shown, vaccine strategies, by design, are conducted in a centralized, exclusive, and expert-dominated chain of command. In this system, the WHO is the primary decision-maker. Advisory groups relevant to pandemic vaccines, such as the GISN and the Strategic Advisory Group of Experts (SAGE) on Immunization, are either institutionally based or WHO-appointed. These consultation mechanisms constrain opportunities for external experts to participate in the selection, development, and evaluation of pandemic risks and vaccines. Some experts, such as veterinarians affiliated with the OIE and FAO, Ilaria Capua and professor of medicine Steven Salzberg at Johns Hopkins University, have criticized WHO’s exclusive mechanisms. Steven Salzberg, for example, said that

“…this practice stands in stark contrast to the genome-sequencing community, which realized at least ten years ago that society reaps the greatest benefit when scientific data are shared rapidly and openly.” (Salzberg 2008).

\textsuperscript{129} For example, tamiflu, an anti-viral drug manufactured by Switzerland’s Roche, was considered critical for treating human infections.

\textsuperscript{130} WHO and UNICEF initiated a project, funded by a grant from the Government of Japan, to support national capacity to deliver pandemic vaccine, including national assessment and strengthening of EPI cold chain and logistics capacity to enable rapid distribution of pandemic vaccine, and the development of mathematical models to build tools to facilitate the decision making process on how to use limited supplies of pandemic vaccines.
To conclude, a pandemic vaccine cannot be quickly developed, manufactured, and deployed without WHO’s coordination. Besides WHO’s involvement, pharmaceutical companies’ participation is also necessary. Over the years, the WHO has developed collaborative and interdependent relationships with the vaccine research community and pharmaceutical industry. The WHO has shared virus samples with manufacturers, persuaded them to donate biomedicines during a pandemic, and provided manufacturer liability protection for expedited vaccines. The development, manufacture, and use of vaccines therefore consolidated the authority and power of the agency and vaccine manufacturers. The consultation mechanism for vaccination campaigns embodies a centralized social order that illustrates the political qualities of a technical artifact that Winner (1986) highlights. In the next section, I show how the increasing centralization in assessing risks and deploying vaccines normalized WHO’s lack of transparency in the 2009 H1N1 influenza pandemic.

**WHO’s responses in 2009: Accustomed, accepted and normalized lack of transparency**

Now let us trace how WHO reacted to the influenza A (H1N1) pandemic in 2009. Specifically, I intend to illustrate how the WHO, although conforming to its recently established and revised guidance, normalized lack of transparency in its deliberation mechanism. To increase efficiency during emergencies, WHO’s highly centralized mechanisms exempted the decision-making processes from scrutiny. For example, the WHO deliberately concealed the names of emergency committee members from public knowledge, arguing that doing so shields them from being influenced. Additionally, the WHO considered SAGE experts’ links with manufacturers unavoidable and justifiable.

During the influenza A (H1N1) 2009 pandemic, risk assessment and vaccine strategies were conducted by two advisory committees respectively – the Emergency Committee and the SAGE Ad hoc Policy Advisory Working Group on Influenza A (H1N1). Both consultation bodies were appointed in response to the H1N1 influenza threat.
These two groups were appointed at about the same time. On April 25, the WHO Director General convened the Emergency Committee (EC), which was the first time such committee was established since the IHR (2005) was ratified. According to the WHO, it appointed the advisors of the Emergency Committee based on expertise and experience. However, the IHR (2005) does not specifically require the WHO to safeguard against conflicts of interest. Although WHO requested the members disclose any conflicts, no procedures were in place to require the WHO to use the information to scrutinize their qualifications or to publicize this information. Between April and May, this committee assessed the risks and continuously scaled up the phase of pandemic status from Phase 3 to Phase 5 based on the geographical spread of H1N1. On 11 June 2009, the WHO declared that an influenza pandemic was underway (Phase 6), because sustained human-to-human transmission was occurring in two or more WHO regions.

On a different front, decisions to develop H1N1 vaccines were made before the pandemic was declared Phase 6 on 11 June 2009. The SAGE Ad hoc Policy Advisory Working Group on Influenza A (H1N1) Vaccines first convened on 29 April 2009, two days after WHO’s first teleconference with influenza experts from core GISN laboratories. Arguing that pandemic vaccine development was an urgent task, the WHO did not make a public call for nominations for this specific SAGE working group. Instead, it simply invited representatives of SAGE, the WHO Global Advisory Committee on Vaccine Safety, and the Expert Committee on Biological Standardization. WHO’s pandemic response formulation is fairly centralized. Between the Emergency Committee (13 external advisors) and the SAGE Ad hoc Working Group (16 external advisors), three experts served on both groups. Most advisors from these two groups were either recruited from WHO’s collaborative centers or they were already serving on other advisory committees,

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131 According to the 2009 edition, the WHO can initiate planning and actions to switch from seasonal to pandemic vaccine production in phase 4.

132 The three experts are: Professor Neil M. Ferguson (UK), Dr Supamit Chunssuttiwat (Thailand), and Dr Nancy Cox (USA).
such as WHO Global Advisory Committee on Vaccine Safety and WHO Expert Committee on Biological Standardization.

It seems that to the WHO, the very feature of centrality and the influence of the Emergency Committee legitimized its decision to conceal the names of the members. Despite suspicions of conflicts of interest between consultants and the industry since late 2009, the WHO continuously refused to release the names of Emergency Committee members. The WHO claimed that releasing the names and interests of these members hampered pandemic responses. The agency argued that keeping the names secret prevented these experts from being “lobbied or pressured for commercial or political reasons, potentially compromising the objectivity of their advice” (WHO 2009c).

Some members supported WHO’s reasoning, such as Professor Mackenzie from Australia:

“I think very strongly that ... the Committee should be anonymous, having served with WHO over SARS (Severe Acute Respiratory Syndrome) and knowing the kind of pressure people are under both from pharma [and] from companies wanting to do diagnostics and so on, as well as countries themselves concerned about what’s happening, do they have the right diagnostics and so on? The pressure the EC could be under would be enormous, and I think the anonymity, if you like, of the Committee is absolutely essential for those conditions ... I think that although it’s not actually written as part of the terms of reference of the EC, in terms of Articles 48 and 49, I think it would be useful if that, in fact, was part of the actual documentation.”(WHO 2012b: 79).

Besides quickly identifying H1N1 as a pandemic, the WHO was fast to initiate actions to develop and deploy H1N1 pandemic vaccines. The speed of vaccine production during the H1N1 pandemic was unparalleled in the history of global health governance. A primary reason for WHO’s enthusiasm was the new ability to produce vaccines quickly.
The WHO frequently claimed that this was the first time the public could use vaccines in advance to prevent a pandemic:

“Finally, stockpiles of antiviral drugs and other essential supplies are now a reality, new approaches to influenza vaccine development are under way and a Global Vaccine Action Plan has been devised to increase the supply of pandemic vaccine” (WHO 2009a: 8).

WHO’s Director General Chan made tremendous efforts to initiate a global vaccine campaign during the H1N1 influenza pandemic. She noted that, “Many of the developing countries have weak health systems. …They actually go into this pandemic what I call empty-handed. They don't have antivirals. They don't have vaccines. They don't have antibiotics.” The Director General thus insisted on making the vaccine more widely available.

During the pandemic, the WHO, advised by the SAGE Working Group, was involved heavily in the global vaccination campaign. By early May, samples of the H1N1 virus had been quickly shared with manufacturers in Europe or the USA. Between May and August, manufacturers, reference laboratories and regulatory agencies worked on modifying the candidate virus strains and developing standardized measurement for vaccine potency. After SAGE consultants concluded that the pandemic was unstoppable, the WHO soon announced that all nations needed access to vaccines that were supposed to be manufactured within months. In addition, the WHO initiated special fast-track mechanisms for approval and licensing of H1N1 vaccines. Because nations have different regulatory requirements for licensing vaccines, and some countries require full registration including clinical trials, the WHO actively expedited the qualification process. Within three months of the outbreak, eight pandemic H1N1 vaccines had been prequalified.

In addition, WHO also actively resolved issues associated with pandemic vaccination, such as intellectual property and liability issues. Major vaccine manufacturers have lobbied for patent rights by establishing an association, the International Federation of Pharmaceutical Manufacturers and Associations (IFPMA). The IFPMA argued that protecting and globalizing intellectual property rights ensures research interests. In addition, the IFPMA claimed that inevitable adverse reactions in any vaccine program would discourage manufacturers from producing vaccines if they suffer from financial liability. During the Pandemic (H1N1) of 2009, manufacturers such as Baxter International, GlaxoSmithKline (GSK), Novartis, Sanofi-Aventis and AstroZeneca requested legal immunity from lawsuits resulting from their pandemic vaccines. In the US and Europe, specific regulatory procedures have been devised to expedite the approval of pandemic vaccines (WHO 2009b).

Further, WHO’s attempt to make the vaccine more widely available legitimizes the ties between the agency, the pharmaceutical industry, and researchers. To make vaccines and antivirals available to developing countries, the WHO established a Pandemic Influenza A (H1N1) Vaccine Deployment Initiative in September 2009. Through this initiative, the agency managed to pledge that donors (the World Bank), countries (the US, Australia, Brazil, France, Italy, New Zealand, Norway, Switzerland the United Kingdom), NGOs (Bill and Melinda Gates Foundation), and pharmaceutical companies (GlaxoSmithKline, Sanofi-Aventis) to donate pandemic H1N1 vaccine supplies to low- and middle-income countries. By October, this Initiative delivered over 78 million doses of pandemic H1N1 vaccine to 77 countries (WHO 2012a: V). Of the recipient countries, seventy-five percent required WHO prequalification as part of local registration or exemption from it. These countries also signed the Letter for Agreement developed by the WHO which granted vaccine makers legal immunity from lawsuits that resulted from these new swine flu vaccines.

The attempt to increase efficiency made the WHO sacrifice transparency. The urgent need and desire for pandemic vaccines influenced the WHO to loosen its safeguards.
Although the WHO asked experts invited into its advisory groups to declare their professional and financial interests, no procedures were in place to make these declarations publicly accessible. Further, the need for manufacturers’ cooperation and involvement in vaccine campaigns normalized the participation of for-profit pharmaceutical companies in the decision making process. The WHO considered the ties between biomedical experts and pharmaceutical manufacturers inevitable, due to the technical-laden and resource-demanding nature of vaccine development and manufacturing. The vaccine manufacturing industry is tightly concentrated and powerful. Only a little more than a dozen pharmaceutical companies based in the US and Europe produce more than ninety percent of global seasonal influenza vaccine supply (WHO 2004b: 9). These companies also have access to patents of the artifact. For example, Baxter International has the patent on the process of using cell culture to produce vaccines. This handful of pharmaceutical companies, including Becton, Dickinson and Company, CSL Limited, GlaxoSmithKline Biologicals, Novartis Vaccines and Diagnostics, and Sanofi Pasteur, thus, has become increasingly powerful in pandemic preparedness. To the WHO, producing large-scale vaccines without the participation of these manufacturers was implausible.

Hence, rather than constraining market-driven behaviors, the WHO intentionally created incentives for manufacturers to invest in pandemic vaccine research. The WHO recognized that these pharmaceutical companies are for-profit actors. For example, the WHO argued that improving the infrastructure for seasonal influenza would facilitate pandemic vaccine manufacture during a pandemic, because the manufacturers would have greater capacity to quickly scale up production. The WHO therefore encouraged nation states to use more seasonal vaccines each year to provide the incentives for the manufacturers and to strengthen the industry’s production capacity. One of WHO’s

134 The most acceptable cell line that is able to implement the reverse genetics method to produce influenza vaccine, the African green monkey kidney cell line, is the property of pharmaceutical companies.

135 In WHO’s Global Action Plan for Pandemic Influenza Vaccine (GAP), the agency recommends 1) increasing use of seasonal influenza vaccine to create market-driven production; 2) increasing production
high-level officials commented on manufacturers demanding vaccine patents by recognizing that:

“It’s been a very tough issue. The reality is that not many companies are able to make vaccines. WHO cannot ask them to produce these vaccines for free. They are for-profit companies, and we have to respect that.” (W9-2008)

WHO officials considered advisors’ affiliation with the pharmaceutical industry practically unavoidable, since the industry is a crucial actor in its pandemic preparedness plan. For example, the WHO claimed that “advice from top experts is sought by industry as well as by agencies like WHO that needs to issue guidance based on the best expertise” (WHO 2009c). In a newspaper interview, one WHO spokesman elaborated: “It would be surprising if they [top experts] didn't [have any affiliation with the industry] because the best experts are sought by all organizations” (Stein 2010). As such, experts’ affiliation with the pharmaceutical industry is regarded as normal. Conversely, WHO officials can be sought after by the pharmaceutical industry. For example, Dr. Klaus Stöhr, former head of WHO’s Global Influenza Program, became the Vice President and Global Head of the Influenza Strategy Liaison for Novartis Vaccines and Diagnostics, the world’s number two flu vaccine producer.

WHO’s plan for risk assessment and vaccine deployment not only made the agency the central and primary decision maker, but the demand for expert advice in deploying a technical-laden artifact further pushed the agency to take the lack of transparency and corporate involvement for granted. Its centralized consultation mechanisms prevented outsiders and the international society from evaluating the decision-making situation. In addition, the mechanisms, as proved during the H1N1 pandemic, normalized the presence and power of market interests in the deliberation process. The WHO generally downplayed potential conflicts of interests by pharmaceutical companies. When there are capacity for pandemic vaccines independently of seasonal vaccine demand; and 3) promoting research and development for new technologies. Each of these strategies aims to create the market and incentives for the manufacturers. See http://www.who.int/influenza_vaccines_plan/en/.
only a handful of consultants allowed to analyze, interpret and evaluate relevant information, the possibility for the international society to know and make well-informed decisions during a pandemic is systematically undermined. Further, the exclusive power of experts recruited in the centralized system led the WHO to justify its concealment of the identities of advisors. The WHO argued that only by concealing the names can it prevent these experts from being influenced. The possibility that the industry and WHO consultants may have already established collaborative relationships through the GISN system, and that the concealment may only prevent the relationships from being examined, was not considered. It was not until after the media suspected that the WHO exaggerated the pandemic risks, that the agency admitted that it failed to publish potential conflicts of interest, and it “regrets this oversight” (WHO 2009c).

**Conclusion: Organizational accountability**

Having spent more than a decade developing pandemic preparedness, why were the WHO’s standard response procedures controversial the first time these procedures were put to use? Rather than blaming the uncertainty of the disease or accusing some individual wrongdoings, I argue that WHO’s controversial responses resulted from cultural and systematic conditions. The controversy revealed the normalization of lack of transparency in WHO’s centralized mechanisms for risk assessment and vaccine deployment. Specifically, pandemic risk assessment and vaccine deployment, though seemingly neutral, embodies and reinforces power dynamics among global actors. The current pandemic preparedness model proved to reinforce a rather authoritative model of knowledge, technology, and policy production. The WHO’s reluctance to establish a transparent system was not simply due to personal misconduct or capitalist conspiracy. Rather, the root cause of the controversy was in the normalization of pharmaceutical involvement and corporate-affiliated experts in decision making. WHO’s efficient pharmaceutical-focused pandemic responses made the agency take lack of transparency for granted.
Among the three sources of international agencies’ legitimacy – representative, procedure fairness, and effectiveness (Cronin and Hurd 2008) – the WHO’s pandemic responses fulfilled the third attribute at the expense of the first two. Decisions about pandemic responses tend not to engage public constituencies. The emphasis on uncertainty and preemption encouraged the WHO to react aggressively, thus effectiveness outweighed concerns about democracy and transparency. Governments, too, are willing to issue vaccination campaigns before ensuring the quality of vaccines, fully communicating the risks to the public, or making compensation plans for vaccine side effects. As one Australian public health official stated, “I’d rather sit here explaining why I bought too many vaccines than explaining why we have too many deaths…It [ordering vaccines for pandemic preparation] is a simple equation” (Fieldnotes, One Health Congress, 2011).

I do not intend to question the effectiveness or the validity of vaccines. Rather, my attempt is to highlight the political effect and social order that is embodied and reinforced by centralized decision-making mechanisms. As a technical artifact, vaccine production and deployment reinforces a hierarchical chain of command, illustrated by the way in which samples are collected, who gets to work on these samples, how to evaluate the necessity of a pandemic vaccine, and how to distribute vaccines. It was evident that the role of the WHO become increasingly crucial and multi-faceted – it determines pandemic threat risks, coordinates vaccine production, oversees clinical trials of vaccines, and facilitates deployment of vaccines to developing countries. During the process, the WHO became preoccupied with the development of vaccines, while ignoring safeguarding mechanisms.

In addition, vaccine-centered responses may divert attention to short-term solutions rather than the root cause of disease outbreaks. Research has shown that emphasis on pharmaceutical intervention often directs attention away from social and economic causes of infectious diseases (Birn 2005, Craddock 2008). Technical interventions tend to reinforce a narrowly conceived understanding of health as the product of technical interventions, rather than of factors with long-term effects such as promoting economic
equality and strengthening the overall heath care system (Birn 2005). Vaccines medicalized the disease problems, and may undermine alternative approaches to addressing the social, political and economic roots of the problem. For example, during H1N1 outbreaks, although a few critics argued that mutated swine flu might originate from the crowded environment of industrial farming, these arguments were not widely recognized. Global responses still centered on how to expedite vaccine production.

This study reveals WHO’s dilemmas, capacity, and blind spots. On one hand, the agency’s attempt to efficiently control influenza pandemics by an aggressive vaccine program contributed to the dark side of organizations. Considerations of vaccine shortages, efficiency, and potential casualty made the WHO err on the side of overstockpiling. Its primary emphasis on medical interventions thus normalized the lack of transparency and corporate involvement in decision making. On the other hand, the WHO also illustrated learning and adaptive capacities. After the incident of pandemic H1N1, the WHO has again begun to evolve. It has learned from criticisms and is gradually considering incorporating a benefit-sharing mechanism in its sample-sharing practice. Director General Chan admitted that stricter rules safeguarding pharmaceutical industry influence are necessary. The WHO claims it has attempted to tighten its safeguards surrounding engagement with industry.

Despite WHO’s effort, my research reveals that the problems were not only simply regarding the regulations but also the political order that vaccine campaigns embody. I argue that only by incorporating and implementing more non-pharmaceutical strategies can the WHO make decisions independent of corporate influences. In addition, my study indicates that the WHO should make its decision making more transparent and accountable by broadening the spectrum of expertise among advisory groups and inviting participation by non-affiliated experts.
Chapter 8  Conclusions: Influence and Limitations of International Bureaucracies

Since the beginning of the 21st century, global outbreaks of SARS, avian flu and H1N1/A pandemic flu have taught the international community the vulnerability of interconnected societies. International agencies have learned that disease prevention and control, like climate change and environmental degradation, is a looming problem requiring interventions at different political levels and across governance areas. Tackling systematic problems that cross multiple boundaries – bureaucratic, disciplinary, national, and species – has become a challenge to international agencies. Lessons learned from this case should have bearing on other global challenges in areas as complex as environmental policies, human rights issues, food crisis, the proliferation of weapons, and the prevention of wars.

Using global responses to highly pathogenic avian influenza (HPAI) as an example, my dissertation examines how three specialized international agencies have learned to cooperate, jointly producing and shaping global authoritative knowledge and policies regarding avian influenza. Interactions among the WHO, FAO, and OIE illustrate that they are actors who attempt to legitimize their knowledge authority and policy interventions; and they have shaped other actors’ interests during the policy-knowledge construction process. Furthermore, I provide an at least partial explanation of a paradox: Why did these agencies advocated for an all-encompassing frame, One Health, while simultaneously still focusing on technocratic top-down strategies such as farm biosecurity and vaccination. My research thus reveals not only the influences but also the limitations of these international bureaucracies.

Primary findings

By conducting in-depth interviews with officials, analyzing avian flu policy documents and scientific publications, and conducting an online survey with key consultants, I demystified the black box of perplexing global policymaking and knowledge construction. I traced how the WHO, FAO and OIE developed cross-agency mechanisms, obtained a
functional consensus on One Health, influenced scientific knowledge production, constructed a new epistemic community, and affected (and sustained) global poultry trade and vaccine manufacturing. My primary findings are as follows:

First, exploring the unprecedented institutional coordination among multiple governance agencies in the age of globalization, I found that international agencies, like other social organizations, need to adapt to environmental changes and to strive for their own sustainability and legitimacy. By developing cooperative relationships in response to complex, systematic and transboundary challenges, the WHO, FAO and OIE strove to establish their legitimacy, secure resources, and maintain authority. Although each agency originally framed disease problems from a distinct perspective, the three agencies managed to develop consensus and partnerships.

Second, I demonstrated that international agencies are key actors in defining global problems and shaping solutions. In response to avian flu, the WHO, FAO, and OIE grappled with competing knowledge claims and policy controversies, and gradually manufactured consensus on One Health. Not only did they manage to reach consensus among themselves, they also shaped the interests and interactions of other global actors, including scientists, states, donors, and interest groups. For example, they mediated the tension among research communities and developed expert networks to bolster One Health. They urged states and private-sector actors to comply with biosecurity surveillance and influenza vaccination programs. Due to these agencies’ aggressive advocacy, One Health has become a global program that allows various actors with different agendas to work toward a similar goal.

Third, I illustrated that international agencies’ behaviors are shaped by their organizational attributes and internal micropolitics. By comparing the WHO, FAO and OIE’s transition to One Health, I found that organizational behavior was dependent on staff experiences, which were affected by their internal micropolitics and organizational attributes. The more hierarchical and less diversified an agency was, the more reluctant its staff was to engage in the boundary-crossing behaviors that One Health demands.
Fourth, I challenged the conventional unidirectional paradigm that scientific advances result in policy changes. My findings revealed that avian flu science co-evolved with policies. Specifically, the WHO, FAO and OIE have been actively involved in knowledge construction and research network restructuring. These agencies have identified research gaps, consulted with specialized laboratory networks, resolved tensions and disconnections between research communities, developed technical standards for research, and transformed previously independent research communities into a One Health epistemic community.

Fifth, I illustrated the influence resourceful private-sector actors have on establishing international norms and policy making. For instance, both transnational agribusiness and pharmaceutical manufacturers organized international networks to influence global programs and standards. By partnering with international agencies – promoting biosecurity production models and donating influenza vaccines, for example – these actors have bypassed state governments and directly influenced international policies.

Sixth, I revealed that international agencies are actors with bounded rationality (Simmon 1991) and limited capacity. Although these agencies advocated for One Health claiming the need for all-encompassing solutions, their disease control responses have been mainly technocratic and biomedical. Although they intended to establish closer cross-sectoral coordination, inter-agency platforms remain mostly technical task-oriented and resistant to structural changes. Although they demonstrated great capacity to affect other actors’ interests, they are still constrained by their own bureaucratic attributes, the influence of other stakeholders, and political economic realities. Although they talked about bottom-up strategies and socioeconomic interventions, their policies and responses have been informed by a core group of medical and veterinary experts. Although they attempted to nurture the One Health epistemic community, expanding their laboratory-based consultation networks proved challenging. These agencies’ capacities were constrained by their bureaucratic interests, organizational capacity, and the external political economic climate.
To elaborate, constraints to these agencies’ policy innovation and adjustments were multi-faceted, including their organizational attributes, other stakeholders’ motivations and influences, and the political economic environment in which they are embedded. In terms of organizational attributes, by design, international agencies are structured to conduct specialized, short-term, emergent, and technical responses. These agencies hence are primarily equipped to advance standardized governance techniques and to implement technical interventions than to develop long-term strategies. Staff has not been well trained to manage long-term systematic projects, root causes of disease problems, and the diversity of societies and cultures affected by and affecting the implementation of policies. As a result, officials preferred to maintain agency specialization and technical responsibilities. Staff was accustomed to responding to emergencies rather than systemic problems. This is why a FAO official reflected, “Contingency responses have been prioritized over long-term strategies” (F12-2009).

In terms of the influence of other stakeholders, international agencies were affected by resourceful or organized states, donors, and private-sector actors. For instance, with limited resources, international agencies often lack interest in expanding their staff diversity to implement One Health strategies. Donors, as many officials pointed out, preferred programs with immediate observable calculable effects. Another instance is that the WHO, FAO and OIE showed little interest in maintaining the human and animal influenza networks previously coordinated by the UNSIC after this agency’s transition, mostly because of declining political interests in avian influenza and their tight finances. The FAO also found enrolling smallholders in their Public Private Partnership projects

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136 The United Nations System Influenza Coordination (UNSIC) was created within the UN Development Group to help ensure that the UN system responds to avian influenza outbreaks and the threat of a human pandemic collaboratively. Its primary purpose was to facilitate cooperation and coordination within the UN system. In 2011, due to emergence of One Health approach and the increasing coordination among international agencies, the UNSIC gradually shifted, moving beyond pandemics to address diseases at the animal-human interface. Upon the request of the UN Secretary General, the UNSIC Coordinator also began to serve as Special Representative of the UN Secretary General for Food Security and Nutrition and as Coordinator of the High Level Task Force on Global Food Security.
challenging because these actors were less interested in biosecurity than export-oriented breeders.

In terms of the effect on overall political economic realities, international agencies frequently reinforced existing power structures due to the imbalanced representation of expertise and political and economic power. Besides, since these agencies were established to advance globalization and to solve associated problems, they serve rather than challenge market-based neoliberalist globalization, even if some trends of globalization, such as increasing meat consumption and trade in animal products, have been identified as one of the root causes of disease outbreaks.

In summary, findings of this thesis depict a complex and interactive process of global knowledge and policy formation. International agencies’ power and limits resulted in gaps between the ideal and the reality of global policies. These agencies on the one hand advocated for an all-encompassing frame – One Health. On the other hand, they primarily invested in technocratic top-down strategies such as advancing laboratory capacity, farm biosecurity, and vaccination campaigns.

**Theoretical contributions**

My research contributes to literature on global governance, global norm- and policy-formation, the interplay between science and politics, and international bureaucracy. Below I summarize my primary theoretical contributions

First, my research fills in a knowledge gap on cross-agency coordination in global governance literature. It sheds light on the emerging transformation of global governance, in which sectoral boundaries of international agencies have been challenged and crossed. Little work has examined inter-agency conflicts and coordination. Most case studies focused on single international agencies. Little is known about the difficulties and effects of cross-agency, multi-disciplinary, and transnational collaboration on strategies aimed to solve complex global problems. My dissertation tackles this gap by exploring how avian
flu knowledge and policies are manufactured through international agencies’ interaction and consensus-building process, illustrating the trend of intensifying cross-agency cooperation in this age of globalization. I show that the WHO, FAO and OIE overcame agency antagonism and established consensus through adoption of a boundary object One World, One Health. The adoption of One Health in many ways has opened up space for consensus, provided a place to coordinate agencies’ work, and engaged previously disconnected science communities. One Health illustrates the value of shared objectives and the productivity of vagueness. Since international agencies are more and more expected to step beyond their “silos” and coordinate with each other, my findings may inform future public debates and policy making in search for common interests. Public officials, experts, and policy makers may gain insights into ways to overcome structural limitations and provide channels for underrepresented voices and coordination. Activists and experts seeking to influence policy making may also learn from my research how to encourage effective participation and cooperative strategies.

Second, my research challenges conventional theories of international policy- and norm-formation, which focus on negotiation, competition and compromise among nation states. This perspective defines international agencies as forums or surrogates who serve for hegemonic states’ interests. By contrast, I illustrate the WHO, FAO and OIE’s autonomy and influence (albeit still constrained) in global policy making. These agencies proved to be guided by interests and objectives that are relatively independent of nation states. They have developed their own identities, resources, authority, and interests; and they are crucial actors in shaping global norms, standards, expert networks, and policies. Their endorsement of One Health was relatively independent of states’ and donors’ interests. These findings also contribute to the neo-institutionalist approach (DiMaggio & Powell 1983, 1991; Meyer & Rowan 1991), illustrating how a new global cultural script is diffused throughout international agencies. I show that international agencies are not only norm promoters but also norm producers. My findings further illustrate these agencies’ adaptive capacity. Encountering an intricate, complex and tough problem like avian influenza, they learned to adjust their relationships, governance devices, and
technological standards. For instance, a WHO official commented that, “One Health is an opportunity for us to understand our biggest failure” (Fieldnotes, One Health Congress, 2011). International agencies have continuously sculpted One Health and broadened its scope, which illustrates that these actors can not only renovate themselves, but also shape their own normative and cognitive environment.

Third, my research advances our understanding of how disease knowledge and policies are simultaneously produced, through the mediation of international agencies. It adds to science and technology studies (STS) which show that the relationship between science and policy is not linear but intertwined (e.g. Jasanoff and Wynne 1998, Miller 2007). Specifically, my research challenges and complements Haas’ (1990, 1992) theory of epistemic communities, which merely defines the community by cultural elements such as experts’ shared normative beliefs, causal explanations, criteria of knowledge validity, and policy enterprise. Haas (1990, 1992) does not specify how these shared cultural elements come about. My study shows that experts’ shared cultural and policy perspectives did not emerge naturally among them but was institutionally cultivated. International agencies, as crucial actors, not only facilitate knowledge production process but also provide competitive advantages to affiliated elite experts. The agencies processed, interpreted, negotiated, and validated scientific information for their policy purposes, and they actively construct a new epistemic community to bolster their emerging policy framework.

Fourth, my research reveals both the influence and limitation of international agencies. Despite the fact the three agencies showed great capacity to shape avian flu science and policies, their steps to conceptualize One Health have been feeble. International and national authorities have just begun to ponder the structural, cultural, and organizational challenges for implementing such a comprehensive policy frame. As of now, the WHO, FAO and OIE have primarily relied on laboratory-based science, reinforcing the authority of selected advisory experts, and facilitating increasing globalization of food and vaccine manufacturing. My findings reveal that international agencies tend to resist change until
crises and criticisms challenge their legitimacy or survival. Hence, my work contributes to theoretical explanations of unsatisfactory international policies by accounting for the limitations of international bureaucracy (Barnett and Finnemore 2004).

Lastly, my research contributes to an understanding of how power is exercised in global governance. It reveals how knowledge, power, and social order are intertwined (Foucault 1994). Foucault (1994) refers to power not only in terms of hierarchical, top-down power but also as social control through knowledge. Power can manifest itself by producing knowledge and discourse that is internalized and guides the behavior of populations. This leads to more efficient forms of social control, as knowledge enables individuals to govern themselves. In my research, I observed that governments were encouraged to maintain surveillance and be responsive to disease outbreaks. States are asked to maintain international standards and regulations, such as the pandemic preparedness plans and compartmentalization. Countries who failed to comply with the IHR (2005) were identified as problem-makers, such as Indonesia which resisted sharing viral strains and thus was labeled selfish. After One Health was endorsed, countries were encouraged to look for “more guidance” to implement One Health (Fieldnotes, One Health Congress 2011). National governments often look to international agencies for instructions. Individuals are also provided with advice regarding hygienic practices and travel warnings during endemics and pandemics. By identifying good and bad behaviors by national governments and individuals, international agencies exercise great influence.

Essentially, the WHO, FAO and OIE exercised all three types of power of international agencies summarized by Barnett and Finnemore (1999: 1). Their power takes the form of 1) creating categories of actors and actions; 2) fixing meanings in the social world; and 3) articulating and diffusing new norms, principles, and actors around the globe. For instance, these three agencies have produced the demand for One Health, so-called One Health experts, biosecurity and desirable production modes, just to name a few. Additionally, my findings show that international policies tend to reinforce rather than overturn preexisting power structures and neoliberal systems of political economy.
example, the WHO, FAO and OIE strengthened the credibility and power of affiliated virologists and veterinarians. The legitimacy of these knowledge producers and international policymakers are mutually reinforcing. Consultants, particularly those connected with international agencies through preexisting laboratory networks, have been more central and crucial in constructing relevant and authoritative knowledge.

My research also reveals an asymmetry of power among global actors, by which international policies tend to benefit large-scale private-sector actors. For instance, biosecurity standards and practices are more applicable to large-scale poultry producers. Pandemic vaccination strategies legitimized the participation of gigantic vaccine manufacturers who controlled the development and production of vaccines. My work echoes Jasanoff’s statement that “The current design of most risk management institutions promotes the accumulation of expert knowledge and the revision of policy without challenging the manager’s framing assumptions” (1990: 34). My work therefore contributes to discussions on how international policies trigger important consequences of representation, distribution, and accountability (Adler and Bernstein 2005, Goldman 2007, Miller 2007). I argue that democratization of these knowledge and policymaking processes is necessary to hold international agencies accountable.

**Limitations and future work**

To conclude, my dissertation contributes to our understanding of how global institutions deal with, or fail to deal with, pressing health challenges. By examining the roles and activities of three agencies, my dissertation depicted global institutions dynamic through which knowledge and policies were produced. The WHO, FAO and OIE have now recognized the benefit of cooperation and coordination. Many officials recognized that they have learned from their experiences with avian influenza and have praised the new paradigm of One Health.

Since One Health is still evolving, future projects might examine how its meaning, scope, context and users continue to unfold. The meaning and scope of One Health is definitely
not fixed. Since 2008, One Health has been reconstructed and redefined by international agencies and various expert groups. With a growing number of stakeholders, investigating One Health’s reconfiguration can advance our understanding of global norm formation and diffusion.

My dissertation is inevitably imperfect and limited, with several methodological and theoretical constraints. Methodologically, I collected data mostly through interviews, published documents, and scientific reports. Due to limited access to closed-door policymaking, I was not able to attend enough meetings and conferences regarding avian flu. Doing so would have allowed me to observe how actors debated and discussed policies. My analysis thus often relies on post-event observations and comments by international officials. I am aware of these limitations. To compensate for such shortcomings, I have analyzed data from multiple sources and tried to avoid over-analyzing the interview transcripts.

In addition, the response rate of the online survey (13.5%) was far from satisfactory. I am aware of the selective effect of respondents, who were particularly motivated to express their concerns on avian flu policies and One Health. As a result, I made use of the survey by simply using the information to supplement analysis from other data, rather than using it to statistically examine causal relationships. The survey data hence were carefully exploited to enrich my understanding of consultants’ interactions with international agencies and other researchers.

Theoretically, my research has not fully explored the roles and interests of other crucial global actors, such as nation states and NGOs, due to my primary interest in the roles and activities of international agencies. Neither did I extensively examine the roles and influence of other organizations at different levels, such as national and regional organizations (such as the European Union), and international donor organizations (such as the World Bank), which are also increasingly influential in policy formation. This is not to say that international policies are not affected by actors other than international agencies and affiliated experts. For example, recent STS studies have revealed the
increasing participation of nonscientific groups and a broader range of stakeholders, such as NGOs and indigenous communities (Adler and Bernstein 2005, Miller 2007). Future research should investigate these other actors who also contributed to complex knowledge and policy processes.

Moreover, my dissertation’s focus on the formation of global policies demanded that I exclusively investigate activities on the global level. I, however, do not assume that policies only diffuse in one direction. I am also interested in the intersection between the local, the national and the global: How local and national actors challenge or reshape global norms and paradigms requires more attention. Future projects could examine whether and how this new global framework diffuses, and how civil society participates in or responds to One Health.

Despite these limitations, my dissertation contributes to our understating of the increasing crucial roles of international agencies in the age of globalization. It reveals that the WHO, FAO and OIE have been actively affecting scientific knowledge production, shaping global norms, and disseminating new global paradigm. These international agencies are actors who have substantial powers but are also constrained. Building on my findings, researchers can further investigate whether and how international agencies refine and diversify their models, and how they formulate solutions for other complex challenges.
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World Organization for Animal Health (OIE)

OIE and FAO.


# Appendix 1: Acronyms and Glossary

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>ARO</td>
<td>Alert and Response Operations (WHO)</td>
</tr>
<tr>
<td>CMC-AH</td>
<td>FAO/OIE Crisis Management Centre for Animal Health</td>
</tr>
<tr>
<td>CODEX</td>
<td>Codex Alimentarius Commission of the joint FAO/WHO Food Standards Programme</td>
</tr>
<tr>
<td>CSIRO</td>
<td>Commonwealth Scientific and Industrial Research Organisation (CSIRO), Australia's national science agency</td>
</tr>
<tr>
<td>FAO</td>
<td>Food and Agricultural Organization of the United Nations</td>
</tr>
<tr>
<td>FOS</td>
<td>The Department of Food Safety and Zoonoses (WHO)</td>
</tr>
<tr>
<td>GAR</td>
<td>Global Alert and Response (WHO)</td>
</tr>
<tr>
<td>GF-TAD</td>
<td>Global Framework for the Control of Transboundary Animal Disease</td>
</tr>
<tr>
<td>GIP</td>
<td>Global Influenza Programme (WHO)</td>
</tr>
<tr>
<td>GISN</td>
<td>Global Influenza Surveillance Network (WHO)</td>
</tr>
<tr>
<td>GLEWS</td>
<td>Global Early Warning System for Major Animal Diseases, including Zoonoses</td>
</tr>
<tr>
<td>GOARN</td>
<td>Global Outbreak Alert &amp; Response Network (WHO)</td>
</tr>
<tr>
<td>H5N1</td>
<td>A subtype of avian influenza viruses</td>
</tr>
<tr>
<td>HSE</td>
<td>Health Security and Environment (WHO)</td>
</tr>
<tr>
<td>IFPMA</td>
<td>International Federation of Pharmaceutical Manufacturers &amp; Associations</td>
</tr>
<tr>
<td>IFRCRCS</td>
<td>International Federation of Red Cross and Red Crescent Societies</td>
</tr>
<tr>
<td>NGO</td>
<td>Non-Governmental Organizations</td>
</tr>
<tr>
<td>OFFLU</td>
<td>OIE/FAO Scientific network for the control of Avian Influenza (2005-2009)</td>
</tr>
<tr>
<td></td>
<td>OIE/FAO Scientific network for the control of Animal Influenza (after 2009)</td>
</tr>
<tr>
<td>OIE</td>
<td>World Organization for Animal Health</td>
</tr>
<tr>
<td>OWOH</td>
<td>One World, One Health</td>
</tr>
<tr>
<td>PPP</td>
<td>Public Private Partnership</td>
</tr>
<tr>
<td>PVS</td>
<td>Performance, Vision, Strategy – global evaluation toll of the veterinary services</td>
</tr>
<tr>
<td>SAGE</td>
<td>Strategic Advisory Group of Experts (WHO)</td>
</tr>
<tr>
<td>UNICEF</td>
<td>The United Nations Children's Fund</td>
</tr>
<tr>
<td>UNSIC</td>
<td>UN System Influenza Coordination</td>
</tr>
<tr>
<td>WAHIS</td>
<td>World Animal Health Information System</td>
</tr>
<tr>
<td>WCS</td>
<td>Wildlife Conservation Society</td>
</tr>
<tr>
<td>WHO</td>
<td>World Health Organization</td>
</tr>
<tr>
<td>Zoonoses</td>
<td>Diseases transmissible to both animals and humans</td>
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Appendix 2: Interviewee List

1. Officials at international agencies

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<td>2009</td>
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</table>

2. **Consultants/Experts**
Appendix 3: Online Survey Questionnaire

Thank you for taking this survey!

The survey aims to understand how consultancy mechanisms of international organizations work at the context of global policies on avian influenza control. You are invited to participate in this survey because you have contributed to policy deliberation. I would like to learn your experience in and perspectives on avian influenza control and research. It is estimated that, on average, the survey will take about 15 to 20 minutes to complete. It is confidential and no sensitive personal information will be acquired.

If you have any concerns or questions, or if you are interested in the aggregate research results, please don’t hesitate to contact Yu-Ju Chien, a PhD candidate in the Department of Sociology at the University of Minnesota, at chien019@umn.edu or 612-325-4096, and her advisor, Prof. Joachim Savelsberg at savel001@umn.edu or 612-624-0273. Thanks very much.

I. Interactions with international organizations

1. Which organizations have you worked with about avian influenza policies?
   1. World Health Organization
   2. Food and Agricultural Organization
   3. World Organizations for Animal Health
   4. The UN System Influenza Coordinator (UNSIC)
   5. World Bank
   6. The United Nations Children's Fund (UNICEF)
   7. The United Nations Environment Programme (UNEP)
   8. Other international organizations

2. Which is the organization that you worked most closely with regarding avian influenza?
   1. World Health Organization
   2. Food and Agricultural Organization
   3. World Organizations for Animal Health
   4. The UN System Influenza Coordinator (UNSIC)
   5. World Bank
   6. The United Nations Children's Fund (UNICEF)
   7. The United Nations Environment Programme (UNEP)
   8. Other international organizations
3. Had you previously worked with this organization (that you worked most closely) in other policies?
   1. Yes
   2. No, I have only acted as an advisory expert in the HPAI issue

4. How was this affiliation established?
   1. I represented my organization/institution/government
   2. I was recommended by other experts affiliated with these international organization(s)
   3. I applied for its open conference/research call
   4. Other (please explain____________)

5. Compared to when you started as a consultant, would you say that this organization’s investment in laboratory-based strategies (e.g. genetic analysis, vaccine development) has
   1. increased
   2. stayed about the same
   3. decreased

6. Compared to when you started as a consultant, would you say that this organization’s investment in social economic strategies (e.g. community engagement) has
   1. increased
   2. stayed about the same
   3. decreased

7. Compared to when you started as a consultant, would you say that this organization’s investment in ecological conservation strategies (e.g. wildlife and environmental protection) has
   1. Increased
   2. stayed about the same
   3. decreased

8. Have you participated in conference and/or given presentations in conferences about avian flu held by international organizations? If so, in what year(s) did you engage in that role? (Please estimate if it’s difficult to recall the precise years)

   Yes/No
   Before 1997 ----------------------------------------------------------2009, current
9. Have you attended consultancy, technical or advisory meetings held by international organizations? If so, in what year(s) did you engage in that role? (Please estimate if it’s difficult to recall the precise years)
   Yes/No
   Before 1997 -------------------------------------------------2009, 2010

10. Have you served in a committee/working group of these international organizations? If so, in what year(s) did you engage in that role? (Please estimate if it’s difficult to recall the precise years)
    Yes/No
    Before 1997 -------------------------------------------------2009, 2010

11. Have you conducted research for/with these international organizations? If so, in what year(s) did you engage in that role? (Please estimate if it’s difficult to recall the precise years)
    Yes/No
    Before 1997 -------------------------------------------------2009, 2010

12. Have you drafted policy recommendations for these international organizations? If so, in what year(s) did you engage in that role? (Please estimate if it’s difficult to recall the precise years)
    Yes/No
    Before 1997 -------------------------------------------------2009, 2010

13. On what topics were you consulted? (choose all that apply)
   1. Disease diagnosis
   2. Pathogenicity of the disease
   3. Eradication strategies
   4. Wild birds research
   5. Human vaccine
   6. Animal vaccine
   7. Pandemic preparedness strategies
   8. Social/cultural factors and impact of HPAI
   9. Economic impact of HPAI
   10. Community mobilization
   11. Sample sharing issue
   12. Other (please explain_________________)
14. Among the strategies below, please choose up to three policies that you consider the most important in controlling and preparing for global avian flu outbreaks? (choose up to three)
   1. Hygienic practices/Biosecurity
   2. Effective and affordable vaccines for humans
   3. Effective and affordable vaccines for poultry
   4. Understanding the role that wild birds play in disease epidemiology
   5. Disease surveillance
   6. Harmonized international regulation
   7. Understanding cultural and local practices
   8. Restructuring the poultry sector
   9. Private-Public Partnership
   10. Stockpile antiviral drugs

15. What in your judgment are the most difficult challenges in developing global avian flu policies? (choose up to three)
   1. Lack of basic knowledge on the disease
   2. Lack of financial resources
   3. Technological limitations
   4. Lack of inter-agency coordination/collaboration
   5. Differences across countries/cultures/societies
   6. Segregation across disciplines/professions
   7. Politics
   8. Other (please explain)

16. What are the challenges you have encountered in your interactions with international organization(s)? (Choose all that apply)
   1. Constant shifts of organizational officials
   2. Objectives are too abstract
   3. Miscommunication among meeting participants/collaborators
   4. Politics overriding science
   5. Emphasis in short-term over long-term policies
   6. Other (Please explain________________)

17. When discussing avian flu with consultants from other professions, what are the challenges you have encountered? (choose all that apply)
   1. Difference in our understanding of disease epidemiology
   2. Difference in our proposed strategies
   3. Difference in research methods
   4. Difference in our identification of “knowledge gaps”
   5. Difference in the jargon/ terminology that we use
6. Difference in our risk assessment
7. Other (Please explain)
8. None

18. Have your interactions with international organizations influenced your research in the following ways? (choose all that apply)
   1. The interactions led to my participation in collaborative projects.
   2. The interactions shifted my research focus and interests to fill in some particular research gaps.
   3. The interactions initiated my concerns about policy decisions.
   4. The interactions shaped my work to be more interdisciplinary-oriented.
   5. The interaction influenced my work in another way (Please explain)
   6. No, the experience did not influence my work

19. What is your opinion on the One World One Health Principle approved by these international organizations?
   1. I am not sure what the principle is about
   2. It is ideologically important but practically ambiguous
   3. It is important but has less to do with my professional expertise
   4. It is necessary and I know how my expertise could contribute to it
   5. Other (please explain____________________)

II. Professional Background

1. What is/are the discipline(s) in which you received your graduate degree(s)?
   (choose all that apply.)
   1. Epidemiology
   2. Biology
   3. Ecology
   4. Veterinary
   5. Virology
   6. Immunology
   7. Medicine
   8. Ornithology
   9. Sociology
   10. Anthropology
   11. Economics
   12. Geography
   13. Other (______________________________________)
2. In what year did you earn your highest degree? ________________

3. In which country did you earn your highest degree? (fill in the country in the blank)
   1. At an academic institution in my home country. (_______________)
   2. At an academic institution abroad. (_______________)

4. What organizations are you employed by?
   1. academic institutions (university/college…etc)
   2. government departments
   3. private research institutions (foundation, hospital…etc)
   4. private companies
   5. non-governmental organizations
   6. other (_______________)

5. In which year did you start the study of avian influenza? ________________

6. In which years was avian influenza your main research focus?

7. When you conduct or conducted your avian flu research, do you usually work individually or collaborate with other researchers?
   1. Mostly work individually (move to question 10)
   2. Mostly collaborate with other researchers (continue on question 8)
   3. Have both individual and collaborative projects (continue on question 8)

8. Could you please identify the research fields of the researchers with whom you have collaborated? (yes/no)
   1. Epidemiology
   2. Biology
   3. Ecology
   4. Veterinary
   5. Virology
   6. Immunology
   7. Medicine
   8. Ornithology
   9. Sociology
   10. Anthropology
   11. Economics
   12. Geography
   13. other (___)
9. Among the collaborators you list in question 8, please choose up to three professions with whom collaboration was most productive.
   1. Epidemiology
   2. Biology
   3. Ecology
   4. Veterinary
   5. Virology
   6. Immunology
   7. Medicine
   8. Ornithology
   9. Sociology
  10. Anthropology
  11. Economics
  12. Geography
  13. other (___)

10. Among the collaborators you list in question 8, please choose up to three professions with whom collaboration was most frustrating.
   1. Epidemiology
   2. Biology
   3. Ecology
   4. Veterinary
   5. Virology
   6. Immunology
   7. Medicine
   8. Ornithology
   9. Sociology
  10. Anthropology
  11. Economics
  12. Geography
  13. other (___)

11. How many papers have you published on avian influenza? ______________
    (estimate the number if can’t remember accurately)

12. What do you think are the most difficult challenges in avian flu studies? (choose up to three)
   1. Limitation of current technology
   2. Availability of virus samples strains
   3. Limited understanding of disease epidemiology
   4. Difficulties in conducting field investigations
   5. Communication and collaborations across disciplines
   6. Lack of international collaboration/segregation among research teams across the globe
7. Lack of funding resources
8. Availability of timely and accurate information about disease outbreaks
9. Other (Please explain____________________)

13. In what area, do you feel future research should be conducted?
   1. Microbiology of viruses
   2. Vaccination development
   3. Epidemiological investigation of the viruses
   4. Pandemic preparedness
   5. Socioeconomic factors
   6. Ecology of wild birds
   7. Interface among human and animal
   8. Interface among domestic and wild animals
   9. Other: ___________________________

III. Demographic Information

1. Gender
   a. Female
   b. Male

2. Nationality: _____________

3. Age: ______________

Open question:
I’d appreciate any additional thoughts on the topic.

Thanks very much for your time in taking the survey. Are you willing to be interviewed to share more of your experience as a consultant? If so, please leave your telephone number and/or email address for further conversation. Thank you very much!