I. Introduction: the problem of infectious diseases

Despite advances in medical and scientific research and development, infectious diseases still represent a threat for the global health. During the last 25 years, the world has seen a dramatic increase in the number of outbreaks (WHO 2013), affecting thousands of people. Many of these outbreaks are caused by emerging infectious diseases (EIDs) and re-emerging infectious diseases (REID) that can be easily transmitted and severely affect populations in a short period of time (Fraser et al. 2009). These are new diseases caused by known or unknown pathogens; or by microorganisms which used to be found just in animals. These can also be common diseases that have increased in incidence1 (Lashley 2003; Morens et al. 2004 Kaufmann 2007; Brown 2011; Budd et al. 2011; Fidler 2004; Hoffman, 2010; Coker et al. 2011; Ear 2012), or the vector or host range has geographically expanded (WHO 2010). Many EIDs are transmitted from animals to humans or are common to both (zoonotic diseases) (Bhatia and Narain 2010; Seimenis 2010; Coker et al. 2011). Pandemics occur when EIDs that are easily transmissible affect a large population and spread over a wide geographical area in a short period of time.

A combination of biological, social, ecological factors, as well as technological and communication processes triggered by globalization have caused and facilitated the spread

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1 Lashley (2003:259) mentions the cases of diphtheria and pertussis, and includes as references to support this claim Lashley and Durham2002; Lederberg and others 1992.
of EIDs (Lashley 2003; Foladori 2005; Elbe 2010: Coker et al. 2011). Figure 1 presents a
summary of these factors.

<table>
<thead>
<tr>
<th>Cause</th>
<th>Explanation</th>
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<tr>
<td>New technologies</td>
<td>Changes in food chains</td>
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<td>Changes in ecosystems and land use</td>
<td>Changes in food chains</td>
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<td>Globalization: Travel and international commerce</td>
<td>Increasing flows of people and merchandises worldwide</td>
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<td>Climate change</td>
<td>Expansion of the ecosystems of certain vectors (such as the case of Malaria, dengue and yellow fever)</td>
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<td>Wars, terrorism and massive migration</td>
<td>Sanitation problems, hunger, famine; limited or lack of access to health facilities, health personnel and materials</td>
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<td>Demographic and population changes</td>
<td>Urban concentration, migration from rural areas to cities</td>
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<td>Socio-cultural changes</td>
<td>Sexual practices and use of drugs</td>
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<td>Weakened human immune system</td>
<td>Antibiotic resistance due to overconsumption</td>
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<td>Microbial adaptation</td>
<td>Adaptation to antibiotics and other products developed to control diseases (insecticides)</td>
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Figure 1. Causes of the EIDs. Adapted from Foladori 2005: 147.

The complexity and inter-sectoral characteristics of these causal factors makes
domestic efforts insufficient and requires international collective action since “countries have
to protect the wellbeing not only of their own patients but also those of fellow nations (The Lancet)”. Medical and non-medical interventions enforced by only one or two countries
cannot effectively control an outbreak, which increases the risk of a pandemic (Ingram 2005; Kaufmann 2007; Brown 2011; Budd et al. 2011; Fidler 2004; Hoffman, 2010; Michaud 2010). Thus, international cooperation becomes a critical instrument to control and manage these outbreaks (Jones 2006; WHO 2007).

The response to infectious diseases involves confirmation of the outbreak, investigation of cases, collection of data, identification of the population at risk, and implementation of control and prevention measures (WHO 2000; WHO 2006). It includes public health responses to reduce the transmission and impact of the outbreak, as well as
technical and scientific activities to identify the pathogen and to define effective countermeasures (Michaud 2010: 3-4). These activities require significant human, financial and material resources for a rapid, rational and effective response (WHO 2006; Tarantora et al 2009; Michaud 2010). The international response to infectious diseases is then a set of activities carried out by actors in the international system to complement and facilitate a domestic response to control a disease outbreak, as well as to reduce its possible negative effects (Fidler 1997; WHO 2000; WHO 2006; Zacher and Reef 2007; Tarantora et al. 2009). Infectious disease outbreaks therefore require high levels of international cooperation. However, fully coordinated international action is not always forthcoming.

This paper analyzes how this cooperation occurs. The research particularly examines the role of networks of epistemic communities in the international response to infectious disease outbreaks. To understand how experts’ transmission mechanisms, it will use network theory. By using network theory concepts and tools, the research will determine the main channels through which these experts influence cooperation. Specifically, the paper presents an exploratory analysis of international cooperation during the H1N1 outbreak of 2009 to understand how the influenza epistemic community increased cooperation.

**Theoretical framework: international cooperation and epistemic communities**

The traditional binary conceptualization of cooperation denies the existence of distributive problems and suboptimal cooperation (Sebenius 1992). Distributional conflicts occur due to multiple options available for cooperation. These are observed when actors want to avoid specific outcomes and have other multiple alternatives to choose among (Krasner 1991; Sebenius 1992). Distributional problems result once parties have decided that an agreement will make all of them better off, however, they cannot decide on the terms of it. This exists due to the multiple points in the Pareto frontier (Krasner 1991).
The problem is not only how to get to the Pareto Frontier, or how to achieve cooperation, but which of the possible outcomes available is the best for the parties to select (Krasner 1991). Additionally, most of the time actors will adopt a different outcome to the equilibrium (Sebenius 1992). Thus, not only agreements have distributive effects, but most cooperative outcomes with distributional consequences are not on or even closer to the Pareto Frontier (Sebenius 1992). In the case of global health, there are multiple options for cooperation than are not optimal most of the time and have distributional consequences. The Pandemic Influenza Preparedness Framework adopted in 2011 is an example. This agreement was the result of a controversial negotiation to determine how countries would share influenza viruses in exchange to get access to the benefits from R&D. This was necessary after Indonesia denounced that developed countries, and their pharmaceutical industry, were taking advantage of the WHO system to share viruses, without providing benefits to countries where those viruses originated (Sedyamingsih 2008; Kamradth-Scott and Lee 2011). After four years of international negotiations to solve this problem, the WHO member States adopted the framework. Countries were able to establish the terms for an agreement to exchange influenza viruses and to get benefits from R&D due to the availability of those samples. However, the agreement reached was far from optimal (Kamradth-Scott and Lee 2011). Developed and developing countries had multiple claims that were not included in the final version. In addition, given that many R&D activities are undertaken by private actors, there are no enforcement mechanisms to make them comply with this framework. Nevertheless, after a deadlock, reaching an agreement was better than no agreement at all, considering that not having access to virus samples makes harder to find adequate medical interventions and to prevent the spread of viruses. Therefore, although the outcome is not on the Pareto frontier, it represents a joint gain since it is a move towards it (Sebenius 1992).
This is represented in figure 2 where the space between the Pareto frontier and the point of origin are also possible options to reach a cooperative agreement.

![Diagram](image)

Figure 2. Distributional conflicts outside the Pareto Frontier. Based on Sebenius 1992.

Results like these are frequent since parties do not know exactly the location of the Pareto frontier, which means they do not know what it is “jointly possible”; then outcomes and preferences tend to be underspecified (Sebenius 1992; Haas 2004; Haas 2016). They have to find the means for moving northeast to get closer to the frontier. Therefore, inferior results, asymmetric outcomes and impasses are common (Sebenius 1992).

In a conceptualization of cooperation as a continuum, the outcomes that parties want to avoid are represented with respect to the origin, as dilemmas of common aversion; and, dilemmas of common interest are with respect to the Pareto frontier (Sebenius 1992). Figure 3 illustrates the area of possible agreement with outcomes between the origin and the Pareto frontier.
Dilemmas of common aversion are at the beginning, closer to the point of origin, since these can be easier to solve, they mostly required coordination, and this type of cooperation does not need to be highly institutionalized (Stein 1990). In the extreme of the spectrum, there are dilemmas of common interest that required collaboration. This collaboration is harder to achieve, it is highly institutionalized and requires higher level of commitments. Therefore, coordination represents low levels of cooperation and collaboration higher levels.

An important aspect in this model is the existence of suboptimal cooperation and the many possibilities for cooperative outcomes. Scholars argue suboptimal cooperation with distributional conflict is common in area-issues with high degree of technical/ scientific or
strategic uncertainty (Haas 1992; Sebenius 1992; Ruggie 1998; Haas 2004; Davis Cross 2013). Uncertainty limits access to sufficient information, thus actors enter into a process where they need to learn from each other and about their preferences (Sebenius 1992; Haas 2004). Technical uncertainty makes more difficult to understand the existence and nature of a problem, as well as to formulate appropriate solutions to solve it (Abbot and Duncan 2004:63). Thus, uncertainty opens a window of opportunity for other actors to influence the process. Although, the typical case study in this category has been the environment (Young 1989; Haas 1992; Haas 2004); some health issues can be classified in the same group due to the level of technical expertise and the role of scientific evidence in policy making (Karlsson 2004; Youde 2005).

To explain why this variation occurs, constructivist theories of social learning, policy diffusion and policy transfer offer alternative explanations to neorealism and liberal institutionalism. Constructivism claims variation in cooperation occurs due to differences in learning processes and the diverse ways states adopt and routinize policy models (Underdal 1998; Kurowska and Kratochwill 2012). Cooperation depends on the manner in which each country internalizes norms and shares knowledge; thus, final informed decisions are based upon information, knowledge and ideas (Hass 1990). There is an emphasis on the role of international organizations, epistemic communities and in general non-state actors (Haas 1990; 1992; Deacon 2007; Jenson 2010) in shaping cooperative outcomes.

Constructivism argues states adopt and implement internationally prescribed policies to the extent that they are compelling models for powerful actors, and can be used to convince or persuade others (Strang and Chang 1993; Weyland 2006; Jonsson 1993; Wendt 1992). The international consensus is also considered a factor that can influence a country to adopt specific policies or regulations (Bennet 1993). In particular, if the international community
agrees in a common definition of a problem, most members of the community will be compelled to apply it (Dolowitz and Marsh 1996). The level of cooperation would be higher when the international norms and organizations have a more comprehensive and deeper base of consensual knowledge and share the identification of the problem as well as agree on the preferred solutions or policy outcomes.

Among these theories, the literature on epistemic communities provides hypotheses that permit to analyse the connection between knowledge, power and policy-making; treating these actors as independent variables to explain patterns of cooperation and policy change in international politics (Haas 1992; Sebenius 1992; Antoniades 2003: 24; Davis Cross 2013). An epistemic community is defined as “a network of professionals with expertise and competence in a particular domain and an authoritative claim to policy-relevant knowledge within that domain (Haas 1992:3).” They form networks of knowledge that share a common culture and language (Morin 2014) and can create and transfer knowledge to policy makers (Haas 1992). Peter Haas defined four essential characteristics that members of an epistemic community share: normative beliefs; casual beliefs; epistemological criteria; and a common policy enterprise (1992:3). They share notions of validity, defining the criteria for weighing and accepting knowledge in their field; as well as a common set of practices associated to their professional expertise (Haas 1992). Thus, they can frame the policy debate on particular issues, providing justifications for alternatives, and catalyzing national or international coalitions to support chosen policies and advocate change (Weiss, Carayannis and Jolly 2009). Haas claims as well that “epistemic communities are a principal channel by which consensual knowledge about causal understanding is applied to international policy coordination, and by which states may learn through processes of international cooperation (Haas 2016: 5)
This approach is grounded in a constructivist tradition of policy diffusion. The utility of epistemic communities has been mostly seen in the case of “complex problems” that require levels of expertise in areas that most policy-makers do not have the capabilities to manage by themselves, and that are surrounded by uncertainty (Haas 1992). The theory analyses the role of experts in the international arena and the key role that these actors have for the formulation of international policies (Stone 2002; Weiss, Carayannis and Jolly 2009; Haas 2016); as well as how they provide expertise and knowledge that will shape policy outcomes.

Epistemic communities are able to have a systemic impact, as a result of the influence these groups can exercise in the definition of the units’ interest and behavior, modifying international policy processes (Antoniades 2003:34; Biermann 2008; Davis Cross 2013). Their potential has increased due to more transnational activity, and their interconnections. Therefore, epistemic communities can “change the game” on the configuration of a set of possible solutions (Sebenius 1992).

Studies on epistemic communities have a particular interest on establishing the path in which these groups influence policy makers. In this regard, researchers have identified some hypotheses about the different elements that make these actors capable to affect the policy process. These factors can be classified into the following categories: a) knowledge; b) transmission mechanisms; and c) context.

A) Knowledge

The authoritative claim on knowledge is one of the main elements on an epistemic community’s influence. This claim makes epistemic communities holders of power in world politics (Sebenius 1992; Antoniades 2003: 21; Haas 2004). Power and knowledge are usually treated as competing alternatives (Sebenius 1992). However, knowledge is power and
epistemic communities control it. Science embodies implicit values of control; therefore, decisions made with scientific support may reflect such hidden values (Haas 2004). In this respect, Haas indicates that “power doesn’t want science, it wants a justification for pre-existing political programs which are driven principally by political anticipations of gain (Haas 2016:341)”. Hence, distributional consequences of science-based advice are themselves political (Haas 2004; Jasanoff et al. 1995; Miller and Edwards 2001).

A claim over knowledge is necessary but not enough to modify actors’ behavior. Having expertise over a particular issue does not translate automatically into a capacity for influencing policymaking. Knowledge is contested and most scholars tend to assume the opposite (Morin 2014; Antoniades 2003). In addition, not all knowledge is relevant for policy makers; and it requires a process of socialization in order to be adopted (Antoniades 2003). Besides, scientific claims have to be perceived by the public as legitimate, objective and isolated from the political space (Haas 2004, 2016; Botcheva 2001; Andresen et al. 2000; Kamradt-Scott 2013). However, as it was mention before, science is not necessary apolitical and some times it reflects political priorities and biases (Kamradt-Scott 2013; Haas 2016). Hence, no all knowledge has the capacity to influence the policy process.

An epistemic community has to hold “usable knowledge” to influence the policy process (Haas 2004). Usable knowledge is described as accurate information, politically tractable for its users, provided in a timely manner and with applicable data for policy making. It “encompasses a substantive core that makes it usable for policymakers and a procedural dimension that provide mechanisms from the scientific community to the policy world (Haas 2016:342)”. Therefore, this type of knowledge arrives in conjuncture with the policy process and provides advice which can be converted into laws or decisions by decision-makers (Haas 2004: 574).
To identify the “ usable knowledge”, Clark and Majone (1985) present four criteria to differentiate it from other knowledge: adequacy, value, legitimacy, and effectiveness. Adequacy relates to including all the relevant facts to the issue. Value refers to the contribution for further understanding the issue. Legitimacy relates to its acceptance by others outside the community that developed it, this knowledge has to be accepted in order to be adopted. Effectiveness relates to its ability to shape the agenda or influence the debate. Thus, epistemic communities influence policy processes when they are able to develop usable knowledge and the decision-makers feel compelled to apply it (Haas 2002; Haas 2004).

One of the most complex issues in the creation of usable knowledge is legitimacy. Epistemic communities can be understood as “de facto natural coalitions” (Sebenius 1992). If they are perceived as these coalitions, they can affect the perceived zone of possible cooperative outcomes, mostly because people in these coalitions have shared interests in the outcome (Sebenius 1992: 354). However, knowledge is constantly contested and there are constant disagreements among experts about knowledge claims, and these disagreements create and sustain rivalry among epistemic communities (Antoniades 2003; Morin 2014: 280). This affects the policy making process; because knowledge remains contested (Haas 2004; Youde 2005; Morin 2014).

In addition to usable knowledge, epistemic communities need to have access to the policy process in order to be able to exercise their influence. These could be achieved if they have a wide membership with strong cohesiveness. Keeping consistent beliefs; having a policy project resonant with outside scientific and popular opinion, and being able to weaken potential opponents (Sebenius 1992: 360) are also factors that permit them to be influential. The greater the homogeneity in an epistemic community’s values, perspectives, and sense of
mission, the less conflict of interest and the easier it will be for organizations to reach and sustain agreements on appropriate actions (Lax and Sebenius 1985; Davis Cross 2013).

Despite the factors described above, epistemic communities not always can influence policies, since he policy process needs to be opened to adopt scientific knowledge. In an open political process, government officials may be persuaded to adopt more sustainable policies, and individual scientists may gain heightened political profiles at home which may ultimately increase their effectiveness as well (Haas 2004: 577). Epistemic communities are more likely to influence policy process if this process is open and states are exposed to consensual science (process of social learning).

Finally, for cooperation, the knowledge that epistemic communities developed and influence the process can assist policy makers to understand the others and their preferences. This can make possible to expand the area of possible agreement. In this case, epistemic communities also alter the process of learning since the members of the coalition share a common policy project; it can reduce the conflict of interest regarding this area and “cooperation becomes not only more likely to be achieved but also more likely to persist once achieved” (Sebenius 1992:354). Some scholars point out that treaties based on scientific knowledge and that involved the participation of epistemic communities tend to be adopted and ratified faster and to last longer (Haas 2016: 14; Wipfli, et al 2010). To achieve these outcomes, knowledge among the epistemic community members has to be consensual (Haas 1992; Hanseclever et al. 1997; Karlsson 2004). This can lead to an informed action that can alter perceptions of the zone of possible agreement (Haas 1992; Sebenius 1992). Thus, an epistemic community can affect the perceived zone of possible agreement to the extent that all the members on the community agree on issue (Sebenius 1992; Adler and Haas 1992; Karlsson 2004).
B) Transmission mechanisms

Epistemic communities are considered knowledge networks. A network is a “set of actors (nodes) that are linked by various relationships (ties) (Whelan 2012:12)”. Actors in a network can be individuals, organizations, or units within organizations. Relationships can be personal, functional between units within an organization or strategic relationships between organizations (Monge and Contractor 2003; Whelan 2012; Hafner-Burton et al. 2009; Maoz 2011, Maoz 2012).

Networks are non-hierarchical organisations (Gerspacher and Benoit 2007; Biermann 2008). They use flexible, dynamic communication linkages to connect and reconnect multiple organizations. They create communication linkages that forge an emergent communications structure that connects different people and groups in the organization regardless of their formal position or roles (Monge and Contractor 2003: 19).

Networks are more effective than traditional organizations for achieving certain outcomes. Leavitt (1951) argues that centralized organizations are more efficient for routine tasks while decentralized networks are more efficient for tasks that required creativity and collaborative problem-solving (in Monge and Contractor 2003: 17). Similarly, O’Toole (1997) finds that networks, as organizational forms, are of increasing importance for effectively managing “wicked” problems or tasks that cannot be divided into parts and allocated individually.

In addition, networks have become more relevant in an era of globalization. This phenomenon is making people to establish new ties, restructuring the world and shifting the focus from the local to the global (Monge and Contractor 2003). Globalization has also made
possible a transformation in communication technologies (Monge and Contractor 2003); affecting the networks, transforming the way people communicate and their relationships.

Epistemic communities are thus, agents that connect actors and transmit information for policy making (Keck and Sikkink 1999; Karlsson 2004; Haas 2016). According to Monge and Contractor (2003) creating inter-organizational alliances requires building extensive knowledge networks among prospective partners and maintaining them among current partners. These knowledge networks are mechanisms through which organizations share and transmit both explicit and tacit knowledge (2003: 24).

The network structure facilitates the transmission and diffusion of information between the epistemic community’s members, influencing the manner it transmits knowledge and how it associates with relevant policy actors. The structure facilitates multiple connections, making more feasible to associate with different epistemic communities and other groups interested in the same topic. They connect with NGOs, governments, international organizations and their secretariats. These actors have an impact in how epistemic communities influence the policy process since they give access to policy makers (Karlsson 2004). In addition, this structure allows the epistemic community to develop more ties that will help the group to influence effective cooperative outcomes (Biermann 2008).

The complexity and variety of issues in international affairs has increased the number of experts immerse in international policy making process as part of governments, delegations and international secretariats (Haas 2016: 32) facilitation the insertion of an epistemic community in the policy process. The capacity of influencing the process, therefore, lies in the positions they have: as national or international bureaucrats, diplomats or policy makers (Sebenius 1992; Antoniades 2003; Davis Cross 2013). Members of epistemic communities in bureaucratic positions can lead to the “institutionalization of the community’s influence in
the policy process (Antoniades 2003: 32)”. Epistemic communities’ ideas are more likely to be effectively diffused if their members are part of domestic or international bureaucracies (Sebenius 1992; Antoniades 2003; Karlsson 2004; Davis Cross 2013; Haas 2016). Additionally, an epistemic community grounded in one group of countries can have greater influence in another group of countries (Morin 2014).

c)Context

Uncertainty is usually identified as the necessary condition for epistemic communities to influence policy making (Haas 1992; 2004; 2016; Davis Cross 2013). Uncertainty pushes policy makers to look for international advice to solve those issues that are uncommon, and at the same time, it creates pressure internationally to cooperate and manage complex problems (Haas 2016:41) Under uncertainty policy makers are faced with limited resources to understand and assess the problem and expected outcomes; increasing the demand for expertise and specialized knowledge (Antoniades 2003; Haas 1992, 2016; Weiss, Carayannis and Jolly 2009). This is more common in individual issue-areas since decision makers cannot master all issues (Haas 2016:28), as well as during shocks or crises (Haas 2016: 6). A crisis will affect political leaders’ capacity to formulate policies since they don’t know the effect of these given the situation, they lack the information to estimate risk, calculate cost, “making them to loose certainty about planning (Haas 2016:41).” Thus, when uncertainty prevails, leaders will provide decision-making authority and power to experts and scientists since they are regarded as the best tool to reduce uncertainty (Haas 2016).

In this context, epistemic communities act as sources of information or consultants, and can influence the policy process and actors’ interests; they can mobilize support for ideas and influence agenda-setting (Kamradt-Smith 2012a; Antoniades 2003). Thus, greater levels of uncertainty about material national interest and national effects increases the influence of
epistemic communities in the policy making process, due to their knowledge (Keck and Sikkink 1999; Karlsson 2004; Haas 2004; Davis Cross 2012).

Uncertainty creates an space for epistemic community activity, but the degree of uncertainty, does not necessarily correlate with the likelihood of epistemic community impact (Davis Cross 2013:150). Very influential epistemic communities may impact policy goals even when the issue seems quite certain. New evidence or information may come to light that compels epistemic communities to develop new policy goals in previously resolved policy areas; or through ongoing internal deliberation and re-evaluation, epistemic communities may reach consensus on previously contested knowledge (Davis Cross 2013:152). Hence, it is more likely that epistemic communities that have emerged and that remain internally cohesive will be more influential in policy making (Davis Cross 2013).

This will also have an effect in international cooperation, since the active participation of these experts can increase cooperation and policy convergence, contingent on the degree of involvement in the situation and the policies and measures formulated to solve the situation (Haas 2016).

Other contextual factors are important as well (domestic and international politics, coexisting communities, leaders, security threats, economic costs) (Karlsson 2004; Davis Cross 2013). For instance, if national security threats have increased, epistemic communities specializing in this issue-area are more likely to be consulted (Davis Cross 2013). Besides if the economic cost to change a particular policy is high, epistemic community persuasion is likely to be more difficult (Karlsson 2004; Davis Cross 2013).

Under this conceptualization, therefore, international cooperation in the international response to infectious diseases varies due to the involvement of epistemic communities in the process. The degree in which each of these communities can affect cooperation depends
on a series of factors since there is no one single epistemic community, their knowledge is contested, and their opinion is not always perceived as relevant for policy-making. To impact international cooperation an epistemic community has to become a global knowledge network; when an epistemic community is more integrated (cohesive), with capacity to influence policy making processes due to their position and ties, and their knowledge claims are adopted by policy makers, levels of cooperation will increase (Hass 1990; 1992; 2004; Sebenius 1992; Davis Cross 2013).

**Participation of epistemic communities in influenza pandemic cooperation**

Influenza pandemics is a subject that has called the attention of policy and decision makers at all levels during the last 25 years. Due to the need for policies to face the disease and expert knowledge, an epistemic community was created and has increasingly became stronger and highly influential at the national and international level. Nowadays medical experts and scientists play a very important role in the management of this disease and the establishment of public policies, given the value that scientific evidence plays in improving the knowledge about it (Kamradt-Scott 2012a, 2012b, 2013).

The possibility of facing the threat of a new influenza pandemic has created a crisis with high levels of uncertainty. Despite the knowledge that we have accumulated about the disease, a new influenza virus can emerge and create a situation in which information is scarce to understand the behavior of the new strain as well as data to formulate the appropriate policy choices for containing the outbreak (see Box 1 for a technical note about influenza pandemic).
Box 1. Influenza Pandemic: Why Do We Care?

The global fear over a pandemic influenza, and the design of policies for preparedness and response to it, are based in scientific evidence and historical experience. Scientifically defined, influenza is a respiratory infection “characterized by the rapid onset of symptoms (Lee and Fidler 2007:216)”. In 1957, influenza viruses were characterized for the first time, dividing them in three types of influenza viruses: A, B, and C.

The type A virus has the capability to infect humans and animal species, which implies a greater number of “pathogen reservoirs (Lee and Fidler 2007:216)” Researchers determined that influenza sub-type A appeared due to two surface glycoprotein receptors – the sixteen haemagglutinin (HA 1-16) from a pool of influenza virus found in birds and three haemagglutinin (HI to H3) found in human virus – and nine neuraminidases (NA 1-9)(Robertson and Inglis 2011) . The A type is a highly unstable virus because it can mutate in minor ways, known as an antigenic drift, which means that there is a mutation in the HA gene. In addition, A type can also mutate in major ways, known as an antigenic shift, which refers to the process of avian gene segments from the circulating avian virus combining with the human adapted virus to create an avian/human combination. In scientific literature, this is referred to as “genetic re-assortments which occurs when the human influenza and animal influenza viruses co-infect a human or an animal (such as pigs) (Avery 2010; Lee and Fidler 2007). This genetic re-assortment has provoked the most notable pandemics of the 20th century. In fact, the US Department of Health and Human Security explains that when a new influenza A virus emerges, a flu pandemic can easily occur because the population has little to no immunity against it and it spreads quickly from person to person worldwide (DHHS 2012).

Historical epidemiologic studies have found this A type of influenza virus and its antigenic shifts have been the cause of influenza pandemics registered over centuries (Robertson and Inglis 2011:40), from the 1889 pandemic (caused by the H2 subtype) to the 1898 outbreak (caused by an H3) during the nineteenth century. While deadly, those outbreaks were minor in comparison to the worst pandemic ever recorded: the 1918 “Spanish Flu” caused by a H1N1 virus, “which WHO estimates killed 40 to 50 million people worldwide (Enemark 2009:193)” After that, the world has experienced a pandemic by H2N2 virus in 1957-1958; a H3N2 virus pandemic in 1968-69; and a H1N1 outbreak in 1977. In the case of the type A(H1N1) virus of the pandemic in 2009, molecular studies determined that it derived from several virus circulating among pigs (the H3N2 virus from North America), the classical swine H1N1, and the Eurasian avian-like swine H1N1 virus (Girard et al. 2010:4896).

The influenza viruses circulating in animals pose threats to human health because humans can become ill when infected with viruses from animal sources (this phenomenon has also been described as the human-animal interface). The primary risk factor for human infection appears to be direct or indirect exposure to infected live or dead animals or contaminated environments (WHO definition). The significant threat to human health from such avian-influence strains, therefore, lies in the potential of the virus to mutate into a form capable of sustained person to person transmission. In the case of the currently active H5N1, the virus managed to infect humans, improving its potential for mutation opportunities (Enemark 2009). From 2003 to March 2012, the World Health Organization has registered 598 cases of H5N1 in humans across 15 countries, with 352 deaths, calculating a global average case-fatality rate around 58% (WHO 2012). Nevertheless, the spread of H5N1 has not yet reached pandemic proportions as the virus has not been efficient enough to become “a virulent pathogen capable of sustained human-to-human transmission (Lee and Fidler 2007:215)” Still, there remains a fear of a pandemic caused by this virus, as there is a potential for an estimated global health death toll in the range of 2-million to 50-million people (Marshall 2005).
During outbreaks policy makers can still face limited knowledge to understand the problem and assess expected outcomes, increasing their demand for technical expertise and specialized knowledge (Antoniades 2003; Haas 1992; Weiss, Carayannis and Jolly 2009; Keck and Sikkink 1999; Karlsson 2004; Haas 2004; Davis Cross 2012; Kamradt-Scott 2012a). Thus, in pandemic influenza the experts’ knowledge and the information they provided through evidence-based medicine have been influencing the policies to prevent, manage and control the disease, as well as the actors’ interests (Kamradt-Scott 2012a). Besides, evidence-based medicine has allowed the epistemic community to create shared principled beliefs, casual beliefs and common notions of validity (Kamradt-Scott 2013). Hence, the degree of uncertainty that emerges during an pandemic makes governments depend on others’ policy choices to achieve their goals, allowing the epistemic community to develop and grow (Haas 1992: 3-4).

The contingency confronts policy makers with a situation in which they do not know what to expect and/or what to do. Therefore, they will require advice and the necessary information from public health scientists that would determine the appropriate actions to follow. This scenario is extrapolated to the international level. A disease outbreak may represent a situation in which current norms and institutions are insufficient to galvanize international cooperation and are unable to address the problem. Besides the epistemic community’s knowledge in the topic, policy makers are also open to its influence since its advice rests in evidence-based medicine, which has given members of this network common values and principles (Kamradth-Scott 2012:S112).
The importance of the epistemic community’s advice for influenza policy making has allowed its members to insert themselves into policy-making apparatus in national governments and international organizations (Kamradt-Scott 2012a, 2012b, 2013). Due to their knowledge, they can turn into expert advisors to national governments and international organizations. Since the transfer of ideas occurs through international task forces, committees or expert groups (Stone 2012), the epistemic community’s influence has increased just by belonging to any of these mechanisms (Karlsson 2004; Min and Ramirez 2008). In addition, constant participation in these fora helps them to strengthen epistemic community members’ ties (Biermann 2008; Davis Cross 2011). In particular, the World Health Organization (WHO) has provided a policy space for these actors, by integrating hundreds of professional with specialized knowledge in its different areas, such as expert committees, task forces, specialized consultations, or as advisors. This is a common feature in global health since experts and scientists are most of the time inserted into the policy process at the national and international level.

Finally, during the formation and consolidation of this epistemic community important figures have appeared, acting as policy entrepreneurs and increase the network capacity to influence policy making (Dolowitz and Marsh 1996; Karch 2007; Gerspacher and Dupont 2007). These are experts with “their own personal resources of expertise, persistence, and skills to achieve certain policies they favor (Weisert 1991: 263)”. Policy entrepreneurs may be international bureaucrats, national officials, civil servants, recognize businessmen, scholars or policy activists (Dolowitz and Marsh 1996; Karch 2007). Due to their position and resources, they can influence policy-making, facilitating the diffusion of certain policies. In global health, policy entrepreneurs have played a crucial role in influencing international cooperation, framing agendas and persuading policy makers to adopt specific policies. They
differentiate from other members due to their strong leadership and their capacity to insert themselves into the policy-making process. In pandemic influenza people like David Nabarro, head of the UN System Influenza Coordinator, and Margaret Chan, WHO Director General, have been notably outspoken in the topic and have the political influence to voice the epistemic community’s concerns and policy recommendations.

The influence of the pandemic influenza epistemic community in international cooperation for preparedness and response

The role played by the pandemic influenza epistemic community has been crucial the last decades to face outbreaks such as the avian influenza H5N1 in 1997 and 2003 or the human influenza H1N1 in 2009. Besides all the characteristics mention before, the epistemic community evolved for decades, being able to consolidate as a powerful actor in the international pandemic influenza governance.

Influenza has been a major health issue for centuries and medical historians have been able to trace the disease centuries ago finding that the virus has killed millions of people during the course of human history and that it is likely to continue like this. For decades, the medical community has studied the virus and known the severity of a pandemic outbreak. Most knowledge about the influenza virus comes from the XX century. The porcine virus was isolated and identified in 1931 by Richard Shope and Paul Lewis, and in 1933 Wilson Smith, Christopher Andrewes and Patrick Laidlaw isolated and identified the human virus, named influenza A (Kamradt-Scott 2012b:92). The first vaccine was developed in 1940 (Kamradt-Scott 2012b:92)

In terms of international collaboration, the Office International d’Hygiene Publique (OIHP), established in 1907, was the first international institution that published
recommendation to manage a pandemic (Shapshak 2011:76). The World Health Organization (WHO) would become the successor of OHIP, and would continue to deal with this topic. At the same time, specialized institutions would be created specifically with the disease, such as the World Influenza Centre (WIC) which arose in London in 1947 as a research center in influenza (Kamradt-Scott 2012a; 2012b:93; 2013). This Center was part of the WHO Influenza Program to plan against the recurrence of future pandemics, develop control methods to limit the impact when a pandemic did appear and limit as much as possible the economic impacts of the disease and a pandemic (Payne 1953). By that time, the WHO saw the imperative need for incorporating expert knowledge in its programs as well as to coordinate research efforts (Payne 1953:763). Thus, in 1950, the 3rd World Health Assembly (WHA) requested to form an Expert Committee on Influenza to instruct the organization`s activity (Kamradt-Scott 2013). The panel was created in 1952 to review the WHO Influenza Program and as part of its mandate “made suggestions for more effective international collaboration (Payne 1953: 763)”. Another critical component of the program was the creation of an international network of laboratories and scientist to share information on the latest influenza-related scientific discoveries; this network continues to function to the present day and that forms the basis of international efforts to control and mitigate the health impacts of influenza (Kamradt-Scott 2012b: 93). In this regard, experts and Scientifics have been the main bloc in the program, given that “the centrality of biomedical knowledge, techniques, processes, interventions and personnel to control of influenza was made apparent from the inception of the WHOs influenza program in 1947 (Kamradt-Scott 2012a: S115)”. Hence, the Global Influenza Surveillance Network (GISN) created an international network of influenza research laboratories that would assist and provide the WHO and to its member states with technical support. Initially the network comprised 40 laboratories (Jensen and
Hogan 1958) (Kamradt-Scott 2012a:S113), including a network of laboratories named “WHO influenza centers” with experts in 42 countries. Dr. Christopher Andrewes, and the WIC, was designated head of the international influenza center (Payne 1953: 765; Kamradt-Scott 2013:108). This network would be the foundation of the influenza epistemic community given that it connected the most prominent experts in the world, working together in influenza research to influence international policy making. Table 1 presents the network member countries and experts.

<table>
<thead>
<tr>
<th>Country</th>
<th>Institution</th>
<th>Lead expert</th>
</tr>
</thead>
<tbody>
<tr>
<td>INTERNATIONAL</td>
<td>World Influenza Centre</td>
<td>Dr. C. H. Andrewes</td>
</tr>
<tr>
<td></td>
<td>Strain Study Center for the Americas</td>
<td>Dr. T. P. Magill</td>
</tr>
<tr>
<td>NIGERIA</td>
<td>Virus Research Institute</td>
<td></td>
</tr>
<tr>
<td>UNION OF SOUTH AFRICA</td>
<td>The South African Institute for Medical Research</td>
<td>Dr. J. H. S. Gear</td>
</tr>
<tr>
<td></td>
<td>University of Cape Town</td>
<td>Professor M. van den Ende</td>
</tr>
<tr>
<td>ARGENTINA</td>
<td>Instituto Bacteriologico Carlos G. Malbran</td>
<td>Dr. A. S. Parodi</td>
</tr>
<tr>
<td>BRAZIL</td>
<td>Instituto Oswaldo Cruz</td>
<td>Dr. J. G. Lacorte</td>
</tr>
<tr>
<td>CANADA</td>
<td>Laboratory of Hygiene, Department of National Health and Welfare</td>
<td>Dr. F. P. Nagler</td>
</tr>
<tr>
<td></td>
<td>The Connaught Medical Research Laboratories, University of Toronto</td>
<td>Dr. C. E. van Rooyen</td>
</tr>
<tr>
<td>CHILE</td>
<td>Instituto Bacteriologico de Chile</td>
<td>Dr. Raul Palacios</td>
</tr>
<tr>
<td>JAMAICA</td>
<td>Department of Pathology, University College of the West Indies</td>
<td>Dr. L. Grant</td>
</tr>
<tr>
<td>MEXICO</td>
<td>Instituto de Salubridad y Enfermedades Tropicales</td>
<td>Dr. Gerardo Varela</td>
</tr>
<tr>
<td>PUERTO RICO</td>
<td>School of Tropical Medicine, University of Puerto Rico School of Medicine</td>
<td>Dr. J. E. Perez</td>
</tr>
<tr>
<td>Country</td>
<td>Institution</td>
<td>Contact Person</td>
</tr>
<tr>
<td>-------------------------</td>
<td>------------------------------------------------------------------------------</td>
<td>------------------------</td>
</tr>
<tr>
<td>UNITED STATES OF AMERICA</td>
<td>Influenza Information Center, National Institutes of Health</td>
<td>Dr. Dorland J. Davis</td>
</tr>
<tr>
<td></td>
<td>Communicable Disease Center, US Public Health Service</td>
<td>Dr. M. F. Schaeffer</td>
</tr>
<tr>
<td></td>
<td>Division of Laboratories, California State Department of Public Health</td>
<td>Dr. E. H. Lennette</td>
</tr>
<tr>
<td></td>
<td>State University of Iowa</td>
<td>Dr. A. P. McKee</td>
</tr>
<tr>
<td></td>
<td>Boston City Hospital</td>
<td>Dr. M. Finland</td>
</tr>
<tr>
<td></td>
<td>Department of Epidemiology, University of Michigan School of Hygiene and Public Health</td>
<td>Dr. T. Francis, jr.</td>
</tr>
<tr>
<td></td>
<td>Division of Laboratories and Research, New York State Department of Health</td>
<td>Dr. I. J. Gordon</td>
</tr>
<tr>
<td></td>
<td>University of Pittsburgh School of Medicine</td>
<td>Dr. J. E. Salk</td>
</tr>
<tr>
<td>EGYPT</td>
<td>Serum and Vaccine Laboratory</td>
<td>Dr. Mohamed Aly &amp; Dr. I. M. Hassan</td>
</tr>
<tr>
<td>ISRAEL</td>
<td>Hadassah Medical School, The Hebrew University</td>
<td>Dr. H. Bernkopf</td>
</tr>
<tr>
<td>AUSTRIA</td>
<td>Bundesstaatliche bakteriologisch-serologische Untersuchungsanstalt</td>
<td>Dr. E. Petrowsky</td>
</tr>
<tr>
<td>BELGIUM</td>
<td>Laboratoire Central d'Hygiene</td>
<td>Dr. P. Nelis</td>
</tr>
<tr>
<td>DENMARK</td>
<td>Statens Seruminstitut</td>
<td>Dr. J. Orskov &amp; Dr. P. von Magnus</td>
</tr>
<tr>
<td>FINLAND</td>
<td>Valtion Serumlaitos</td>
<td>Dr. Kari J. Penttinen</td>
</tr>
<tr>
<td>FRANCE</td>
<td>Mlle G. Cateigne, Institut Pasteur</td>
<td>Professeur R. Dujarric de la Riviere, Professeur Pierre Lupine, &amp;</td>
</tr>
<tr>
<td>GERMANY (WEST)</td>
<td>Hygienisches Institut der Universitat Marburg</td>
<td>Professor K. Herzberg</td>
</tr>
<tr>
<td>Region</td>
<td>Institution Name and Details</td>
<td>Contact Person</td>
</tr>
<tr>
<td>--------</td>
<td>-------------------------------</td>
<td>----------------</td>
</tr>
<tr>
<td>BERLIN-WEST</td>
<td>Bernhard-Nocht-Institut fur Schiff- und Tropenkrankheiten</td>
<td>Professor E. G. Nauck</td>
</tr>
<tr>
<td>GREECE</td>
<td>Central Public Health Laboratory, Ministry of Hygiene</td>
<td>Dr. S. G. Pavlidis</td>
</tr>
<tr>
<td>ICELAND</td>
<td>University of Iceland Institute for Experimental Pathology</td>
<td>Dr. B. Sigurdsson</td>
</tr>
<tr>
<td>IRELAND</td>
<td>St. Vincent's Hospital</td>
<td>Dr. P. N. Meenan</td>
</tr>
<tr>
<td>ITALY</td>
<td>Istituto Superiore di Sanita</td>
<td>Professor I. Archetti</td>
</tr>
<tr>
<td>NETHERLANDS</td>
<td>Instituut voor Praeventieve Geneeskunde</td>
<td>Professor J. D. Verlinde</td>
</tr>
<tr>
<td></td>
<td>Interne Universiteitskliniek</td>
<td>Professor J. Mulder</td>
</tr>
<tr>
<td>NORWAY</td>
<td>K. W. Wilhelmsen og frues Bakteriologiske institutt</td>
<td>Professor Th. Thjøtta</td>
</tr>
<tr>
<td>PORTUGAL</td>
<td>Dr. Ricardo Jorge Laboratorio de Bacteriologia Sanitaria do Instituto Superior de Higiene</td>
<td>Dr. A. A. C. Sampaio</td>
</tr>
<tr>
<td>SPAIN</td>
<td>Escuela Nacional de Sanidad</td>
<td>Dr. F. Perez Gallardo</td>
</tr>
<tr>
<td>SWEDEN</td>
<td>Statens bakteriologiska laboratorium</td>
<td>Dr. A. Svedmyr</td>
</tr>
<tr>
<td>SWITZERLAND</td>
<td>Institut d'Hygiene, Universite de Geneve</td>
<td>Professor E. Grasset</td>
</tr>
<tr>
<td></td>
<td>Institut fur Hygiene und Bakteriologie</td>
<td>Professor C. Hallauer</td>
</tr>
<tr>
<td>TURKEY</td>
<td>Refik Saydam Central Institute of Hygiene</td>
<td>Dr. Niyazi Erzin</td>
</tr>
<tr>
<td>UNITED KINGDOM</td>
<td>Public Health Laboratory, General Hospital</td>
<td>Dr. L. Hoyle</td>
</tr>
<tr>
<td></td>
<td>Bacteriology Department</td>
<td>Dr. R. H. A. Swain</td>
</tr>
<tr>
<td></td>
<td>Central Public Health Laboratory</td>
<td>Dr. F. O. MacCallum</td>
</tr>
</tbody>
</table>
By 1954, the number increased to over 50 centers in 42 countries, and in 1977 the GISON had reached 98 national influenza centers (NICs) in 70 countries (Pereira 1979; Kamradt-Scott 2012a: S113).
However, by the 1980s influenza was no longer a major topic of interest at the political level due to the emergence of new diseases such as HIV. As consequence, by the mid-1990s the WHO Influenza Program and the GSIN were reduced (Lederberg 1996). In 1988 the then-directors of the WHO Collaborating Centers issued a statement calling for the WHO Influenza Program to be maintained and strengthened because its importance for activities to prevent and control the disease (WHO 1988: 457) (Kamradt-Scott 2012a: S114).

Political interest in the WHO’s influenza program reemerged in 1997 following an outbreak of H5N1 avian influenza in Hong Kong (Kamradt-Scott 2012a: S114; 2012b:94), which reached a 33% case fatality rate (Lee and Fidler 2007:217). One of the most prominent actors during this pandemic was Margaret Chan, Hong Kong’s Health Minister, who later would become the WHO Director General.

The H5N1 outbreak renewed international interest and pushed the WHO to strengthen its influenza program. The organization had to develop new policies guidelines on how its member states should prepare for mitigating an influenza pandemic. Thus, the WHO’s first official pandemic influenza preparedness guideline document was released in 1999 (Kamradt-Scott 2012a: S114).

The political interest due to the H5N1 outbreak also created an outburst of international arrangements to face the possibility of a new pandemic outbreak such as the United Nations System Influenza Coordinator (UNISIC). In addition, other international organizations incorporated programs and surveillance areas to prevent and manage a future pandemic influenza, such as the Food and Agriculture Organization (FAO), the World Bank, the International Monetary Fund (IMF), the World Organization for Animal Health (OIE), the Association of Southeast Asian Nations (ASEAN) and the Asia-Pacific Economic Cooperation (APEC) (Lee and Fidler 2007: 220; Kamradt-Scott 2012a: S115).
Along with this, regional and sub-regional networks were created and incorporated pandemic influenza as a major topic in their agendas. This is the case of the *Global Health Security Initiative (GHSI)*. The GHSI is an informal network under the leadership of the United States created after 9/11. GHSI is a high-level decision making group composed of the Ministers of Health from the G-7 nations (Canada, Germany, France, Italy, Japan, United States and United Kingdom), Mexico, and the European Commission. The main goal of the GHSI is to create a forum where the member countries can discuss and formulate policies for preparedness and response to health security threats, commonly known as CBRN (chemical, biological, radiological, and nuclear). This motivated the creation of the Global Health Security Action Group (GHSAG), with senior level officers coordinating and leading technical working groups, one of the related to pandemic influenza (GHSI 2011).

The Initiative has been an important forum for policy making, offering a space for the sharing of best practices and consultations, as well as facilitating communication among its members. It has also built a network among the countries reinforcing the influenza epistemic community. The GHSI has facilitated the emergency preparedness and public health functions for North America Plan for Avian and Pandemic Influenza, a regional agreement among the United States, Canada and Mexico. The incorporation of pandemic influenza planning as one of the top priorities for the GHSI has created synergies between the mechanisms and policies promoted by both instruments, GHSI and NAPAPI (Avery 2007:8).

In addition, the US President George W. Bush proposed the creation of the International Partnership on Avian and Pandemic Influenza (IPAPI), at the United Nations General Assembly on September 14, 2005. The partnership’s goal was to bring countries together with shared interests in generating and coordinating policies to address avian and pandemic influenza (DHHS 2012). IPAPI would compel to major donor countries to invest
in and assist the countries already dealing with the H5N1 virus for strengthening capabilities for influenza pandemics\(^1\). (Kamradt-Scott 2012b: 95)

This panorama explains that since the creation of the WHO’s Expert Committee on Influenza in 1952 to the present day, medical professionals have been in key advisory positions at the national and international levels, continuing to establish and delineate public health policy with regard to influenza prevention and control ((Kamradt-Scott 2012a: S115). By 2011, 135 institutions in 105 countries composed the GISN. After the Pandemic Influenza Preparedness (PIP) Framework in May 2011, the network was renamed WHO’s Global Influenza Surveillance and Response System (GISRS) with 148 National Influenza Centers and 10 WHO Collaborating Centres (http://www.who.int/influenza/gisrs_laboratory/en/ accessed June 10, 2016). It has become the most important network for influenza surveillance, connecting a broad group of experts working in influenza (Shapshak et al. 2011).

**The H1N1 Influenza pandemic and influenza epistemic community role in the response.**

In 2009, the WHO enforced for the first time the updated International Health Regulations (IHRs 2005) to respond to the influenza H1N1 outbreak. On April 12 (in compliance with this regulations), the Mexican government reported that some people were showing symptoms of a severe respiratory disease to the Regional Office of the WHO in the Americas [the Pan-American Health Organization (PAHO)] (Jimenez 2010). During the same days, the Centers for Disease Control and Prevention (CDC) in the United States realized that there were uncommon characteristics in the country’s flu season (Cohen 2012). This situation was also notified at the WHO.
Following this announcement, more countries reported cases. Table 2 presents the characteristics of the influenza outbreak.

<table>
<thead>
<tr>
<th></th>
<th><strong>H1N1 2009</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>VIRUS</strong></td>
<td>Influenza</td>
</tr>
<tr>
<td><strong>DEATH RATE</strong></td>
<td>1%-2%</td>
</tr>
<tr>
<td><strong>TYPE OF TRANSMISSION</strong></td>
<td>Human to human</td>
</tr>
<tr>
<td><strong>NO. OF CASES</strong></td>
<td>More than 340,000 (Oct. 2009)</td>
</tr>
<tr>
<td><strong>NO. OF COUNTRIES</strong></td>
<td>214 (Oct. 2010)</td>
</tr>
<tr>
<td><strong>TREATMENT</strong></td>
<td>Tamiflu</td>
</tr>
<tr>
<td><strong>VACCINES</strong></td>
<td>Available after six months</td>
</tr>
</tbody>
</table>

Table 2. Characteristics influenza H1N1

By August 2010, around 214 countries (and territories) had reported more than 340,000 laboratory-confirmed cases of pandemic influenza H1N1 2009. This figure included over 18,449 deaths (WHO website). Table 3 summarizes the number of deaths per region.

<table>
<thead>
<tr>
<th>Region</th>
<th>No. of deaths*</th>
</tr>
</thead>
<tbody>
<tr>
<td>WHO Regional Office for Africa (AFRO)</td>
<td>168</td>
</tr>
<tr>
<td>WHO Regional Office for the Americas (AMRO)</td>
<td>8533**</td>
</tr>
<tr>
<td>WHO Regional Office for the Eastern Mediterranean (EMRO)</td>
<td>1019</td>
</tr>
<tr>
<td>WHO Regional Office for South-East Asia (SEARO)</td>
<td>1992</td>
</tr>
<tr>
<td>WHO Regional for the Western Pacific (WPRO)</td>
<td>1858</td>
</tr>
<tr>
<td>WHO Regional Office for Europe (EURO)</td>
<td>4879**</td>
</tr>
<tr>
<td>Total</td>
<td>18449</td>
</tr>
</tbody>
</table>

*The number of deaths is estimated by the World Health Organization as of August 2010.
**The numbers might be underrepresented since not all cases were reported.

Table 3. Distribution of deaths by region during the H1H1 outbreak. Source: World Health Organization, Global Alert, and Response

The international response to the H1N1 outbreak was unprecedented. Due to the circumstances, the WHO Director General called for an Emergency Committee under the IHRs to assess the situation. The first meeting was held on April 25, 2009. As a result, the members of the Committee agreed that, in accordance with the IHRs Article 12, the situation

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2 The rules to establish an Emergency Committee are stated in the IHRs 2005, Article 48.
constituted a “public health emergency of international concern”. This committee was integrated by expertes members, most of them part of the network of expertes working in pandemic influenza. Table 4 presents the composition of the Emergency Committee.

<table>
<thead>
<tr>
<th>NAME</th>
<th>COUNTRY</th>
<th>ORGANIZATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dr. Lawson Ahadzie</td>
<td>Ghana</td>
<td>Ghana Health Service/Ministry of Health</td>
</tr>
<tr>
<td>Dr. Rogelio Pérez Padilla</td>
<td>Mexico</td>
<td>National Institute of Respiratory Diseases &quot;Ismael Cosío Villegas&quot;</td>
</tr>
<tr>
<td>Prof. Neil Morris</td>
<td>United Kingdom</td>
<td>Department of Infectious Disease Epidemiology, Imperial College Faculty of Medicine</td>
</tr>
<tr>
<td>Mr. André Basse</td>
<td>France</td>
<td>Embassy of Senegal</td>
</tr>
<tr>
<td>Dr. Wing Hong Seto</td>
<td>Hong Kong</td>
<td>Department of Microbiology, Queen Mary Hospital</td>
</tr>
<tr>
<td>Dr. Muhammad Akbar Chaudhry</td>
<td>Pakistan</td>
<td>Fatima Jinnah Medical College</td>
</tr>
<tr>
<td>Dr. Masato Tashiro</td>
<td>Japan</td>
<td>Department of Viral Diseases and Vaccine Control, National Institute of Infectious Diseases</td>
</tr>
<tr>
<td>Dr. Claude Thibeault</td>
<td>Canada</td>
<td></td>
</tr>
<tr>
<td>Dr. John Wood</td>
<td>United Kingdom</td>
<td>Division of Virology, National Institute for Biological Standards and Control</td>
</tr>
<tr>
<td>Prof. Maria Zambon</td>
<td>United Kingdom</td>
<td>Virus Reference Department, Health Protection Agency, Centre for Infection Diseases</td>
</tr>
<tr>
<td>Dr. Supamit Chunssuttiwat</td>
<td>Thailand</td>
<td>Department of Disease Control, Ministry of Public Health</td>
</tr>
<tr>
<td>Dr. Nancy Cox</td>
<td>USA</td>
<td>Centers for Disease Control and Prevention</td>
</tr>
<tr>
<td>Dr. Anthony Evans</td>
<td>Canada</td>
<td>Aviation Medicine Section, International Civil Aviation Organization</td>
</tr>
<tr>
<td>Prof. John Mackenzie</td>
<td>Australia</td>
<td>Division of Health Sciences, Curtin University</td>
</tr>
<tr>
<td>Prof. Arnold Monto</td>
<td>USA</td>
<td>Department of Epidemiology, University of Michigan</td>
</tr>
<tr>
<td>Dr. Fernando Otaiza</td>
<td>Chile</td>
<td>National Infection Control Program, Ministry of Health</td>
</tr>
</tbody>
</table>

Table 4. Members Emergency Committee H1N1

After the Emergency Committee’s 4th meeting (June 11, 2009), the WHO declared the outbreak as a global pandemic. Since the virus had already spread across several distinct
geographical regions, the pandemic status was reached (Howard 2010; Potter and Jennings 2011).

Mexico received technical cooperation to identify the virus immediately after notifying the situation\(^3\). This step was crucial in determining the measures to be followed during the international response. The WHO deployed GOARN, providing technical and material assistance to manage the outbreak. There was an important exchange of information worldwide and flows of financial assistance increased to those countries that needed to invest in national capabilities for managing infectious diseases\(^4\). However, the response had critical moments, when some countries decided to implement different measures to the recommended by the WHO, creating negative effects for the most affected nations (Mexico, the United States, and Canada).

In response to the outbreak, the international community was able to put in place the new IHRs, created after the SARS and H5N1 outbreaks.

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\(^3\) The WHO sent a group of experts from GOARN to support different areas. Experts from Canada and the CDC went to Mexico to set up real-time PCR technology\(^3\) to directly test for H1N1. In addition, they also trained Mexican molecular biologists in different states to work with the PCR machines\(^3\). The Canadian-United States expert team included two people from the Winnipeg National Laboratory of Microbiology, three epidemiologists, two laboratory technicians, and one logistic advisor from CDC Atlanta\(^3\). The United States provided the funding and technical assistance for the construction of a new National Laboratory BSL-3 (Biosecurity Level 3), which will improve Mexico’s future capabilities in disease research\(^3\).

\(^4\) This cooperation included US$0.68 under the concept of development assistance in 2010 to build laboratory capacities (DAC 2013). Other countries provided financial assistance as well. Australia provided a significant amount of many to support actions in South Asia.
The research focuses on the participation of the influenza epistemic community in the international response. The response was highly influenced by this network of experts through its medical experts and scientists who were working in governments and international organizations (Kamradth-Scott 2013).

During the onset of the outbreak, the epistemic community worked together to identify the virus and formulate measures for control, management, and containment. At the center of this response were the National Laboratories part of the GSIN, which were in charge to notify and identify the virus. As well, experts’ constant communication and personal connections made easier to identify the new strain.

Once reports of unusual respiratory diseases started to circulate in Mexico, the Head of the National Laboratory, sent an electronic communication to the Head of the Winnipeg National Microbiology Laboratory in Canada, to explain the situation in Mexico. The head of the Laboratory offered full support and cooperation to his Mexican counterparts. He offered the assistance of the microbiology laboratory to the identification of samples. Afterward, Mexico received assistance from the CDC in Atlanta, USA; the designated collaborative center in the WHO laboratory network for influenza.

Flu samples from Mexico arrived in Winnipeg on April 22. In six hours, the Canadian lab confirmed that the specimens contained a novel strain of influenza virus A (H1N1) with a swine virus component. On April 23, in a tri-national call conference the CDC also indicated that the same virus had been confirmed in an analysis made of samples from respiratory illnesses reported in California (Cohen 2009). The confirmation of a novel influenza strain in the country made the Mexican Government issue a declaration of national
emergency on the evening of April 23. Soon after, Mexico and the United States notified the WHO about the disease outbreak.

The cooperation among Mexico, the United States, and Canada was possible because the officers of these countries had been working together in different influenza networks, as part of the pandemic influenza epistemic community. This community has been an important component for strengthening personal and institutional linkages amongst those working in health community and for increasing international cooperation. A group of experts from these countries, along with other professional worldwide, have worked together in the areas of surveillance, preparedness, and response to influenza pandemics. They have had constant interactions as a result of their participations in networks such as GISN, NAPAPI, GHSI, APEC. These networks were created and strengthened after the H5N1 outbreak, and they have worked since then in the areas of preparedness and response to human and animal influenza. Map 1 illustrates this connections.
These experts are professionals in different fields, who also hold bureaucratic positions in national governments and international organizations. They facilitated technical assistance and the implementation of international measures to manage the outbreak.

During the outbreak, the members of the community participated in multiple international forums. Most of these meetings were organized to assess the situation and to analyze the international response. They were important venues that increased the influence of the epistemic community members in the international response. Some of the most important meetings were:

- the High-level Consultation on Influenza A(H1N1) held during the 62<sup>nd</sup> World Health Assembly in May 2009;
- the High Level Meeting in influenza A(H1N1): Lessons learned and Preparedness in July 2009;
- the Special Meeting on Pandemic (H1N1) in September 2009.

The High Level Consultation is highly relevant since it took place during a WHA. Therefore, all WHO member states were able to send at least one representative to the session<sup>5</sup>. The meeting in Cancun brought together the epistemic community allowing another setting for an exchange of information between experts and policy makers. There was a high-level meeting with 40 Ministers of Health. Besides, the meeting had a technical/scientific agenda, which included workshops and round tables. There were side meetings including a GHSI Senior Officials encounter and a high-level NAPAPI meeting<sup>6</sup>. Table 5 shows the number of participants in this meeting by country or organization.

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<sup>5</sup> The meeting was part of the 62th WHA Agenda. Thus, it is not possible to have a specific list of participants since all of them were part of the official delegations.

<sup>6</sup> Information was obtained by the Mexican Government through the Access of Information Law.
<table>
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Table 5. Participants meeting H1N1 influenza Cancun 2009

The Director-General of the WHO, Margaret Chan, attended this meeting along with other WHO officials. PAHO sent a delegation of 20 people, including its Director.

Therefore, the 2009 H1N1 influenza pandemic, the medical community has been fully complicit in this framing exercise:

“As in most areas of biomedicine, a small group of experts dominate the science of influenza (...). They are the starts who set policy for organizations such as the WHO (...). They have a stake (...) in maintaining the prominence of the influenza menace, and it is difficult for influenza researchers to dispassionately assess the risk the disease poses (...)” (Vance 2011: 
An example of this is also the network of experts that was created as part of the Expert Committee. Map 2 presents a network representation of this committee.

Map 2. Experts, Emergency Committee H1N1 – 2009, NodeXL Graph

Before the outbreak, the epistemic community was working on creating a concept to capture the multi-sectoral nature of the problem. The complexity of influenza viruses required joint work of different fields. Thus, the epistemic community in influenza has incorporated experts in the fields of human and animal health, the environment, security, transportation, and trade. This has been possible due to the expectation of the damage that an influenza pandemic might cause (Cromie et al. 2011). This movement began during the International Ministerial Conference on Avian and Pandemic Influenza held in India. There, the “One health” approach was adopted to acknowledge the importance of strengthening collaboration among different fields to address zoonotic diseases (Hilgenfeld and Peiris...
The leaders of the Initiative are the World Health Organization (WHO), the Food and Agriculture Organization (FAO), and the World Organisation for Animal Health (OIE). This has created a larger community of experts involved in the influenza pandemic.

In 2009, a few days before the notification of a new influenza virus, a technical meeting, to determine the “One Health” strategy and objectives, was held in Winnipeg, Canada. 112 delegates participated in the meeting. Therefore, by the time the H1N1 outbreak started, there were already different groups of experts working on the topic. This factor positively affected the level of cooperation.

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\(^1\) Enemark, “Is Pandemic Flu a Security Threat?”, 191-214