Surveillance networks and spaces of governance: technological openness and international cooperation during the 2009 H1N1 pandemic

The (bio)politics of public health

AAG 2010

Surveillance networks and spaces of governance: Technological openness and international cooperation during the 2009 H1N1 pandemic

Adam Warren*, Morag Bell* and Lucy Budd**

* Department of Geography, Loughborough University

** Transport Studies Group, Department of Civil and Building Engineering, Loughborough University

Abstract

The ongoing 2009-10 H1N1 pandemic has highlighted the importance of global health surveillance. It has, in the words of WHO Director-General Margaret Chan, offered the opportunity to 'watch a pandemic unfold […] in real time'. Moreover, it has allowed the international community to more fully prepare for major infectious disease outbreaks. Whilst there is an expanding literature on biosecurity and preparedness, we argue that little consideration has been given to the impact of increased reliance on event-based surveillance on global public health governance. Using Margaret Chan's 2007 call for a 'new' international health diplomacy, we assess the importance of global surveillance networks (such as the Global Public Health Intelligence Network (GPHIN) and HealthMap) in informing national and transnational practices in relation to the risks posed by emerging infectious diseases. Our analysis is supported by empirical data supplied by GPHIN and by reference to national pandemic influenza preparedness plans. In conclusion, we argue that, by increasing availability of local reporting of disease outbreaks, these networks act as a powerful prompt in initiating global pandemic preparedness and, by extension, international cooperation. Yet, the ongoing H1N1 pandemic demonstrates their fragility as practices of preparedness vary between states across the global north and south.

Introduction

In a speech to the WHO Executive Board on 18 January 2010, Director-General Margaret Chan reviewed progress in public health during the first decade of the twenty-first century and outlined some of the challenges ahead. In relation to the ongoing H1N1 pandemic influenza outbreak, she drew attention to the importance of global health surveillance:

> 'This is the first pandemic to occur since the revolution in communications and information technologies. For the first time in history, the international community could watch a pandemic unfold, and chart its evolution, in real time.' (WHO, 2010a).

In an age of rapid disease spread, facilitated in large part by widespread aeromobility (Budd et al, in preparation), increased emphasis has been placed on international cooperation in 'detecting and responding to unusual outbreaks, wherever and whenever they might occur' (Ingram, 2009a: 1). One aspect of this cooperation has been the international community's increased use of, and reliance on, event-based information systems such as the Global Public Health Intelligence Network (GPHIN) and HealthMap. Whilst traditional indicator-based surveillance routinely report *cases* of disease, usually on a weekly or monthly basis, event-based surveillance aims to rapidly detect, report and assess public health *events*, including clusters of disease and rumours of unexplained deaths. Significantly, event-based systems make judgements about disease risk by monitoring often unverified media sources.

Within an expanding literature on biosecurity and preparedness (for example, Collier et al, 2004; Collier and Lakoff, 2008; Fearnley, 2008; Ingram, 2009b), hitherto little consideration has been given to the very nature of event-based surveillance systems, including the 'informal' data on which they are based, and their impact on global public health governance. In particular, there is a dearth of analysis into the ways in which the WHO and its member states utilise the 'informal' information supplied by these systems in order to make judgements concerning the spread and severity of global disease outbreaks. In this paper, we place their activity in the context of the current H1N1 pandemic, considering how disease risk is represented in the international community. Using Margaret Chan's call for 'new' international health diplomacy, we uncover the spaces captured by complex information networks that contribute to initiating pandemic preparations. We draw attention to the importance of localities, often situated in countries of the global south, in providing the source material that initiate pandemic preparedness procedures. Finally, we conclude by considering the interaction between technological and diplomatic openness in determining the effectiveness of pandemic preparedness interventions.

Methods

Our analysis is informed by a number of data sources. Policy documents, working papers and pandemic preparedness plans produced by the WHO and individual countries were consulted. In addition, reference was made to current epidemiological literature. Empirical data on GPHIN was obtained via a telephone conversation and email correspondence with GPHIN officials. This included information relating to volume of articles retrieved, classification of risk, issuing of alerts and further developments of the system. Finally empirical material on the H1N1 pandemic was obtained from HealthMap, an open-access event-based system, dispatches from national regulatory bodies such as the Centres for Disease Control and Prevention (CDC) and national news organisations, for example, *BBC News Online*. The data collection from this combination of sources facilitated analysis of the operation of global surveillance networks and the nature of 'diplomatic' openness.

Biosecurity and preparedness

In recent years, biosecurity has become a prominent site of enquiry as scholars have sought to understand various forms of expertise and practices through which disease threats are articulated and managed (Collier et al, 2004; Collier and Lakoff, 2008; Bingham et al, 2008; Ingram, 2009b). Biosecurity operations are enacted within what Bingham et al describe as a 'complex geography' where 'states and locales are increasingly asked to conform to what is regarded (in the metropolitian core) as a safe world' (2008: 1529). According to this perspective, it is the 'centralised expertise', often located in the countries of the global north, that push for 'globalising biosecurity practices' (Bingham et al, 2008: 1529), seeking 'maximal cooperation from all countries' (Ingram, 2009: 2). This drive for cooperation raises geopolitical, as well as biopolitical, questions. Indeed, there is evidence that internationally-imposed systems of biosecurity may be 'more precarious and prone to breakdown than we usually give credit' (Bingham and Hinchliffe, 2008: 190)[1]. In relation to H5N1, for example, in early 2007, it was reported that Indonesia – the country with by far the highest rate of H5N1 influenza – had stopped sharing virus samples with the WHO and instead had entered into an agreement with Baxter Health Care, a private US corporation (Ingram, 2008: 82). The vulnerability of such international systems of biosecurity has led some authors to return to Foucault and to 'his sense that security is itself a multiply enacted matter' impacting not just on nation-states and territories, but also on 'populations, *networks*, and social welfare' (Bingham et al, 2008: 1529, italics added).

[1] This was demonstrated by the response of Egypt to the arrival of H5N1 ('avian') influenza in 2006 when, arguably motivated by a need to be seen to be 'modern', the national government embarked on a cull of domestic poultry extending beyond WHO and UN Food and Agricultural Organization (FAO) advice (Hinchliffe and Bingham, 2008). One outcome of this practice was the expansion of large industrial farming practices to the detriment of the local economy and small backyard industries.

Indeed, in recent years, biosecurity practices have been applied to travel networks and become embedded in the work of global surveillance systems. Increasingly, geographers have given prominence to the implications of global mobility of various kinds for the spread of infectious diseases. Population movement, in particular, has been facilitated by a far-reaching global airline network, which, in an era of transport industry liberalisation, permits direct travel from regional cities to global cities (Budd et al, in preparation). At the same time, such inter-connectivity allows hundreds, if not thousands, of human pathogens to circulate the world's airways (Mangili and Gendreau, 2005; Leibhold et al, 2006; Pavia, 2007; Avila et al, 2008; Budd et al, 2009). During the last influenza pandemic, in 1968, 261 million passengers worldwide travelled by air (ICAO, 1968). In 2008, passenger air traffic exceeded two billion (ICAO, 2008). This increased mobility highlights the 'epidemiological vulnerability of a closely inter-connected and highly aeromobile twenty-first century world' (Budd et al, 2009: 427). It is a vulnerability that was clearly illustrated during the 2003 outbreak of SARS, which spread rapidly along major airline routes to infect over 25 countries (Bowen and Laroe, 2006; Pang and Guindon, 2004). One outcome of the SARS epidemic was the increased development of global surveillance networks such as GPHIN, to enable the early identification, and alerting, of disease threats (Blench, 2008a: 300-301).

According to Ingram, biosecurity in the context of concerns about global mobility and, increasingly, security is characterised by *anticipation* of threats 'which do not yet exist or have not been fully formed' and *preparedness*, the outcome of the former (2009b: 4). Rather than tackling specific dangers (or, like public health, relying on statistical records of past events) preparedness is more concerned with 'generic capacities that will enable responses to a broad spectrum of contingencies' (Ingram, 2009b: 4; Fearnley, 2008). It aims to 'address vulnerabilities in health infrastructure' by, for example, stockpiling drugs, strengthening hospital surge capacity and exercising response protocols (Collier and Lakoff, 2008: 14). Indeed, the concept of preparedness has been the focus of growing attention from scholars, the WHO and its member states (Collier and Lakoff, 2008; Fearnley, 2008; Garoon and Duggan, 2008). Collier and Lakoff demonstrate that the interventions comprise work across a number of scales, resulting in the assemblage of experts and organisations in new initiatives that link health and security. For example, public health officials, trans-national organisations such as the WHO and national health agencies such as the UK Health Protection Agency (HPA) increasingly operate across a number of 'overlapping and rapidly changing problem areas' (Collier and Lakoff, 2008: 9).

In relation to pandemic influenza, the nature of these interventions has been documented through varied pandemic preparedness guidance. The initiative in this policy development has been taken by the WHO, which has regularly produced pandemic guidance since 1999[2]. In 2009, the WHO

[2] WHO had initially published pandemic preparedness guidance in 1999 and updated it in 2005. The 2009 revision was reportedly necessitated due to a number of advances in 'areas of preparedness and response planning' including the

published *Pandemic Influenza Preparedness and Response* (WHO, 2009a). This guidance made specific reference to the negative implications of pandemic influenza at international and national scales, considering the impact on economies and populations (for example, social order would be 'disrupted') (WHO, 2009a: 13). Preparedness, therefore, is arguably the enactment of Foucauldian multiple biopolitical realities by many sovereign states. Indeed, Hinchliffe and Bingham note the various practices (or 'orderings') involved in the enactment of biosecurity (2008: 1536-1537). Examples outlined in national pandemic preparedness plans – often adapted from the WHO guidance – include ensuring availability of hospital beds and distribution of vaccines, and the imposition of restrictions on internal travel and public gatherings (Cabinet Office and DH, 2007). In the context of pandemics, therefore, the scale of the implications for global public health has been highlighted and guidance provided on a wide range of interventions within national boundaries. In determining the timings of these interventions, global surveillance networks have come to play an important role.

Surveillance networks and global public health governance

A number of scholars have discussed event-based surveillance networks in relation to wider geopolitical debates concerning the expansion of sovereign power (Braun, 2007), the defence and military requirements of an 'oligarchic' global north (Weir and Mykhalovskiy, 2006: 257) and the search for greater global health equity (Ingram, 2008: 81-83). However, there has been little investigation into the actual *operation* of the surveillance networks and the extent to which their use informs debates surrounding international cooperation in pandemic preparedness interventions. Public health authorities have increasingly come to rely on unstructured 'informal' information – such as internet news and online discussion sites – to safeguard against potential disease outbreaks. Indeed, role of networks such as GPHIN in the detection of rare but high-impact outbreaks (such as Severe Acute Respiratory Syndrome (SARS) and H5N1 ('Avian') influenza) has been well documented (Keil and Ali, 2006; Weir and Mykhalovskiy, 2006; Zong and Zeng, 2006). Moreover, Keller et al (2009) reported that, in the last decade, almost all major disease outbreaks investigated by the WHO were first identified through these sources. According to the WHO, these networks have proven to be particularly effective in detecting outbreaks among populations that 'do not access health care through formal channels'[3] (WHO, 2008a: 4). Accordingly, biosecurity practices, notably alerts, have become ever more embedded in the work of global surveillance systems.

The work of these networks rose to international prominence during the 2003 SARS epidemic. The reports gathered by systems such as GPHIN, coupled with China's role in concealing information

'reality' of stockpiles of antiviral drugs, the development of a WHO guideline to attempt to stop or delay pandemic influenza at its initial emergence and 'strengthened outbreak communications' (WHO, WWW)

[3] We understand this to be a reference to countries located in the global South.

during the early spread of the disease, provided the impetus for agreement on the WHO's revised International Health Regulations (IHR) in 2005. The regulations - which came into effect in June 2007 - gave the WHO a legal basis for greater intervention in the affairs of member states to enable, as the WHO perceived it, more effective global public health governance[4] (WHO, 2008b). In particular, article 9 permitted the WHO to take account of information from sources other than official notifications and consultations, allowing it to legally override any national government that tried to suppress data concerning communicable disease. Therefore, informal information on isolated disease outbreaks occurring in various localities was granted a new authority. By identifying patterns amongst the information gathered, global surveillance systems such as GPHIN could issue 'real time' alerts that would be taken seriously by the WHO.

Whilst the gathering of media reports does not necessarily require international cooperation, it could be argued that subsequent global public health interventions do. In February 2007 the sense of a 'new' era in public health governance was made explicit when, in a speech given a few weeks after her appointment as Director-General, Margaret Chan argued that the organisation needed to go further in its preparations for public health emergencies of international concern. According to Chan, this requirement had been demonstrated by the outcome of 'recent events' when collaboration had broken down. They included not only China's concealment of SARS, but also Indonesia's withholding of H5N1 virus samples from the WHO as part of its dispute over proprietary rights to vaccines developed from 'its' virus strains (Fidler, 2008). In both instances, the consequences resulting from lack of cooperation were seen to be harmful to global public health. Margaret Chan, therefore, argued that lessons needed to be learnt from these events and applied to a 'new' international health diplomacy. Firstly, this required the WHO to appeal to 'national self-interest', with Margaret Chan stating that international cooperation in containing SARS had much to do with 'fear of the economic and social consequences' of failure (WHO, 2007). Secondly, in order to be meaningful, multi-national cooperation required ground rules for good and poor performance on the international stage, for example, the provision that a state must not conceal an outbreak. Finally, there was a need for accountability:

> 'If we want to enforce the ground rules, we need to find ways of using the power of public and political opinion to exert pressure.' (WHO, 2007)

Therefore, within the context of heightened global uncertainty over emerging infections, according to Chan, effective international preparedness required member state consensus that there be greater openness in the sharing and harmonisation of practices. For this relatively new Director-General of the WHO, therefore, effective global public health governance had important

[4] Prior to the IHR revision process, WHO had access to non-governmental sources of information but, in law and policy, was limited in how it could use them (Fidler, 2004: 489).

components. It required a combination of technological openness, inspired by, in her words, the contemporary 'revolution in communications and information technologies' (WHO, 2010a) and the diplomatic openness which she referred to in her call for a 'new' international health diplomacy.

GPHIN, arguably the most longstanding global event-based surveillance system, underpins the WHO's commitment to 'technological openness'. Over the last decade, GPHIN has played a prominent role in alerting key public organisations to major disease outbreaks. A subscription-based network, its membership includes the WHO, the UN Food and Agriculture Organization (FAO), the European Commission, the European Centre for Disease Prevention and Control (ECDC) and the CDC. It is a multilingual internet-based system, established in 1997 to provide 'relevant unverified information on disease outbreaks and other public health events' (Blench, 2008b). In claiming to monitor on a global scale, it gathers information from local, national and transnational media sources in nine languages[5]. Sources of information included websites, news wires and local and national newspapers (Keller et al, 2009: 690). In addition, the frequency of recording is high. Keller et al (2009) note that GPHIN's software application retrieves relevant articles every 15 minutes from newsfeed aggregators (Al Bawaba and Factiva) responding to regularly updated search queries. Notwithstanding the informal nature of this information, GPHIN follows a protocol by which this source material is verified and given some credibility. Retrieved articles are categorised according to the GPHIN taxonomy[6], and assigned a relevancy score (Blench, 2008a: 301). Duplicates are eliminated[7]. Keller et al note that approximately 4000 articles are handled each day (2009: 690).

GPHIN categorises articles according to risk, using a combination of automated and human processes. According to Blench, each article retrieved is given a 'relevancy score', derived from an algorithm utilising keywords and terms within the taxonomy or taxonomies which it had been assigned to (2008b: 301). Those with a score above a certain threshold are automatically 'published' on the GPHIN database; those with a score below an established threshold are automatically 'trashed'. The remainder are presented for human examination, whereby a GPHIN analyst makes a judgement as to whether to: publish on the GPHIN database; publish on the GHPIN database and email to users in the form of an alert; or dismiss (Keller et al, 2009: 691). According to GPHIN, by this process of elimination, approximately 15% are 'published', 20% trashed and the remaining 65% are put forward for human analysis (Blench, 2008b).

[5] The nine languages are: Arabic, Chinese (Simplified), Chinese (Traditional), English, Farsi, French, Portuguese, Russia and Spanish (Blench, 2008b).
[6] GPHIN's taxonomy categories cover the following topics: animal diseases; human diseases; plant diseases; biologics; natural disasters; chemical incidents; radioactive incidents; unsafe products (Blench, 2008a: 301).
[7] According to GPHIN, a strict definition of 'duplicate' is applied. For example, if two reports were issued by the same agency on the same day and were identical except for the number of stated cases, they would count as discrete reports (telephone conversation with GPHIN official, 13 January 2010).

The degree of risk posed by an event is therefore indicated by the assignation of an alert. According to Keller et al, alerts are deemed necessary for events that 'might have serious public health consequences' (2009: 691). They are sent 'immediately' to GPHIN users (Keller et al, 2009: 691). Whilst the majority focus on infectious diseases in humans and animals, alerts are also emailed on significant events involving chemical and radioactive exposure, food safety and security, product safety and natural disasters. In all, approximately 7-10 alerts are issued daily (Hitchcock et al, 2007: 210). It is this human analysis process that distinguishes GPHIN from other surveillance systems such as HealthMap and EpiSPIDER[8] (Keller et al, 2009: 693).

Notwithstanding the apparent rigour of this approach, it nevertheless poses risks. In particular, alerts rely on often uncorroborated information, for example, commentary on: estimation of an incident's magnitude; control and prevention measures that have been considered (in addition to those actually implemented); concerns of the general public; and political implications (Hitchcock et al, 2007: 210). These practices of identifying and grading risk are subject to continual revision. For instance, 'enhancements' to GPHIN, scheduled for implementation during late March / early April 2010, include: clarification as to why a risk has been classified as 'low', 'medium' or 'high'; and marking up specific texts in reports that GPHIN publish as alerts, in order to illustrate why the information has been categorised as such[9]. The human involvement in the alerting procedures demonstrates the significance of GPHIN's role in the preparedness process and may also – due to its reliance on the remote assessment of unverified information - be an indication of the precariousness of the pandemic preparedness process. Nevertheless, according to a GPHIN official, the work of analysts in classifying risk is conducted in accordance with official guidance. In particular, Annex 2 of the WHO IHR (2005) supports the decision-making of GPHIN analysts in the assessment and notification of events that may constitute a 'public health emergency of international concern'[10] (WHO, 2008b: Annex 2; refer Appendix 1).

For the WHO to issue an alert, a further set of verifications are necessary, purportedly involving the detailed event management process illustrated below (WHO, 2008c).

Insert Figure 1

[8] An application that plots emerging infectious disease information from ProMED Mail, combines it with country info from the CIA Factbook and PubMED, extracts location using natural language processing and plots them on Google Maps.
[9] Telephone conversation with GPHIN official, 13 January 2010.
[10] *Ibid.*

The first step of this process comprises screening against criteria based on the 2005 WHO IHR (2005)[11]. Significantly, the second step involves seeking verification from the affected member state and 'any other sources' (WHO, 2008c: 9). In effect, technological openness is not enough, it also requires cooperation by national governments. Subsequent procedures, it is claimed, involve risk assessment of the event and - depending on the outcome - alerting other member states to the event, providing assistance and, in rare circumstances, declaring a public health emergency of international concern (WHO, 2008c: 8-13). At the same time as screening unofficial sources of information, the WHO uses information from its National IHR Focal Points (NFP). These are national centres, located in each member state, that facilitate information exchange between that country and the WHO (WHO, 2008c). They are, according to the WHO, its 'official' information source (WHO, 2008c: 10). Nevertheless, the role of unofficial data – not least from the news media – in facilitating the WHO's global health governance remains significance. By its own estimation, more than 60% of WHO initial outbreak reports came from 'unofficial informal sources' (WHO, 2010b). Moreover, Weir and Mykhalovskiy contend that approximately 40% of the news reports on disease outbreaks that were verified by the WHO originated from GPHIN (cited in Hitchcock et al, 2007: 210). Table 1 below quantifies this, highlighting the number of GPHIN disease alerts verified by the WHO between January 2001 and April 2008.

2001	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**[12]	**Total**
192	244	509	374	324	296	321	155	2,415

Table 1: GPHIN disease alerts verified by WHO, January 2001 – April 2008 (adapted from: Beatty et al, 2008)

Whilst the above represent absolute numbers only, they given an indication of the scale of GPHIN's input into the WHO's 'event management' process.

Thus, whilst regulatory developments have undoubtedly conferred new power on the WHO, the evidence suggests that it is a power dependent on access to supranational networks (such as GPHIN) and their repository of informal information grounded in individual countries and localities. Within these settings, there will undoubtedly be silences, as well as records of some kind. Furthermore, by its own admission, the authority of the WHO to issue alerts is dependent, at least in part, on 'openness' by member states, notably their willingness to verify particular 'events'.

[11] IHR Annex 2 Decision Instrument. The IHR were revised in 2005, and oblige member state reporting of events that may constitute a 'public health emergency of international concern' (WHO, 2008).
[12] January – April only.

Case study: informal information and H1N1 in Mexico

Pandemic preparedness is undoubtedly complex, involving global and national interventions informed by irregular, sometimes unstructured, information and motivated by competing strategic and political priorities (Coker and Mournier-Jack, 2006; Gostin, 2009). The ongoing H1N1 influenza pandemic – the first influenza pandemic since 1968 - is particularly significant as it represents a 'test case' for the WHO's pandemic alerting structure. From its initial reporting in parts of Mexico at the beginning of April to the present, the pandemic has caused the WHO to raise the level of alert from Phase 3 to Phase 6 (see Table 2, below).

Pandemic Phase	Declaration by WHO	Probability of Pandemic	Description	Key recommended actions
1-3	Period until 27/04/09	Uncertain	Sporadic clusters / small cases of disease	Producing, implementing and exercising national pandemic preparedness and response plans
4	27/04/09	Medium to high	Verified community-level outbreaks	Rapid containment
5	29/04/09	High to certain	Sustained community-level outbreaks in at least two countries in one WHO region	Pandemic response: each country to implement actions detailed in their national plans
6	11/06/09	Pandemic in progress	Sustained community-level outbreaks in at least one other country in another WHO region	
Post-peak	Not yet declared		Outbreaks in most countries dropped below peak levels	Evaluation of response, recovery, preparation for possible second wave
Possible new wave	Not yet declared		Activity in most countries rising again	Response
Post-pandemic	Not yet declared		Activity returned to seasonal influenza level in most countries	Evaluation of response, revision of plans, recovery

Table 2: Level of WHO pandemic alert in relation to 2009/10 H1N1 outbreak. Adapted from WHO (2009a).

Analysis of the chronology of the pandemic and the spatialities involved demonstrate that, whilst the networks of surveillance were profoundly important in shaping the WHO's alerting process, this technological sophistication involved a complex set of interactions between member states, in which diplomatic openness competed with national interests. In particular, there were key moments when the WHO pandemic alerting, and advice on cooperation, were undermined by member state practices of preparedness. In this section, we identify three such moments.

i. Period until 29 April 2009 (initial alerting of influenza activity)

Reports of an outbreak from a range of locations were purportedly being processed from as early as 30 March[13]. On 1 April, HealthMap located a local media report[14], in the Mexican newspaper *La Jornada*, declaring that a respiratory illness had 'sickened up to 60% of residents' at the Mexican village of La Gloria in Veracruz (HealthMap, WWW). On 2 April, a second report[15], published in the Mexican magazine *Proceso*, described the possible role of Granjas Carroll, a US-owned pig farm, also located in Veracruz, in the epidemic (Brownstein et al, 2009: 2156). This account, and further media broadcasts within Mexico over subsequent days, reported that residents suspected the source of illness to be related to manure 'lagoons' sited at the Granjas Carroll farm, and that 33 Mexican health officials had been sent to the area to investigate a report that 400 people were ill, and two had died, as a result of the outbreak (HealthMap, WWW).

According to Brownstein et al (2009), it was GPHIN's alert to the WHO concerning an outbreak of acute respiratory illness in the Mexican state of Veracruz on 10 April 2009 that prompted communication of the illness to international institutions such as the WHO's Global Outbreak Alert and Response Network and the Pan American Health Organization (PAHO), a regional office of the WHO[16]. Reporting in Mexico, therefore, coupled with a series of other activities[17], which prompted the WHO to issue its first disease outbreak notice on 24 April. A day later, the Director-General convened a meeting of the Emergency Committee[18] and formally declared the event a 'public health emergency of international concern' (WHO, 2009b). On 27 April, the WHO raised the level of pandemic alert to Phase 4 'medium to high'. Two days later, it was increased again, to Phase 5 'high to certain'.

It was during this initial, complex, period that the WHO began to explicitly issue advice to member states on public health interventions, based on the need for global cooperation. It counselled that 'all countries intensify surveillance for unusual outbreaks of influenza-like illness' (WHO, 2009b)

[13] According to its own press release, Veratect, a 'biosurveillance firm', began 'tracking unusual respiratory illness associated with Mexico' on 30 March (Veratect, 2009).

[14] Morales AT. Veracruz: reporta agente municipal extraño brote epidémico que ha cobrado dos vidas. *La Jornada*. April 1, 2009 (as cited in Brownstein et al, 2009: 2156).

[15] Martinez R. Extraño brote epidemiológico causa la muerte a dos bebés en Veracruz. *Proceso*. April 2, 2009 (as cited in Brownstein et al, 2009: 2156).

[16] It is reported that Veratect sent an alert to its clients – which included PAHO – on 6 April (Brown, 2009). According to Brown (2009), Veratect's servers show that an epidemiologist at PAHO looked at the alert on 10 and 11 April. A second alert was sent to PAHO, and this time directly to the WHO's Global Outbreak and Response Network, on 16 April.

[17] The Mexican government reportedly informed PAHO - and, by extension, the WHO - on 12 April that it was encountering cases of 'atypical influenza' (CDC, 2009). According to the Mexican Presidency, the national government had, by 16 April, sent H1N1 virus samples to laboratories US and Canada for further analysis (Mexico, 2009b). Mexico was subsequently praised by its WHO representative for demonstrating 'responsibility and transparency', with the 'lessons learned from the Mexican experience […] essential for the international community' (*Daily Telegraph*, 2009a).

[18] The Emergency Committee was established in compliance with the IHR (2005). It comprised international experts 'in a variety of disciplines' (WHO, 2009b).

and stated that it was 'not recommending any travel or trade restrictions' (WHO, 2009c). In effect, the WHO sought to mitigate fears of damage to tourism and trade that had been a motivation for member states to conceal previous disease outbreaks (Giesecke, 2000). Yet, the actions of certain countries went well beyond this, militating against any notion of cooperation. In some instances, travellers were subject to increased monitoring. China, for example, required incoming passengers to report flu-like symptoms at ports of entry when arriving from H1N1-affected areas (*Reuters*, 2009a). Singapore deployed thermal scanners to screen air passengers on arrival (*Reuters*, 2009b), whilst Japan increased the use of pre-existing scanners at Narita International Airport (*Reuters*, 2009a). Moreover, and in direct contradiction to WHO advice, various measures were introduced aimed at restricting travel. On 28 April, Cuba became the first country to suspend flights to Mexico, an action that had been adopted by a number of tour operators across Europe (Bone et al, 2009). Other member states - such as the UK, Australia, Canada, France and Switzerland - all advised against 'non-essential' travel to Mexico (Bone et al, 2009).

ii. 29 April – 10 June (WHO alert remains at Phase 5)

The period from late April to early May 2009 represented the peak of the media coverage of the H1N1 outbreak. At that time, GPHIN was retrieving a total 30,000 articles a day[19] (figure 2, below).

Insert Figure 2

During this period, the WHO reiterated its advice against travel and trade restrictions. Its purported intention was to maintain communication among all member states (Katz, 2009) and, we argue, deter individual countries from taking unilateral actions which would undermine a spirit of 'cooperation'. On 2 May, in an indication of the importance it attached to its task, the WHO combined with other global organisations - the FAO, the World Organisation for Animal Health (OIE[20]) and the World Trade Organization (WTO) - to issue a joint statement on the H1N1 virus, declaring that the consumption of pork posed no sanitary risks (WTO, 2009). This was in response to various trade restrictions imposed during late April and early May 2009. According to Gostin, 20 countries banned meat imports from Mexico, Canada and the US[21] (2009: 2378). China and Russia, two of the world's largest pork importers, imposed embargos, as did a number of South East Asian nations such as Indonesia, Thailand and the Philippines[22] (Gostin, 2009; Ager, 2009). Egypt took the most drastic measure, with its government ordering, on 29 April, the culling of all the country's pigs (*Reuters*, 2009c; Gostin, 2009). In addition, unilateral travel advisories continued to

[19] Telephone conversation with GPHIN official, 13 January 2010.
[20] Formed in 1924 as Office International des Epizooties.
[21] The US and Canada were among the first countries outside of Mexico to report cases of H1N1
[22] The Philippines lifted its ban on imports from Mexico and the US (but not from Canada) on 4 May 2009 (Ager, 2009).

be imposed by sovereign states. For example, Hong Kong residents were advised not to travel to Mexico, whilst, on 2 May, mainland China suspend flights from the country altogether (*China View*, 2009). At the same time, both China and Hong Kong implemented quarantines for travellers from affected areas, whilst Singapore placed recent visitors to Mexico under home quarantine (Gostin, 2009). Finally, social distancing measures were sporadically introduced in a number of countries with, for example, school closures occurring in parts of the US and the UK (Gostin, 2009; Bowcott et al, 2009; *Daily Telegraph*, 2009b)

iii. 11 June – present (Phase 6 'pandemic in progress')

This final period began with the WHO's formal declaration of pandemic Phase 6 on 11 June 2009. In her announcement of the decision, Margaret Chan stated that the virus in circulation was 'entirely new' and gave general guidance to member states, requesting that those with no or a few cases 'remain vigilant' whilst countries experiencing widespread transmission focus on 'appropriate management of patients' (WHO, 2009d). At the same time, countries were instructed to prepare for a 'second wave' of infection (WHO, 2009d). Moreover, the organisation's longstanding position against travel restrictions and border closures was restated (WHO, 2009e). Yet, in spite of this advice, and notwithstanding the recognition that the H1N1 outbreak was proving to be of 'moderate' severity (WHO, 2009e), certain member states continued to undermine the WHO's global pandemic guidance. Pork import bans were sustained, in some cases, for several months. For ban, Russia did not withdraw its embargo until October 2009 (*Reuters*, 2009e), China's embargo continued until December 2009 (*People's Daily Online*, 2009) and Indonesia's H1N1-related prohibition remained in place until February 2010 (Ekawati, 2010). At the same time, China continued to quarantine travellers throughout summer 2009 in spite of international criticism (Huang, 2009; Metzl, 2009; Levy, 2009). Indeed, existing advice from the UK Foreign and Commonwealth Office continues to warn that anyone arriving in China with flu-type symptoms 'may be quarantined for up to seven days' (FCO, 2010; see also US Embassy Beijing China, 2009).

Conclusions

This analysis of event-based surveillance systems has exposed tensions between technological openness and international cooperation in global public health governance. Paradoxically, global networks require locality reporting in order to operate. In effect, the 'informal' information gathered by event-based systems has its own spatiality and temporality. Nevertheless, in the issuing of worldwide alerts, this informal information is converted into a pattern of 'events' that transcend national boundaries. This informal openness acts as a powerful prompt to organisations like the WHO in initiating internal cooperation in pandemic preparedness planning. The ongoing H1N1 pandemic demonstrates that, notwithstanding the WHO's drive for member state cooperation, the varied practices of preparedness between countries across the global north and south undermine its appeal to a 'new' international health diplomacy.

Words: 5,568

References

Ager, M. (2009) Import ban on pork lifted, except Canada, *Inquire.net*, 4 May. http://newsinfo.inquirer.net/breakingnews/nation/view/20090504-203022/Import-ban-on-pork-lifted-except-Canada Last accessed 12/03/10

Avila M, Said N and Ojcius D M (2008) The book reopened on infectious disease *Microbes and Infection*: 1-6

Beatty, A., Scott, K. and Tsai, P. (2008) *Achieving Sustainable Global Capacity for Surveillance and Response to Emerging Diseases of Zoonotic Origin: Workshop Summary*. The National Academies Press: Washington, DC.

BBC News (2009a) Five new UK flu cases confirmed *BBC News* 29 April http://news.bbc.co.uk/1/hi/8024394.stm Last accessed 12/03/10

BBC News (2009b) The world response to flu crisis *BBC News* 5 May http://news.bbc.co.uk/1/hi/world/americas/8022516.stm Last accessed 12/03/10

Bingham, N. and Hinchliffe, S. (2008) Mapping the multiplicities of biosecurity, Lakoff, A. and Collier, S.J. *Biosecurity Interventions*, New York: Columbia University Press, 173 - 193.

Blench, M. (2008a) Global Public Health Intelligence Network (GPHIN), *8th AMTA conference, Hawaii, 21-25 October*, 299 – 303.

Blench, M. (2008b) Global Public Health Intelligence Network (GPHIN). 'Recipes for Success', *8th AMTA conference, Hawaii, 21-25 October*. [PowerPoint presentation].

Bone, J., Lister, S. and Henderson, M. (2009) Swine flu outbreak in New York raises fears for hundreds of children, *TimesOnline,* 29 April http://www.timesonline.co.uk/tol/life_and_style/health/article6188729.ece

Bowcott, O., Carrell, S. and Jha, A. (2009) Swine flu closes second school as UK outbreak grows*, The Guardian,* 4 May. http://www.guardian.co.uk/world/2009/may/04/swine-flu-britain-south-hampstead-school Last accessed 12/03/10

Bowen, J. and Laroe, C. (2006) Airline networks and the international diffusion of severe acute respiratory syndrome (SARS) *The Geographical Journal* 172(2): 130-144

Braun, B. (2007). Biopolitics and the molecularization of life, *Cultural Geographies,* 14: 6-28.

Brown, D. (2009) System Set Up After SARS Epidemic Was Slow to Alert Global Authorities, *The Washington Post*. 30 April. http://www.washingtonpost.com/wp-dyn/content/article/2009/04/29/AR2009042904911.html

Brownstein, J., Freifeld, C. and Madoff, L. (2009) Digital Disease Detection — Harnessing the Web for Public Health Surveillance, *The New England Journal of Medicine*, 21 May, 2153-2157.

Budd, L., Bell, M., Brown, T. (2009). Of plagues, planes and politics: controlling the global spread of infectious diseases by air. *Political Geography* 28, 426-435

Budd, L,, Bell, M., Warren, A. (in preparation). Global Health Governance in the UK: airport regulation and the mobile body.

Cabinet Office and Department of Health (DH) (2007) *Pandemic Flu: a national framework for responding to an influenza pandemic*, DH: London.

Centers for Disease Control and Prevention (CDC). (2009) Outbreak of Swine-Origin Influenza A (H1N1) Virus Infection --- Mexico, March--April 2009". *Morbidity and Mortality Weekly Report*. CDC. 2009-04-30.

China View (2009) First cases of A/H1N1 flu reported in Asia**,** *China View*, 2 May. http://news.xinhuanet.com/english/2009-05/02/content_11300039.htm

Coker, R. and Mournier-Jack, S. (2006). Pandemic influenza preparedness in the Asia–Pacific region. *Lancet,* 368: 886–89.

Collier, S. and Lakoff, A. (2008) The problem of securing health, in Lakoff, A. and Collier, S.J. *Biosecurity Interventions*, New York: Columbia University Press, 7 – 32.

Collier, S., Lakoff, A. and Rabinow, P. (2004) Biosecurity: towards an anthropology of the contemporary, *Anthropology Today*, 20 (5), 3-7.

Daily Telegraph (2009a) Swine flu: WHO praises Mexico's response to virus *Daily Telegraph*, 6 May. http://www.telegraph.co.uk/health/swine-flu/5281924/Swine-flu-WHO-praises-Mexicos-response-to-virus.html

Daily Telegraph (2009b) Swine flu forces 20th English school to close in Berkshire *Daily Telegraph*, 9 June http://www.telegraph.co.uk/health/swine-flu/5486501/Swine-flu-forces-20th-English-school-to-close-in-Berkshire.html

Department of Health (2007) *Pandemic Flu: a national framework for responding to an influenza pandemic*, DH, London.

Ekawati, A. (2010) Indonesia Lifts Ban on Swine, Pork Imports, *Jakarta Globe*, 14 February http://www.thejakartaglobe.com/tradeandexport/indonesia-lifts-ban-on-swine-pork-imports/358627

Fearnley, L. (2008) Signals come and go: syndromic surveillance and styles of biosecurity, *Environment and Planning A* 40 (7) 1615 – 1632

Fidler, D.P. (2004) Germs, norms and power: global health's political revolution in *Law, Social Justice and Global Development*, 1. (http://www2.warwick.ac.uk/fac/soc/law/elj/lgd/2004_1/fidler/)

Fidler, D. (2008) Influenza virus samples, international law, and global health diplomacy. *Emerging Infectious Diseases*, 14 (1) 88-94

Foreign and Commonwealth Office (FCO) (2010) Travel advice by country: China. http://www.fco.gov.uk/en/travel-and-living-abroad/travel-advice-by-country/asia-oceania/china?ta=health&pg=5

Garoon, J. and Duggan, P. (2008) Discourses of disease, discourses of disadvantage: a critical analysis of National Pandemic Influenza Preparedness Plans, *Social Science and Medicine*, 67: 1133-1142.

Giesecke, J. (2000) Prevention, not panic—epidemics and trade sanctions, *The Lancet*, Volume 356, Issue 9229, 12 August, Pages 588-589

Gostin, L. (2009) Influenza A(H1N1) and Pandemic Preparedness Under the Rule of International Law *JAMA.* 301(22):2376-2378.

HealthMap (WWW), HealthMap Blog, Influenza A (H1N1) – "Swine Flu": An Overview, http://healthmapblog.blogspot.com/2009/05/influenza-h1n1-swine-flu-overview.html

Hinchcliffe, S. and Bingham, N. (2008) Securing life: the emerging practices of biosecurity, *Environment and Planning A*, 40, 1534-1551.

Hitchcock, P., Allison Chamberlain, Megan Van Wagoner, Thomas V. Inglesby, and Tara O'Toole Challenges to Global Surveillance and Response to Infectious Disease Outbreaks of International Importance *Biosecurity and Bioterrorism*. Volume 5, Number 3, 2007.

Huang, Y. (2009) The H1N1 Virus: Varied Local Responses to a Global Spread, *Yale Global Online*, 1 September http://yaleglobal.yale.edu/content/h1n1-virus-varied-local-responses-global-spread

International Civil Aviation Organization (ICAO), 1968. Statistics Section. News Release. Growth in civil aviation.

ICAO (2008). *Annual Report of the Council*. Doc 9916. ICAO, Montreal.

Ingram, A. (2008) Pandemic anxiety and global health security *in* Pain, R. and Smith, S. (eds) *Fear: critical geopolitics and everyday life*, Ashgate: Aldershot, 75-85.

Ingram, A. (2009a) Swine flu calls into question the meaning of global health security, *e-International Relations*, 29 April. http://www.e-ir.info/?p=1016

Ingram, A. (2009b) Biosecurity and the international response to HIV/AIDS: governmentality, globalisation and security, *Area*, early view, 1-8

Katz, R. (2009) Use of Revised International Health Regulations during Influenza A (H1N1) Epidemic, 2009, *Emerging Infectious Diseases*, 15, No. 8, August, 1165-1170.

Keil, R. and Harris Ali, S. (2006). The avian flu: some lessons from the 2003 SARS outbreak in Toronto. *Area,* 38.1, 107-9.

Keller, M., Blench, M., Tolentino, H., Freifeld, C., Mandl, K., Mawudeku, A., Eysenbach, G., Brownstein, J. (2009) Use of Unstructured Event-Based Reports for Global Infectious Disease Surveillance, *Emerging Infectious Diseases*, 15 (5), May, 689-695.

Leibhold A M, Work T T, McCollough D G and Cavey J F (2006) Airline baggage as a pathway for alien insect species invading the United States *American Entomologist* 52: 48-54

Levy, A. (2009) Quarantine nightmare of 'swine flu' Britons held by Chinese *Daily Mail*, 9 July.

Mangili A and Gendreau M A (2005) Transmission of infectious diseases during commercial air travel *The Lancet* 365(12): 989-996

Metzl, J. (2009) China's ill-considered response to the H1N1 virus *Los Angeles Times*, 12 June http://articles.latimes.com/2009/jul/12/opinion/oe-metzl12

Mexico (2009a). Secretaria de Relaciones Exteriores. INFORMATIVE BULLETIN ON THE INFLUENZA A(H1N1) EMERGENCY, 4 May. http://portal.sre.gob.mx/canada/pdf/090504_Bol_SRE_En.pdf

Mexico (2009b) Presidencia de la Republica. Press Room. Mexicans should be proud of the maturity and responsibility with which they have dealt with the problem: President Calderón. 29 April. http://www.presidencia.gob.mx/en/press/?contenido=44543

Pang, T. and Guindon, E. (2004) Globalisation and risks to health, *European Molecular Biology Organization Reports* Vol.5 Special Issue-Science and Society: S11-S16

Pavia, A. (2007) Germs on a plane: aircraft, international travel, and the global spread of disease *The Journal of Infectious Diseases* 195: 621-622

People's Daily Online (2009) China lifts bans on pork imports from U.S., Canada, Mexico, *People's Daily Online*, 1 December. http://english.peopledaily.com.cn/90001/90778/90861/6829092.html

Public Health Agency of Canada (PHAC) (2005) *The Global Public Health Intelligence Network (GPHIN)* http://www.phac-aspc.gc.ca/gphin/pdf/english_about.pdf

Reuters (2009a). Asia moves to ward off new virus *Reuters* 27 April http://uk.reuters.com/article/idUKTRE53Q0SL20090427?pageNumber=2&virtualBrandChannel=0&sp=true

Reuters (2009b) PRESS DIGEST - Singapore newspapers – April 27, *Reuters*, 26 April http://www.reuters.com/article/idUSSIN47532920090427

Reuters (2009c) Flu fears prompt new bans on pork, meat imports *Reuters* 4 May http://www.alertnet.org/thenews/newsdesk/L471250.htm

Reuters (2009d) Asia puts up fight as H1N1 makes inroads *Reuters* 21 May http://uk.reuters.com/article/idUKSP53722
Last accessed on 12/12/2009.

Reuters (2009e) Russia to lift all H1N1-related meat bans, *Reuters*, 14 October http://uk.reuters.com/article/idUKTRE59D1D620091014

Teo, P., Yeoh, B.S.A., and Ong, S.N. (2005). SARS in Singapore: surveillance strategies in a globalising city, *Health Policy*, 72: 279-291.

Tuckman, J. (2009) 'My head hurt a lot' - child who could reveal origin of swine flu outbreak, *The Guardian*, 29 April.

US Embassy Beijing China (2009) H1N1 FAQ, 10 December http://beijing.usembassy-china.org.cn/121009u.html

Veratect (2209). Media release. Veratect the Company to First Sound Alarm on Swine Influenza Makes Data on the Spread of this Disease Public. *Veratect*. 26 April. http://veratect.com/media/042609_release.pdf

Weir, L. and Mykhalovskiy, E. (2006). The geopolitics of global public health surveillance in the twenty-first century. *In*: Bashford, A. (ed). *Medicine at the Border: disease, globalization and security, 1850 to the present*. Basingstoke: Palgrave Macmillan.

WHO, WWW Pandemic influenza preparedness and response
http://www.who.int/csr/disease/influenza/pipguidance2009/en/index.html

WHO (2007) Health diplomacy in the 21st century, Dr Margaret Chan, Director-General of the World Health Organization. Address to Directorate for Health and Social Affairs, Norway. 13 February
http://www.who.int/dg/speeches/2007/130207_norway/en/print.html

WHO (2008a) Western Pacific Region. *A Guide to Establishing Event-based Surveillance*. WHO: Geneva.

WHO (2008b) *International Health Regulations (2005). Second edition.* WHO: Geneva.

WHO (2008c) *WHO event management for international public health security OPERATIONAL PROCEDURES Working document*, June. WHO: Geneva.

WHO (2009a) *Pandemic Influenza Preparedness and Response*, WHO: Geneva.

WHO (2009b) Swine Influenza. Statement by WHO Director-General, Dr Margaret Chan. 25 April
http://www.who.int/mediacentre/news/statements/2009/h1n1_20090425/en/index.html

WHO (2009c) Swine flu illness in the United States and Mexico - update 2. 26 April
http://www.who.int/csr/don/2009_04_26/en/index.html

WHO (2009d) World now at the start of 2009 influenza pandemic, Statement to the press by WHO Director-General Dr Margaret Chan, 11 June.
http://www.who.int/mediacentre/news/statements/2009/h1n1_pandemic_phase6_20090611/en/index.html

WHO (2009e) Influenza A(H1N1): lesson learned and preparedness, Dr Margaret Chan. Director-General of the World Health Organisation. 2 July
http://www.who.int/dg/speeches/2009/influenza_h1n1_lessons_20090702/en/index.html

WHO (2010a) Progress in public health during the previous decade and major challenges ahead. Report by the Director-General to the Executive Board at its 126th session, Geneva, Switzerland, 18 January
http://www.who.int/dg/speeches/2010/executive_board_126_20100118/en/index.html

WHO (2010b). Epidemic intelligence – systematic event detection.
http://www.who.int/csr/alertresponse/epidemicintelligence/en/index.html

WHO, 2010c Cumulative Number of Confirmed Human Cases of Avian Influenza A/(H5N1) Reported to WHO http://www.who.int/csr/disease/avian_influenza/country/cases_table_2010_02_17/en/index.html

World Trade Organization (WTO) (2009) Joint FAO, OIE, WHO and WTO statement on A(H1N1) virus *WTO* 2 May. http://www.wto.org/english/news_e/news09_e/jt_stat_02may09_e.htm

Zong, N. and Zeng, G. (2006) What we have learnt from SARS epidemics in China, *British Medical Journal*, 333, 389 – 391

Figures

Figure 1: WHO event management process for international public health security (WHO, 2008b: 8)

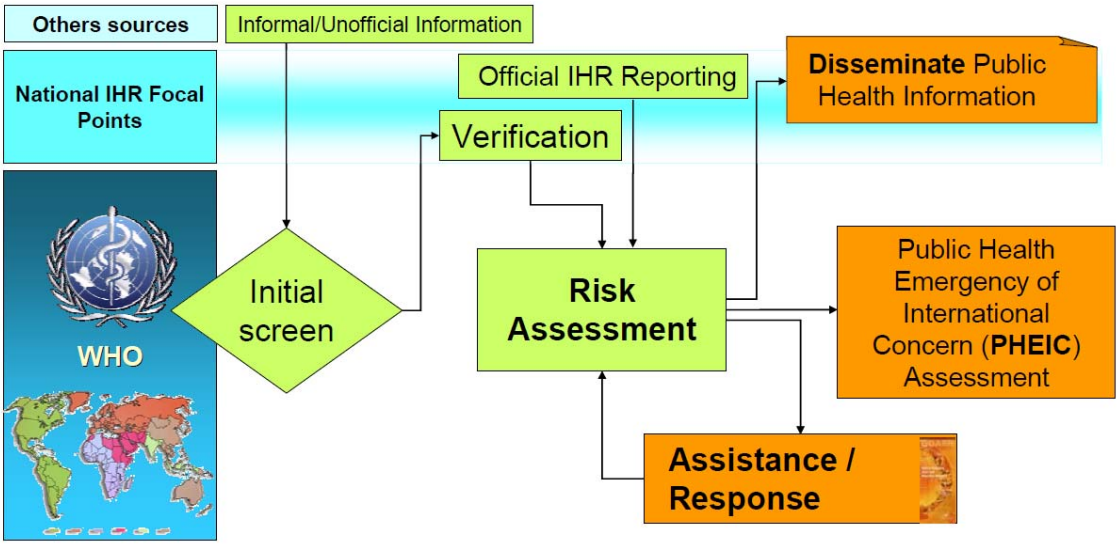

Figure 2: GPHIN total news stories retrieved: March 2009 – 28 January 2010 (source: GPHIN official, by email, 29 January 2010)