Contents lists available at SciVerse ScienceDirect

Health & Place

journal homepage: www.elsevier.com/locate/healthplace

H1N1, globalization and the epidemiology of inequality

Matthew Sparke*, Dimitar Anguelov

University of Washington, Seattle, USA

ARTICLE INFO

Keywords:
Global health
Globalization
H1N1
Inequality
Neoliberalism
Social determinants of health
Social/seroepidemiology

ABSTRACT

This paper examines the lessons learned from the 2009 H1N1 pandemic in relation to wider work on globalization and the epidemiology of inequality. The media attention and economic resources diverted to the threats posed by H1N1 were significant inequalities themselves when contrasted with weaker responses to more lethal threats posed by other diseases associated with global inequality. However, the multiple inequalities revealed by H1N1 itself in 2009 still provide important insights into the future of global health in the context of market-led globalization. These lessons relate to at least four main forms of inequality: (1) inequalities in blame for the outbreak in the media; (2) inequalities in risk management; (3) inequalities in access to medicines; and (4) inequalities encoded in the actual emergence of new flu viruses.

Incubated in animals bred for international meat markets, communicated by jet-setting travelers across borders far and wide, and anticipated, estimated and geographically represented by diverse global disease-mapping technologies, H1N1 (technically the 'swine-origin influenza A H1N1 virus') was a conspicuously globalized disease. Declared a pandemic by the World Health Organization on June 11, 2009, its virulence and global human impact turned out to be much less deadly than was originally feared. Yet H1N1 still deserves attention for the lessons it teaches about globalization, global health and infectious disease. These include an important set of insights into how political and economic processes producing economic inequality also co-produced divergent public health discourses and responses in different places. To be sure, as a highly contagious border-crossing threat, the most obvious lessons of the outbreak concerned our world's shared vulnerability: the precarious global interdependency of human, animal and viral ecologies that now encompass the whole planet. But far from teaching us that this interdependent world is flat, the place-based variations in blame, risk, surveillance, and experience of illness highlighted by H1N1 were tellingly uneven and unequal. It is this paradoxical picture of inequality amidst interdependency that is the focus of the present paper.

Four inequalities in particular demand close attention. These are: (1) inequalities in blame for the outbreak in the media; (2) inequalities in risk management; (3) inequalities in access to medicines; and (4) inequalities that help explain the actual emergence of new flu viruses in the first place. Together these inequalities reveal a world of extreme asymmetry amidst interdependency, and they demand an epidemiology of inequality that can draw on insights about the political and economic geography of market-led globalization as well as on the already extensive public health and global health literatures surrounding inequality as a social determinant of sickness and health (e.g. Kay and Williams, 2009). Methodologically this means addressing inequality as more than just an independent variable that can predict ill-health in particular populations. In addition, it involves consideration of how media reports (ranging from formal journalism to political speech to blogs) as well as public health and biomedical reports re-present and respond to inequality in their own particular terms and frameworks. And most importantly, it involves examining inequality as a consequence as well as a consequential determinant of wider social dynamics, exploring thus how particular kinds of inequality both mediate and make manifest the structuring effects of global economic ties along with the market-led transformations of health citizenship that they entail.

The epidemiology of inequality is an expanding field of research and writing, and includes geographically and methodologically wide-ranging interpretations and approaches (compare, for example, Farmer, 1999; Heggenhougen, 2005; Hunter, 2010; Orford et al., 2002). A literal translation of the terminology is simply the study of populations living under or amidst diseases of inequality. Broadly defined in this way, it represents a tradition of analysis going back at least as far as investigations of the social and economic preconditions of disease in the mid-nineteenth century. Pioneering studies such as Rudolf Virchow's 1848 enquiry into the Typhus outbreak of Upper Silesia pointed thus to the need for socio-economic disease etiologies alongside ongoing research into biological pathogenesis (**Virchow, 2006**). Based on such combined social and biological analysis, Virchow asked what is often considered the inaugural question of social

* Corresponding author. Tel.: +1 206 526 5363.
E-mail address: sparke@uw.edu (M. Sparke).

1353-8292/$ - see front matter © 2011 Elsevier Ltd. All rights reserved.
doi:10.1016/j.healthplace.2011.09.001

Please cite this article as: Sparke, M., Anguelov, D., H1N1, globalization and the epidemiology of inequality. Health & Place (2011), doi:10.1016/j.healthplace.2011.09.001

medicine: "Do we not always find the diseases of the populace traceable to defects in society" (Virchow, 1985)? His own answer was affirmative, and, when it came to identifying the defects, Virchow in turn highlighted class inequalities and the exploitation of the poor as key causes of illness.

Virchow's approach is also worth noting because even back in the mid-nineteenth century he sought to underline that inequality and affliction were linked across long distances. "May the rich remember during the winter," he said, "when they sit in front of their hot stoves and give Christmas apples to their little ones, that the ship hands who brought the coal and the apples died from cholera" (quoted in Waitzkin, 2006). Today, in the globalized twenty-first century, these sorts of linkages span even bigger distances and, in the context of global trade rules, global debt crises, and global market governance, they are considerably more complex as well as more consequential (Kay and Williams, 2009). Our knowledge of these complexities and consequences has also expanded, albeit unevenly, with varying approaches to identifying the kinds of causal connections linking inequality and ill-health. Most notably, population health literatures on the social determinants of health have focused on the strong correlations within specific data-set-defined territories between high levels of socio-economic inequality and poor population health outcomes (e.g. Wilkinson, 1996; Marmot and Wilkinson, 2006). These sorts of studies now boast global data (e.g. Wilkinson and Pickett, 2010) as well as ongoing relevance for national data in rich countries (e.g. Kulkarni, 2011), and, precisely because of their strong statistical evidence at the level of population health, they underpin effective arguments in the World Health Organization and elsewhere (e.g. PBS, 2010) that reducing socio-economic inequalities will reduce disease and improve health outcomes globally (WHO, 2008; see also Dorling and Barford, 2009).

The 2008 report from the WHO Commission on the Social Determinants of Health is also of especial importance because as an epidemiology of inequality it went beyond a technical preoccupation that sometimes limits analyses based on the correlative claims about inequality predicting ill-health *within* data-set-defined populations. Insofar as attempts at explaining the correlations have rested on just biomedical mechanisms (most notably, the argument that the stress produced in individual bodies by steep income gradients is unhealthy), the study of the links *within* populations has also led epidemiologists into sometimes becoming 'prisoners of the proximate' (McMichael, 1999). By focusing only on the proximate mechanics linking individual bodies to population statistics such accounts risk obscuring more global and more complex socio-economic dynamics unleashed by market-led globalization (Sparke, 2009a). These are structural dynamics (sometimes described in terms of 'neoliberalization') that include cutbacks in health services, the deregulation of the workplace, the breakdown of social solidarity, welfare reforms, and structural adjustment policies such as privatization and financial deregulation, and they have generally contributed to rising inequality and worsening health outcomes at the same time (Navarro, 2007). The 2008 WHO report represented an advance in the epidemiology of inequality precisely because it added attention to these sorts of structural forces as coactive causes of the connections between inequality and poor health.

Treating inequality as more than an independent variable means coming to terms with it as one of many measurable symptoms of a global system becoming increasingly structured and governed by global market forces. This is the open-ended political-economic approach now adopted by leading texts on international health (e.g. Birn et al., 2009), as well as by a long list of global health books with titles such as *Infections and Inequalities* (Farmer, 1999), *Dying for Growth* (Kim, 2000), *Pathologies of Power* (Farmer, 2003), and *Sickness and Wealth* (Fort et al., 2004). Such work opens up the possibility of a structural and global epidemiology of inequality, and it is precisely this approach that inspires the analysis offered here of H1N1. Building too on recent geographically sensitive studies of SARS and other epidemics (Ali and Keil, 2008; Giles-Vernick and Craddock, 2010), the challenge is to examine how inequalities across a wide range of scales come together as a form of structural violence that is in turn both embedded in local public health responses and embodied in personal experiences of the disease. Such an approach simultaneously demands attention to the *multiplicity* of mechanisms through which inequality and affliction are connected, including through mechanisms such as intellectual property rules and international power hierarchies that link political-economic asymmetries with affliction across long-distances.

H1N1 offers us an especially interesting window onto these forms of inequality because it was seen in 2009 as a disease that threatened to cross the borders between poor and rich. By being "made over globally," in the terms of Kleinman (2010), "into the socially threatening and culturally fearful swine flu epidemic" it was simultaneously socially constructed as a country- and class-crossing as well as a species-crossing virus. For exactly the same reasons, it generated a huge global response, and yet in that response both global and local inequalities returned with force to structure the distribution of blame, protection, and vulnerability. As we shall now see, H1N1 revealed in this way a world in which global biopolitical ties are being tied ever tighter together even as their outcomes in terms of health citizenship are enclaved apart in unequal experiences of disease and disease management. To begin with, let us consider the initial outbreak narrative that was told about H1N1 and the unequal and deceptive distribution of blame it so often involved.

1. Inequalities in blame for the outbreak

> "The outbreak narrative is a powerful story of ecological danger and epidemiological belonging, and as it entangles analyses of disease emergence and changing social and political formations, it affects the experience of both" (Wald, 2008: 33).

In her eloquent study of outbreak narratives literary critic Priscilla Wald shows how stories of disease emergence are generally told in ways that simultaneously and consequentially construct communities of insiders and outsiders. Contagions that start out as border-crossing communal threats to people everywhere are thereby turned from being reminders of shared human vulnerability into the basis of border-bound and border-building efforts to externalize disease and territorialize public health as a geographically organized defense system. In Wald's examples this process of territorializing 'epidemiological belonging' takes place in and through the imagined community of the nation-state, and, whether it is through the championing of national 'disease detectives' and national 'medical defenders', or xenophobic efforts to keep out the 'viral otherness' represented by 'pestilent foreigners', she argues that traditional outbreak narratives thereby help narrativize the nation as the basis of health citizenship (cf. Raimondo, 2011).

The other side of such externalization, Wald argues, is the unequal attribution of disease threats to foreign places of pathology through outbreak narratives that "give microbes a natural history in the primordial landscape of the developing world" (Wald, 2008: 46). Such pathologization of poor places and people in turn constructs what Paul Farmer has famously critiqued as 'geographies of blame' (Farmer, 2009). And in the case of H1N1 the geography of blame became very clear very quickly. Édgar Hernández, a five year old Mexican boy from the southern Mexican town of La Gloria was declared 'Patient Zero', and,

Please cite this article as: Sparke, M., Anguelov, D., H1N1, globalization and the epidemiology of inequality. Health & Place (2011), doi:10.1016/j.healthplace.2011.09.001

H1N1 was ascribed a nationality in the mass media as 'Mexico's swine flu' (Fox News, 2009). Whether it was in America, in France or in China, the calls for robust national public health responses to the disease were in this way all also immediately articulated with an identification of Mexico as the place to blame and of Mexicans as the people to keep out.

Not surprisingly it was in the U.S. where an anti-immigrant discourse about 'illegal aliens' from Mexico was already well established that the imagination of the nation as a community under threat from a Mexican disease took its most egregiously xenophobic form. In this media context the visioning of 'epidemiological community' versus 'viral otherness' became by turns racist, reactionary and, in at least one odd case, wrapped-up in a warped war-on-terror fear about disease-deploying terrorists. "Make no mistake about it," said the radio commentator Michael Savage on his nationally syndicated show.

> Illegal aliens are the carriers of the new strain of human–swine avian flu from Mexico....If we lived in saner times, the borders would be closed immediately....[C]ould this be a terrorist attack through Mexico? Could our dear friends in the radical Islamic countries have concocted this virus and planted it in Mexico knowing that you, [Homeland Security Secretary] Janet Napolitano, would do nothing to stop the flow of human traffic from Mexico? [T]hey are a perfect mule—perfect mules for bringing this virus into America. But you wouldn't think that way, would you? Because you are incapable of protecting America's homeland, Napolitano (Savage quoted in Media Matters, 2009).

Here in an angry sound-bite all the basic elements of the geography of blame became instantly articulated in an especially paranoid depiction of H1N1 as a terrorist plot using Mexico as a new ground zero from which to spread fear and take lives in America. Not only was Mexico blamed as an epidemiological entry point for H1N1, but Mexican immigrants were represented as blamable carriers, and the US Homeland Security secretary was in turn billed as blameworthy too for failing to defend the homeland with an adequate show of strength at the border. Without the ties with terrorists, though, it was still this same basic territorializing line of argument that was shared with other less paranoid depictions of the disease. The concern with border security obviously built on a longstanding preoccupation of conservative nationalists, but it also became the basis of a much more widely shared geographical imagination of the response many Americans expected to see against H1N1. Democratic Representative Eric Massa of New York, for instance, called in this way for the U.S.–Mexico border to be closed in order to curb the spread of the virus.

> "I'm glad that the White House has issued a travel advisory and is conducting passive screening at the border, but I think we should consider stronger measures at the border. I am in favor of using all tools available to reduce the spread of H1N1" (Mesa quoted in Osborne, 2009).

These kinds of commentaries and calls for action had consequences. Despite WHO advice that travel restrictions would be ineffectual and costly, and despite America actually having more cases of the disease, the US government recommended suspending non-essential travel to Mexico (Gostin, 2009a). US flights to Mexico were canceled (Reuters, 2009); holiday-makers in Mexico cut short their vacations (Britten, 2009); and Mexican restaurants in America saw a drop in business (Alexander, 2009). A similar pattern of avoiding, isolating and blaming Mexico and Mexicans also became quite common globally too. The French government called on the EU to ban flights from Mexico, and around the world Mexicans became viewed as carriers.

> "From Chile, where sports officials declined to host Mexican soccer teams, to China, where the authorities forced even healthy resident Mexicans and Mexican travelers into quarantine, Mexicans say they have been typecast as disease carriers and subjected to humiliating treatment" (Lacey and Jacobs, 2009).

In response, the Mexican government strongly criticized the singling out of Mexican travelers, and, complained about attempts to call H1N1 the 'Mexican flu' (a complaint that itself rankled Lou Dobbs, a loud xenophobic voice in the US media who sensed political correctness in the biomedical renaming of the disease and said "that the "idiots referring to it now as 'H1N1 virus' [are] out of their cotton pickin' minds" (quoted in *Media* Matters, 2009)). For reasons we will go on to examine in the final section below, there was far more merit in the Mexican government's contestation of 'Mexican flu' than in the efforts of pork production companies to resist the nomenclature of 'swine flu'. But this did not stop someone in the unaccountable space of the blogosphere from making a racist link between the two contested names for the disease: "This disgusting blight," blurted a 'Prison Planet' post, "is because MEXICANS ARE PIGS!" (cited in Alexander, 2009).

Beyond the obvious xenophobia and racism of all the anti-Mexican discourse, something else more significant involving inequality was going on inside the geography of blame constructed for H1N1 in 2009. In short, many of the attempts to single out Mexico and Mexicans for an unequal attribution of blame actually included an acknowledgement (however tacit and unexamined) of the ways political-economic inequalities themselves structured the transnational ties that enabled H1N1 to spread. To understand this it is vital to recall a key lesson from Farmer's own careful critique of how Haiti and Haitians were once accused of bringing HIV into the US. In this geography of blame, Farmer argued, the inequitable misallocation of responsibility for the spread of the disease (which is now understood to have been introduced to Haiti by Americans) ironically served to obscure the way in which political-economic inequalities materially structured the conditions of HIV's North American transmission through sex tourism. Operating through border-crossing markets and microbes, political-economic inequalities structured the underlying epidemiological interdependency that iniquitous accounts of disease emergence obscured and replaced with territorializing geographies of blame. Similarly, what was especially significant about the 'blame Mexico' outbreak narratives of H1N1 was the way in which they also in turn involved occasional moments where the geography of blame revealed an uncanny awareness of the inequalities structuring the underlying epidemiological interdependency.

Glen Beck, another conservative commentator who was quick to jump on the blame bandwagon and call for border security, also nevertheless noted some big inequalities between the US and Mexico and how they tied the fates of the two countries together. "Mexico is in real trouble," he said.

> What happens to a country that is in that much of an economic dire strait when they say no public events for possibly four weeks? What happens when the economy stops in Mexico because of an emergency in Mexico where no one can spend money? No one can go to a soccer game, a movie, go out to eat, nothing, for four weeks. What happens to that economy? Gee, it would be nice if we had border security now, wouldn't it? What happens if there is a rash of deaths in Mexico and it's not—they're not dying here? And maybe it's because it

Please cite this article as: Sparke, M., Anguelov, D., H1N1, globalization and the epidemiology of inequality. Health & Place (2011), doi:10.1016/j.healthplace.2011.09.001

> mutated differently down there, maybe it's because we have better health care here—I don't know. But if you are a family and you're down in Mexico and you're dying and those in America are not, why wouldn't you flood this border? Why wouldn't you come across this border? (Beck quoted in Media Matters, 2009)

Beck's assessment was at one level brutally simple: namely, build up the border. But by registering the differential case fatality levels in the US versus Mexico, and by drawing conclusions (albeit erroneous ones) about contrasting patterns of viral reassortment, the availability of health care in the two countries, and the possible incentives that might make Mexicans migrate, he was also acknowledging how cross-border inequalities created cross-border ties that could easily spread disease. Savage similarly acknowledged in his own rant how Americans depend daily on the low-paid work of Mexican laborers, and, in doing so, he also highlighted a dependency based on inequality that in turn opened opportunities for cross-border movements of microbes as well as migrants.

While the disease may have traveled with migrants, it also traveled transnationally with pigs and global pig farming operations, and as a result it turned out in the end that H1N1's north-American trajectory had already crossed the border in the opposite direction to the one charted by the geography of blame. Early cases occurred in the US states of Wisconsin, Ohio and Texas before the outbreak in Mexico. Laurie Garrett, one of America's leading public health journalists and commentators explained this in the popular press with an article in *Newsweek* (Garrett, 2009). In doing so, she also made two other points of note about Mexico that highlighted how the same sorts of US–Mexico inequalities alluded to in the geographies of blame still needed to be factored in to a more accurate accounting of H1N1's etiology. The first point concerned the disease incubation role played by industrial pig farming; and the second concerned the way in which Mexico had to pay an unfairly heavy economic price despite acting in a globally responsible way in reporting and responding to its H1N1 outbreak.

On the point about industrial pig farming, to which we will return, Garret effectively took the geography of blame down to a smaller and much more meaningful scale by noting that Édgar Hernández – the mislabeled 'patient-zero' from La Gloria Mexico – may well have inhaled H1N1 from a pig at a nearby American-owned pig fattening factory. Inequality was involved in this respect because the reason many American CAFOs or Confined Animal Feed Operations have been relocated to Mexico relates to the lower wages and laxer enforcement of environmental regulations south of the border—a North American Free Trade Agreement enabled-development that meant a better label for H1N1 may well have been 'the NAFTA flu' (Wallace, 2009b). In turn, it was also amidst the same extensive poverty that sets the floor so low for Mexican wages that the economic costs of Mexico's public health quarantining and reporting measures – including the shut down of many economically important activities in the country – seemed so unfairly high. Garrett therefore told her readers that "the world owes Mexico a big *gracias*" (Garrett, 2009). This was a call to thank rather than blame the victim, and given Garrett's stature in the U.S. it was a particularly notable gesture of thanks. At the same time, given her parallel diatribes against Indonesia's resistance to providing avian flu samples to WHO reference laboratories, Garrett's sensitivity to the costs to "Mexico's already beleaguered economy" was striking (for evidence of her more mocking approach to Indonesian arguments see Colbert, 2009).

The serious criticism of Indonesia addressed the shared global health risk posed by the spread of the highly pathogenic H5N1 virus or avian flu (Garrett and Holbrooke, 2008). However, in railing against Indonesia's claim to 'viral sovereignty' Garrett simultaneously ignored and obscured the inequalities limiting poor country access to vaccines and public health risk management options (Sedyaningsih, 2008). It was precisely these inequalities structuring vaccine development and access – inequalities demonstrated when the Australian vaccine manufacturer CSL announced plans to develop a vaccine from Indonesian strains shared with WHO's laboratories – that the Indonesian health minister had originally highlighted when she suspended shipments of H5N1 viral samples to WHO labs (Sedyaningsih, 2008; Reuters, 2007). The concern about these inequalities was a resonant global issue, and in fact the Indonesian intervention led to an ongoing WHO reform process, the 2007 passage of resolution WHA 60.28 regarding the need for "fair and equitable sharing of benefits, including access to, and distribution of, affordable diagnostics and treatments, including vaccines," and a more recent 2011 *Pandemic Influenza Preparedness Framework* that includes benefit sharing for developing countries in exchange for the expedited sharing of influenza viruses (Khoon, 2010; WHO, 2007; Gostin and Fidler, 2011). All of which is to underline that, in contrast to her criticisms of Indonesia, Garrett's comments on Mexico revealed an awareness of the expense of disease control in poor countries where debt and austerity mean there is little money to pay for surveillance and biomedical risk management. It is to these forms of inequality that we now turn directly.

2. Inequalities in risk management

> "Severe disparities in public health can persist because of the array of technological, scientific and architectural innovations that enable wealthy households to insulate themselves from the environmental conditions of the poor. These public health inequalities – emboldened by the distortions of marketized public health and medical research – are creating the corporeal equivalents of gated communities" (Gandy, 2008a, b: 179–180).

Matthew Gandy's argument based on research into health enclaving in India was also amply illustrated by the experience of H1N1 across a variety of geographical scales. There were technological innovations in disease surveillance involved that enabled wealthy elites to manage risk more effectively at a personal level, and we will shortly examine the enclaving effects that they made possible, before turning in the next section to consider how inequalities also structured access to risk-managing medicines too. But in addition there was the wider matter of international inequalities in how risk was measured and managed globally. Inequality in this sense was not just about the risks posed by H1N1 and the difficulties of finding and interpreting comparative case fatality ratios. It was also and simultaneously about the remarkable ways in which these risks were dwarfed by the much bigger and more enduring dangers posed by diseases of poverty around the world. Global mortality and morbidity due to malnutrition, diarrhea, and infant and maternal deaths, combined with the huge burden of disease in the Global South presented by AIDS, tuberculosis and malaria, made the risks posed by H1N1 seem as irrelevant to the poor as the concierge and cosmetic medicine available for the rich in privileged health enclaves (Duclos, 2009; Gostin, 2009b; see also IHME, 2011). Many critics of the 'H1N1 scare' pressed these comparisons and further highlighted the associated inequalities in attention (and for a fuller review of 'crying wolf' complaints vis-à-vis H1N1 see Nerlicha and Koteyko, forthcoming).

"The importance accorded to flu virus A is an outrage," noted infectious disease researcher Marc Gentilini, "when you compare it to the overall health situation in the world... I'm ashamed to see

Please cite this article as: Sparke, M., Anguelov, D., H1N1, globalization and the epidemiology of inequality. Health & Place (2011), doi:10.1016/j.healthplace.2011.09.001

what is being done to avoid this flu which we know so little about, while malaria kills a million people and hardly anyone notices" (quoted in Duclos, 2009). Summarizing arguments such as these, the sociologist and journalist Denis Duclos noted too that: "When it comes to fears, not all diseases are equal, nor are their victims. Why were health professionals mobilised against swine and bird flu when simple gastroenteritis kills nearly a million children and 600,000 adults a year in poor countries without causing alarm?" (Duclos, 2009) And pointing out similar inequalities of risk and relevance with the further use of comparative mortality data in *The Lancet*, a group of researchers working on tuberculosis cautioned that it was vital to keep an empirical focus on the contrasts in danger posed by the big killers vis-à-vis H1N1. "Tuberculosis is a respiratory pandemic priority," they insisted:

> affecting an estimated 9.27 million people and killing 1.77 million worldwide in 2007. Multi-drug-resistant tuberculosis (MDR-TB; 511,000 cases, 150,000 deaths estimated in 2007) has a case-fatality rate of 294 per 1000 affected individuals, and extensively drug-resistant tuberculosis (XDR-TB; 50,000 cases and 30,000 deaths estimated in 2007) has a case–fatality rate of 600 per 1000 affected cases. This means 1.13 daily deaths in Mexico and 0.1 in the rest of the world for H1N1 and 410.9 and 82.2 daily deaths, respectively, for MDR-TB and XDR-TB. (Migliori et al., 2009: 2108)

The unstated implication of the simple empirical contrasts was to point up the injustice of making H1N1 a priority ahead of the big global killers: an injustice that was ultimately about economic inequality itself insofar as it was about prioritizing a disease that *might* effect the wealthy rather than other diseases that *already* effect the poor. However, in making their contrast with reference to case fatality ratios and pointing to the 1.13 daily deaths due to H1N1 in Mexico in mid 2009, the *Lancet* letter writers were also working with H1N1 data that was itself beset by yet other questions and interpretative challenges relating to inequality.

Early observations of contrasting fatality rates between Mexico and the US were, as we have already seen, a part of the initial outbreak narrative (see also Bosely, 2009). Countering the rush to pathologize Mexico, however, Julio Frenk (the dean of Public Health at Harvard and former Mexican health minister) argued that the high reported numbers of fatal cases in Mexico could instead be interpreted as an indication of an efficient and transparent surveillance system in the country (Frenk, 2009). Meanwhile, at the same time, in many other parts of the Global South, under-reporting and under-ascertainment of the denominator in the case fatality ratios were more likely a reflection of underfunding for public health surveillance that in turn made it hard to assess the actual number of cases. The WHO guidance on complying with the new global health regulations acknowledged as much in noting the challenges vis-à-vis reporting H1N1 (albeit in the apolitical bureaucratic language of reporting rubrics).

> Countries without a designated National Influenza Center, with no ongoing influenza surveillance activities and with no laboratory capacity to diagnose the pandemic H1N1 2009 influenza virus should collect representative samples from clinically compatible cases from newly affected areas and among severe cases (WHO, 2009a, 2009b).

The "should" here no doubt reflected a certain amount of wishful thinking about what might be possible for the world's poorest countries. Thus, in places without a National Influenza Center and no surveillance and laboratory capacity the inability even to measure risk from influenza turned itself into another indication of inequality.

For all the above reasons it was (and remains) very hard to determine comparative case fatality levels for H1N1 at a global scale (for a rigorous overview of the statistical pitfalls see Garske et al., 2009; and for further commentary on the divergent methodologies used in different national contexts, see Giles-Vernick and Craddock, 2010). The WHO summarized that most countries were estimating that their true CFRs were $<0.5\%$ (WHO, 2009c), but, like researchers in the UK (Donaldson, 2009) and the US (HSS, 2009; CDC, 2011), it continued to caution about the case denominators being difficult to estimate because of the under-reporting of influenza. India's Ministry of Health similarly urged caution in 2010, even as it reported extremely high H1N1 CFRs for certain Indian states (Indian Ministry of Health, 2010). And elsewhere in Asia a WHO report on the Western Pacific region (including most of Asia and the South Pacific) also advised against reading too much into comparative CFRs, saying that Singapore's high CFR was due to "selection bias," at the same time as noting that the high ratios for Cambodia and Mongolia required "closer scrutiny" (WHO-WPR, 2009).

While poor countries struggled to provide reporting and disease surveillance with beleaguered public health systems, wealthy individuals in more privileged contexts sought to buy themselves personalized and privatized risk management with online geo-surveillance tools: tools that thereby repeated virtually the material geographical enclaving highlighted by Gandy. There was, as the adverts say, an 'app' for that. An iPhone application known as *'Outbreaks Near Me'*, was one of the most remarkable public health innovations to come out of the global response to the pandemic: a radically localizing, marketizing and individualizing disease surveillance technology. Not near us, not near our nation-state, but 'near me', the application promised users GPS-enabled alerts on when an outbreak might be occurring in their personal vicinity. In addition the app also offered consumers the opportunity to become disease detectives themselves by being the first to spy and report signs of an outbreak. "You will get credit as a disease detective," the ad on iTunes explained, "and your find will be featured on Health Maps website (www.HealthMap.org)." Here the traditional state authority over the production of surveillance data and the mapping of public health geography was being usurped by an upstart example of Web 2.0 or Neo-Geo cartography (Sparke, 2011). And the result was in turn being advertized to the consuming classes – those that could afford to purchase iPhones, pay the monthly fees, and invest effort in reviewing and installing apps – to buy their way in to the electronic and hence mobile equivalent of a privileged health citizenship enclave.

The transformations in traditional state health surveillance represented by the *Outbreaks Near Me* app went further than this. It not only indexed a societal challenge to the formal scientific surveillance role traditionally reserved for the state in mapping the movement of disease in space. By being wired to other online technologies such as *Google Flu Trends Tracker*, the challenge to traditional public health surveillance by the state was also about time as well space. The Google tool uses algorithms based on correlations between specific search query entries and historic state surveillance data to generate speedier real time 'syndromic surveillance' than state agencies can provide with their dependence on the lab-testing of swabs taken in clinics (Ginsberg et al., 2009). Critical empirical questions have subsequently been asked about the accuracy of Google Flu Trends' algorithmic surveillance results (Ortiz et al., 2011). Nonetheless, there can be no doubting that the need for speed indexed by both the Google tool and the *Outbreaks Near Me* app illustrate a very real interest on the part of technology companies in providing their consumers with accelerated as well individualized access to information. In this sense, these so-called neo-geo technologies were also simultaneously

Please cite this article as: Sparke, M., Anguelov, D., H1N1, globalization and the epidemiology of inequality. Health & Place (2011), doi:10.1016/j.healthplace.2011.09.001

serving as neoliberal technologies too: technologies that reflect the wider neoliberalization of citizenship, and which as such are not aimed at national citizens or national health administrators in the manner of traditional public health communications, but rather targeted more narrowly at the kinetic elites of a hyper-mobile and, for the elites at least, post-national global era (Mitchell, 2004, 2007; Sparke, 2009b).

The wealth inequalities associated with the market-led neoliberalization of citizenship more generally have led to the development of many other technologies geared to servicing the mobility needs of the business class. Like the systems that use biometrics to facilitate fast-track clearance at borders and airport checkpoints, the privatization and individualization of high-speed disease surveillance also represents an adaptation of state administration in the interests of making space more navigable for a subset of privileged consumers who can afford the technological fast lanes and VIP services (Amoore, 2009; Häkli, 2007). And precisely because they use expensive biometrics and biosecurity technology to manage risk, these developments have not only elevated a form of twenty-first century neoliberal citizenship over twentieth-century liberal citizenship – a transformation which we can theorize following Foucault (2008) as the privileging of personalized forms of 'biological citizenship' over collective 'biopolitical citizenship' (Rose and Novas, 2005) – they have also at times directly undermined collective health citizenship too. It maybe because of the effects of liberalized mobility on the traditional sanitary borders of the nation-state, or it maybe because public health budgets are redirected to pay for the risk-managing technologies designed to pre-clear the privileged, but in these and other ways, the promise of biological risk management for a class of privileged, albeit neurotic, biological citizens is predicated on the exclusion and heightened vulnerability of others (cf. Budd et al., 2011; Isin, 2004; Braun, 2007).

Beyond all the challenges to traditional national-state biopolitics, yet another feature of the unequal risk management opportunities made manifest by H1N1 related to what people were able to do *with* the fast flows of information coming from state and non-state agencies alike. On the one side, the idealized fast track consumers of the *Outbreaks Near Me* app could simultaneously link online to other mapping tools geared to providing information on where to find local pharmacies and clinics with a reliable supply of vaccines. On the other side, the risk management options available to working class citizens suffering from flu symptoms were instead reduced to the very opposite of internet-enabled enclaving: namely, going to work sick. In contexts where sick leave options have been widely curtailed by the neoliberalization of the labor market – including innovations in post-Fordist flexibility such as 'temping' – workers with influenza had little choice but to go to work and share their illness with others (cf. Major, 2008). "Glynndana Shevlin awoke Oct. 30 with a runny nose and scratchy throat, worried she might have the flu," reported the *LA Times*.

> "But the full-time food and beverage concierge at the Disneyland Hotel in Anaheim has no paid sick days, and if her absences stack up, she faces discipline. So like many others in the service industry, Shevlin, 49, weighed her options and reported to work sick" (Hennessy-Fiske, 2009).

The widespread lack of sick leave at the bottom end of America's highly unequal labor market in turn undermined the administration's announcement that the flu's status as a national emergency meant that all citizens should stay home when ill. And addressing these contradictions in the US Congress, Senator Chris Dodd suggested to fellow lawmakers that the economic plight of 57 million Americans without sick leave had put the US in a similar situation to some of the world's poorest countries (international inequalities here being invoked rhetorically by Dodd to underline the dangerous impact of inequalities within the US). "We're in the company – and I say this respectfully of these countries – of Lesotho, Liberia, Papua-New Guinea and Swaziland. Those countries and the United States are the five that don't have paid sick leave," Dodd said (quoted in AFP, 2009). What Dodd did not say, but something that could have been easily added to his argument, was that another more biomedical form of risk management was also limited in the US for some of the same reasons as it was radically curtailed in poor countries globally: namely the use of vaccines and anti-virals.

3. Inequalities in access to medicines

> Questions concerning production and distribution of resources such as vaccines and drugs during epidemics extend beyond underserved communities.... [The] current global regulatory mechanisms protecting pharmaceutical industries have driven prices of vaccines and antivirals up, diminished possibilities for collaborative production, and made it exceedingly difficult to manufacture cheaper generic versions. The result is that inequities in resource allocation occur between countries as well as between subgroups within countries (Giles-Vernick and Craddock, 2010: 283).

The most glaring inequalities in access to medicine revealed by the H1N1 pandemic occurred at a global scale. Early on in the crisis as wealthy countries scrambled to build-up stock-piles and secure advance purchase agreements with drug companies, the injustices involved were widely noted. Lawrence Gostin, a leading legal scholar of global health, put the problem like this:

> Stockpiling by the rich, of course, leaves poor countries in Africa, Asia, and Latin America much more vulnerable. ... Serious questions of global social justice arise when wealth, rather than need, becomes the primary allocation criterion. The maldistribution of vaccines in the face of a global health crisis will only widen the already large health gap between rich and poor (Gostin, 2009b).

As well as the basic inequalities in ability to pay for patent-protected prophylaxis and treatment, a related problem affecting access was the privileging of countries in which drug companies are based. Sangeeta Shashikant of the *Third World Network* issued a statement highlighting the obvious and unfair underside of this uneven global distribution of vaccine and anti-viral production capacity.

> The swine flu outbreak is a stark reminder that if a deadly pandemic were to develop, there will be a desperate fight over limited supplies of anti-viral treatments and vaccines, in which the developing countries will be at a vast disadvantage. Today more than 90% of the global capacity for vaccine manufacturing is located in Europe and in North America. Developed countries through 'advance purchase agreements' with manufacturers have already reserved a good portion of the limited current manufacturing capacity. Thus in the event of a pandemic, the world would be several billion doses short of the expected demand (Sashikant, 2009).

Interconnected with the access problems created by economic inequality was a global governance problem too: namely, the difficulties facing the WHO in establishing a more equitable tissue-and-vaccine sharing system in response to the complaints started by Indonesia and joined by most other developing countries. As we have noted already, these complaints highlighted

Please cite this article as: Sparke, M., Anguelov, D., H1N1, globalization and the epidemiology of inequality. Health & Place (2011), doi:10.1016/j.healthplace.2011.09.001

the basic injustice of asking poor countries to share disease samples with global laboratories in the name of surveillance while allowing the same laboratories to develop patented vaccines for which poor countries could never afford to pay. Thus as it began to wrestle with global drug access injustices, the WHO had to deal with three interconnected inequalities at the same time—inequality in ability to pay, inequality in ability to access drug production capacity, and inequality in the ability to benefit from sharing tissue. Led by Margaret Chan, the WHO did nevertheless try to come to terms with the resulting injustices. "It is my job," she said, "to do whatever is possible to ensure that developing countries are not left without protection.... An influenza pandemic is a global event that calls for global solidarity." However by November 2009, these calls had only led to the donation of 200 million doses for 95 countries with well over 2 billion people, in other words, barely enough for one in ten. This clearly compared poorly and very unequally with the 250 million doses already purchased by the US by the end of 2009, or Germany's 50 million, or France's 94 million; and as a reporter writing for *Science* critically concluded, such inequalities hardly looked like 'global solidarity' (Enserink, 2009). And attuned to such shortcomings, similar concerns were subsequently echoed by the *Third World Network*, the *Peoples Health Movement* and other NGOs in their more critical comments on the WHO's 2011 Pandemic Influenza Preparedness Framework (Saez, 2011). In the end H1N1 therefore showed that the concerns originally raised by Indonesia with regard to H5N1 samples and benefits remained justified: that poor countries with no domestic production capacity were effectively reduced to being pandemic canaries in the cloudy mineshafts of global influenza surveillance (Khoon, 2010; Lowe, 2010). Included in terms of data collection but simultaneously excluded in terms of effective biomedical protection, they represent a global health version of what scholars of developmental inequality call 'adverse incorporation' (Mosse, 2010).

Inequalities also came to shape access to medicines within countries too. In the US where the CDC's Advisory Committee on Immunization Practices (ACIP) had identified five target groups for priority vaccination – including children, people in close contact with infants, emergency first responders, and people with high risk medical conditions – a major scandal erupted when it was discovered that leading investment banks and other large corporations had received early and disproportionately large allotments even as vaccine shortages continued for hospitals. New York City health officials acknowledged thus that Goldman Sachs and Citigroup had received much larger shares of what they had requested than Memorial Sloan Kettering Cancer Center (Anderson, 2009). Given the popular discontent with the investment banks in the context of the global financial crisis, this additional indication of their privileged position atop a steeply stratified US society was widely noted. It even led to a *Saturday Night Live* skit highlighting the underlying epidemiology of inequality involved. "Can you not read how mad people are at you?" demanded Amy Poehler, on the show. "When most people saw the headline 'Goldman Sachs Gets Swine Flu Vaccine,' they were super happy until they saw the word 'vaccine.'" To which her co-host Seth Meyers added: "Also, Centers for Disease Control, you sent the vaccine to Wall Street before schools and hospitals? Really!?! Were you worried the swine flu might spread to the Hamptons and St. Barts? These are the least contagious people in the world. They don't even touch their own car-door handles."

The jibes about investment banks may well have made for good gag lines on TV, but they pointed to serious underlying issues about inequality. As Lawrence Gostin had anticipated, "the private market may still privilege the rich and politically connected in gaining access, particularly if the virus becomes more pathogenic and consumer demand is strong" (Gostin, 2009b). At the same time, and at the other end of the socio-economic spectrum, many poor and vulnerable workers in the low-wage contingent workforce in the US were slipping through the net of treatment altogether (Mastroianni, 2009). Even though many might have qualified for priority vaccination, and even though US government purchases were meant to make vaccines free at the point of delivery, the same economic inequalities that forced people to go to work sick often combined with other obstacles such as immigration status to make treatment an impossibility. These sorts of vulnerable (non-)patients were also made more vulnerable by the redirection of public health budgets to pay for H1N1 prevention and treatment too, and, in the UK context, this added burden on primary care trusts led at least 16% of them to cut other health care services (Community Practitioner, 2010).

The budget straining government purchases of medicines were in turn tied in the US and elsewhere to yet another set of inequalities associated with the expansion of corporate influence: namely the neoliberal policies that systematically make governments and citizens take on risks and responsibilities at the same time as business is freed-up to focus on profit-making. H1N1 made this unequal distribution of risk and reward especially clear insofar as many of the costs associated with both vaccine deployment and the stock-piling of anti-virals were taken on by governments and their citizens at the same time as the stocks of the major drug companies saw big boosts from the government guaranteed sales (Padlock, 2009). "Investors can make money and avoid losses when it comes to swine flu," explained Jason Kantor, analyst at RBC Capital. "The secret is to own companies that will benefit directly regardless of the outbreak's severity" (quoted in Krantz, 2009). And the public governmental secret behind this private profiteering secret was that governments were so anxious to respond to public fears about H1N1 and so blindly optimistic about the ability of business to deliver that they gave drug companies everything they wanted in terms of both guaranteed profits and liability protection (Ehrenreich, 2009; Jefferson, 2009). As numerous stock market advisories therefore suggested, increased earnings could be expected based on increased anxieties about the flu – and for the same reason a new *RXFLU index was started to track stocks for investors seeking to bet on the industry. It should be noted, though, that an important global corollary (and inequality) vis-à-vis this pattern of public strain and private gain was that the Indian drug manufacturer Cipla did *not* benefit from US sales of Antiflu, its cheap generic version of the Tamiflu anti-viral sold by Roche. Worries about H1N1 were not enough, it seems, to force the US government to issue a compulsory license overriding Roche's patent on Tamiflu (NPR, 2009).

In the EU context still more critical questions have subsequently been raised about the degree to which government decisions and the WHO's own declaration of a pandemic may have themselves been influenced by the profit-making interests of the pharmaceutical industry. A special report to the Council of Europe by the British MP Paul Flynn noted "grave shortcomings" in the transparency of the decision-making process and "concerns about the possible influence of the pharmaceutical industry on some of the major decisions relating to the pandemic." It noted further that the EU parliamentary assembly was also:

> particularly troubled by some of the consequences of decisions taken and advice given leading to distortion of priorities of public health services across Europe, waste of large sums of public money, and also unjustified scares and fears about health risks (Flynn, 2010).

Similarly, a joint investigation by the *British Medical Journal* and the Bureau of Investigative Journalism uncovered evidence

Please cite this article as: Sparke, M., Anguelov, D., H1N1, globalization and the epidemiology of inequality. Health & Place (2011), doi:10.1016/j.healthplace.2011.09.001

that raised what the authors, Deborah Cohen and Philip Carter, describe as "troubling questions about how the WHO managed conflicts of interest."

Was it appropriate for WHO to take advice from experts who had declarable financial and research ties with pharmaceutical companies producing antivirals and influenza vaccines? Why was key WHO guidance authored by an influenza expert who had received payment for other work from Roche, manufacturers of oseltamivir, and GlaxoSmithKline, manufacturers of zanamivir? (Cohen and Carter, 2010a)

These questions have in turn led to yet others over the actual approval process and effectiveness of the antivirals (Epstein, 2011). Answers to all these questions about corporate influence will no doubt continue to be debated (cf. Barry, 2010; Butler, 2010; Chan, 2010; with Cohen and Carter, 2010b). However at least two significant lessons can already be drawn about the ways in which market forces came to distribute the costs and benefits of biomedical risk management in unequal ways in response to H1N1. First, the reputation of public health institutions and the reliability of public health advice was undermined to the extent that national and global agencies allowed drug companies to shape policy priorities. Second, public health defenses at the level of biomedical preparedness were also undermined when governments ceded authority to drug companies over the reliability, speed and quality of production (Pollack and McNeil, 2009). When Kathleen Sibelius, the US Health and Human Services secretary, complained in this regard about having to rely on the over-optimistic delivery promises of private vaccine manufacturers, she also showed that even the US government was unable to force the companies to invest in new research and development that might make vaccines cheaper, more reliable and quicker to produce (Ehrenreich, 2009). Meanwhile, in the case of antivirals something else threatens to undermine biomedical preparedness still more: namely, the evolution of new antiviral resistant strains of the flu, whether by spontaneous mutation, or by 'drug selection' due to mass use in rich country populations such as Japan, or prohibited use in industrial agriculture (Hatakeyamaet al., 2007; Moscona and McKimm-Breschkin, 2007; Sipress, 2005; Van der Vries, 2010; WHO, 2005). Roche itself may well be more nervous about the lifespan of the Tamiflu patent or the political criticism of its involvement in WHO pandemic preparedness planning, but the deeper risks posed to the public involve the decreasing effectiveness of oseltamivir as a tool of saving lives. And this, as we shall now see, is just one of many examples of how the viral evolution of flu itself encodes the political-economic ties and tensions of market-led globalization.

4. Inequalities encoded in the virus ecology

> Factory practices provide what seems to be an amenable environment for the evolution of a variety of virulent influenzas, including pandemic strains. Swine flu H1N1, the most recent example arising early 2009 appears by definition industrial in origin. The closest ancestor for each of this H1N1's eight genomic segments is of swine origin. The segments have been identified as originating from different parts of the world: neuraminidase and the matrix protein from strains circulating in Eurasia, the other six from North America. No small farmer has the industrial capacity necessary to export livestock of any consequence across such long distances, nor the market entree livestock influenzas need to spread through international commodity chains (Wallace, 2009a: 924).

In a brilliant path-breaking article on what he calls the 'political-virology of offshore farming', Robert Wallace provides a detailed microbiological account of how the political-economy of globalization becomes encoded at a molecular scale in the breeding of new viral reassortments. His own analysis of influenza as "a case study in the inadvertent biotic fallout of efforts aimed at steering animal ontogeny and ecology to multinational profitability" (2009: 919) is focused on H5N1. Nevertheless, his account of how the micro-mutations of influenza are linked to the macro-mutations of market-led global change also offers critical analytical insight into the evolution of H1N1 too. Central in this respect are three nested geographies: the geography of the factory farm, the geography of the factory zone of southern China, and the geography of a global economy predicated on the inequalities that make off-shoring low wage production to factory farms and factory zones so profitable. Initially this might sound like another geography of blame. But unlike the blaming of Mexico as H1N1's origin, Wallace's relational approach to the nested geographies that are influenza's "greater context" takes us in a much more critical geographical direction: a multifactorial geo-graphical direction that illustrates how complex patterns of inequality amidst interdependency are implicated in the evolution of influenza as well as in the unequal distributions of blame, risk management and treatment for H1N1 charted in the previous sections (on geography in this sense see Sparke, 2005).

In terms of the factory farm, Wallace's account offers more microbiological evidence for the role played by "the supply of susceptibles" (2009a: 921) in other accounts of the threats posed by industrial agriculture. In her own counter-narrative to the 'blame Mexico' meta-narrative, for example, Garrett had effectively suggested that the real place to blame is the "strange ecology we have created to feed meat to our massive human population" (Garrett, 2009). Focusing in on this strange ecology with a microbiologist's attention to evolutionary mechanisms, Wallace in turn offers us a compelling account of why breeding billions of animals in factory farms also breeds highly virulent influenza too. "As long as there are enough susceptibles to infect," he explains, "a virulent phenotype can work as an evolutionary strategy" (2009a: 921). Historically this has not happened so much because highly virulent versions of viruses tend to kill off or damage their hosts before transmission occurs. However, if this natural selection cap on virulence is removed by supplying vast numbers of susceptibles in close quarters – which is exactly what is done with pigs and chickens in factory farms – it enables much more virulent virus strains to evolve. Moreover, given that these factory farms put a profit-making premium on shortening the turnover time it takes to prepare animals for slaughter, they also create an evolutionary imperative to select out viral strains that reach their transmission thresholds with increasing speed too.

Factory farms are now found all over the world. Amidst this globalization of corporate agriculture, though, certain sites stand out as regional incubators of accelerated viral evolution. In Wallace's account of influenza's recent metamorphoses, it is the rapid industrialization of the factory farms of the global industrial factory that is southern China that are central in this regard. "In reorganizing its stockbreeding industries under the American model of vertically integrated farming," he says, "Chinese farming helped accelerate a phase change in influenza ecology, selecting for strains of greater virulence, wider host range and greater diversity" (2009a: 929). Seroepidemiology and phylogeographic studies of global agricultural commodity chains point in this direction too, he argues (2009a: 923), as do other accounts of changes to both the physical and human geography of the Guangdong region produced by rapid economic growth (e.g. Davis, 2005). These changes include: the transformation of traditional farming land into industrial land; the destruction of traditional wetlands; the development of dense human housing close to even more densely packed CAFOs; and the constant

Please cite this article as: Sparke, M., Anguelov, D., H1N1, globalization and the epidemiology of inequality. Health & Place (2011), doi:10.1016/j.healthplace.2011.09.001

movement into and out of the region of large numbers of both migrant birds and low income migrant workers (cf. Martin et al., 2011). The regional result is that:

> What we find in southern China today for influenza is neither effortlessly remade independent of history nor enslaved to a static past. The region has neither been unconnected from the rest of the world nor had its specificities erased by a wave of recent generic globalization. The socioecological environment in which influenzas are evolving there is the complex and layered product of past and present, of global and local. The causes of emerging influenzas in southern China today are threads which may bind many places, peoples, and times together, though never evenly, and in a place-specific way. In other words, southern China's role as a primary influenza epicenter is far from inherent, instead arising from a contingent confluence of local and global factors in what the geographer David Harvey would call an 'active moment' in spatial configuration. (Bergmann et al., 2010)

We still do not have an adequate map of all the other epicenters that may have been involved in the evolution of H1N1. Nevertheless, the place of southern China in the broader evolution of new influenzas is important to note if for no other reason than to contextualize the tough response taken by Chinese authorities to H1N1. Spurred by heightened anxiety about influenza as well as by criticism of their handling of the SARS outbreak, they responded to H1N1 with a government sponsored vaccine development program using a new cell-culture method—a more research intensive method that the big western drug manufacturers were not obliged to invest in by western governments (Ehrenreich, 2009). Addressing other feedback loops in the region, Wallace suggests that earlier Chinese attempts to manage avian flu with mass vaccinations may be forcing yet further viral evolution in more untreatable directions. But for a human population dealing with H1N1 these dynamics vis-à-vis vaccines (unlike anti-virals) are not subject to the same massive evolutionary acceleration produced in factory farms. And so the Chinese effort to develop and deliver vaccines independent of the IP constraints surrounding western medicines seems like a way of shielding the country's citizens from at least one set of market-made inequalities and dangers.

In any event, criticizing China instead of Mexico is not the lesson of Wallace's work. This is why it is not another geography of blame, and nor does it ontologize a border between spaces of disease emergence and disease management (cf. Shaw et al., 2010). Instead Wallace's approach draws on Harvey's argument about the ongoing production of space in order to suggest that the whole factory zone of the Guangdong region be itself understood as a transitory spatial fix of much broader globe-spanning capitalist processes (Harvey, 2006). The main point therefore is that the Chinese 'phase change' in influenza's ecology cannot be understood without contextualizing the transformation of Guangdong within the broader imperatives of global capitalism. These consist of systemic forces such as WTO rules, IMF insistence on the removal of agricultural subsidies, and the ongoing search for cheap inputs into commodity chains through outsourcing to low wage and low environmental protection places of production. Amidst all these global dynamics more specific illustrations of the global ties include the role played by global industrial farming conglomerates such as the CP Group, and, as Davis (2005) points out in his own critical geographical account of H5N1, following the linkages of companies such as CP leads all over the world to "multiple epicenters" (p. 89) of influenza breeding, including back to North America and the mega-farms of North Carolina where, Davis explains, H1N1 also has a historical-geography.

Finally, and not unrelatedly, it also should be noted here – given the account offered above of inequalities in access to H1N1 vaccines – that Goldman Sachs has also been one of the specific global businesses profiting from investments in industrial farming in China. As Wallace notes: "The firm adeptly moved out of high-risk US mortgages and, during a global food crisis, into the brave new world of offshore farming in China" (2009a: 932). The fact that the same firm was also very adept at securing itself protection from the H1N1 pandemic would seem to illustrate therefore the much broader pattern of inequality involved in privately profiting from risk at the same time as externalizing its dangers and offloading its costs on to other people, places and governments.

5. Conclusions

Following Wallace, and yet also following Virchow whose exemplary innovations in the epidemiology of inequality began this article, we must note in conclusion that today's equivalents of hot stoves and Christmas apples – in short, all the diverse consumer goods, components and food coming out of the factories and factory farms of southern China – are no less connected to the production of disease. However, instead of ship hands suffering from cholera, today's victims of inequality-induced affliction are much more diverse and diversely situated, their relationships back to exploitative commodity production chains not always being so obvious as in Virchow's time. As the preceding pages have shown, H1N1 exposed a telling sampling of this diversity.

The pandemic highlighted first of all how poor countries and poor people are easily blamed for diseases which instead have global roots and routes. It showed how an awareness of inequality nevertheless helps the geographers of blame to identify border-crossing carriers as blameworthy subjects. It revealed in turn how inequalities also structured risk, the calculation of risk, and, most of all, the ability to respond to and manage risk from the pandemic. As part of these inequalities shaping response capacity, unequal access to medicines both globally and within nation-states was also clearly illustrated by the scramble to stockpile H1N1 vaccines and antivirals. And finally reflecting on the evolution of new multidrug resistant strains of influenza led us into the still more extensive and far-reaching ways in which the same processes of neoliberal globalization that produce inequality are also helping to produce still more virulent and pathogenic viral reassortments in places such as southern China.

In short, H1N1 taught us multiple lessons about the epidemiology of inequality, but like the struggling public health systems in the developing world for which compliance with influenza sampling is an unfunded mandate that only benefits other people in other more wealthy countries, we remain in a tragically poor position to act on any of the lessons.

Uncited references

Q2

~~Craddock and Giles-Vernick (2010), Farmer and commentators (2004), Garrett (2008), Major (2009),~~ and Sparke (2008, 2006a, **2006b, 2004)**.

References

Alexander, B., 2009. Amid H1N1 Outbreak, Racism goes Viral. MSNBC, (online) Available at: ⟨http://www.msnbc.msn.com/id/30467300/⟩ (Accessed on July 25, 2011).

Ali, S.H., Keil, R., 2008. Networked Disease: Emerging Infections in the Global City. Wiley-Blackwell, Oxford.

Please cite this article as: Sparke, M., Anguelov, D., H1N1, globalization and the epidemiology of inequality. Health & Place (2011), doi:10.1016/j.healthplace.2011.09.001

Amoore, L., 2009. Algorithmic war: everyday geographies of the war on terror. Antipode 1, 49–69.

AFP, 2009. No Paid Sick Leave Hampers US Swine Flu Battle, MSN reporting *Agence France-Presse*. (online) Available at: ⟨http://news.ph.msn.com/lifestyle/article.aspx?cp-documentid=3699702⟩ (Accessed on July 25, 2011).

Anderson, J., 2009. Officials Defend Distribution of Flu Vaccine to Companies. *New York Times*, (online) Available at: ⟨http://www.nytimes.com/2009/11/06/nyregion/06flu.html⟩ (Accessed on July 25, 2011).

Barry, J., 2010. How Prepared are we for the Next Great Flu Breakout? Why we're Losing the War Against Influenza. World Policy, The Nation, (online) Available at: ⟨http://www.thenation.com/article/37520/how-prepared-are-we-next-great-flu-breakout⟩ (Accessed on July 26, 2011).

Bergmann, Wallace R, Hogerwerf, L., Gilbert, M., 2010. Influenza's Historical Present. **In: Craddock, S., Giles-Vernick, T. (Eds.), Influenza and Public Health: Learning from past pandemics, Earth**scan, London, pp. 101–143.

Birn, A., Yogan, P., Holtz, T., 2009. Textbook of International Health: Global Health in a Dynamic WorldThird Edition Oxford University Press, New York.

Braun, B., 2007. Biopolitics and the molecularization of life. Cultural Geographies 14, 6–28.

Budd, L., Bell, M., Warren, A., 2011. Maintaining the sanitary border: air transport liberalisation and health security practices at UK regional airports. Transactions of the Institute of British Geographers 36 (2), 268–279.

Butler, D., 2010. Flu experts rebut conflict claims. Nature 465, 672–673.

CDC, 2011. Updated CDC Estimates of 2009 H1N1 Influenza Cases, Hospitalizations and Deaths in the United States, April 2009–April 10, 2010. *CDC*, (online) Available at: ⟨http://www.cdc.gov/h1n1flu/estimates_2009_h1n1.htm⟩ (Accessed on July 26, 2011).

Chan, M., 2010. WHO Director-General replies to the BMJ. BMJ 340.

Cohen, D., Carter, P., 2010a. WHO scandal exposed: advisors received kickbacks from H1N1 vaccine manufacturers. British Medical Journal 340, 2912–2925.

Cohen, D., Carter, P., 2010b. Questioning the timeline of H1N1 flu vaccination contracts. Nature 466 (7304), 315.

Colbert, S., 2009. Laurie Garrett Warns that the Bird Virus in Indonesia is 850 Times as bad as the Swine Flu. *Colbert Report*, (online) Available at: ⟨http://www.colbertnation.com/the-colbert-report-videos/226864/may-06-2009/laurie-garrett⟩ (Accessed on July 25, 2011).

Community Practitioner, 2010. H1N1 costs mean PCT cuts. Community Practitioner 83 (6), 8.

Craddock, S., Giles-Vernick, T., 2010. Influenza and Public Health: Learning from past pandemics. Earthscan, London.

Davis, M., 2005. The Monster at Our Door: The Global Threat of Avian Flu. New Press, New York.

Dorling, D., Barford, A., 2009. The inequality hypothesis: Thesis, antithesis, and a synthesis? Health & Place 15, 1166–1169.

Donaldson L.J., 2009. Mortality from Pandemic A/H1N1 2009 Influenza in England: Public health Surveillance Study. *BMJ*, (online) Available at: ⟨http://www.bmj.com/content/339/bmj.b5213.full⟩ (Accessed on July 26, 2011).

Duclos, D., 2009. Pandemics and Rumours: the Great Swine Flu Scare. *Le Monde Diplomatique*, (online) Available at: ⟨http://mondediplo.com/2009/12/16flu fears⟩ (Accessed on July 26, 2011).

Ehrenreich, B., 2009. The Swine Flu Vaccine Screw-up: Optimism as a Public Health Problem. Available at: ⟨http://ehrenreich.blogs.com/barbaras_blog/2009/11/the-swine-flu-vaccine-screwup.html⟩ (Accessed on July 26, 2011).

Enserink, M., 2009. Developing countries to get some H1N1 vaccine—but when? Science 6, 782.

Epstein, H., 2011. Flu Warning: Beware the Drug Companies! The New York Review of Books. Available at: ⟨http://www.nybooks.com/articles/archives/2011/may/12/flu-warning-beware-drug-companies/?pagination=false⟩ (Accessed on Sept 1, 2011).

Farmer, P., 2009. AIDS and Accusation: Haiti and the Geography of Blame. University of California Press, Berkeley.

Farmer, P., 1999. Infections and Inequalities: the Modern Plagues. University of California Press, London.

Farmer, P., 2003. Pathologies of power: health, human rights, and the new war on the poor. University of California Press, Berkeley.

Farmer, P., 2004. commentators, 2004. An anthropology of structural violence. Current Anthropology 45, 305–325.

Flynn, P., 2010. The Handling of the H1N1 Pandemic: more Transparency needed. *Council of Europe: Strasbourg*, (online) Available at: ⟨http://www.assembly.coe.int/CommitteeDocs/2010/20100604_H1N1pandemic_e.pdf⟩ (Accessed on July 25, 2011).

Fort, M., Mercer, M.A., Gish, O., 2004. Sickness and wealth: the corporate assault on global health. South End Press, Cambridge.

Foucault, M., 2008. The Birth of Biopolitics: Lectures at the College de France, 1978–1979. Palgrave Macmillan, Houndmills Basingstoke.

Fox News, 2009. 'Patient Zero' in Swine Flu Outbreak Identified as 5-Year-Old Mexican Boy. *Fox News*, (online) Available at: ⟨http://www.foxnews.com/story/0,2933,518347,00.html#ixzz15lgdDPzC⟩ (Accessed on July 25, 2011).

Frenk, J., 2009. Mexico's Fast Diagnosis. *New York Times*, (online) Available at: ⟨http://www.nytimes.com/2009/05/01/opinion/01frenk.html⟩ (Accessed on July 25, 2011).

Gandy, M., 2008a. Death, Disease and the Global Politics of Public Health. In: Ali, S.H., Keil, R. (Eds.), Networked Disease: Emerging Infections in the Global City, Wiley-Blackwell, Oxford, pp. 172–185.

Gandy, M., 2008b. Landscapes of disaster: water, modernity, and urban fragmentation in Mumbai. Environment and Planning A 1, 108–130.

Garrett, L., Holbrooke, R., 2008. 'Sovereignty' That Risks Global Health. *Washington Post* (online) Available at: ⟨http://www.washingtonpost.com/wp-dyn/content/article/2008/08/08/AR2008080802919.html⟩ (Accessed on July 25, 2011).

Garrett, L., 2008. Global Health Update. *CFR*, (online) Available at: ⟨http://www.cfr.org/content/thinktank/GlobalHealth/GHU_FoodCrisis_Jul208.pdf⟩ (Accessed on July 25, 2011).

Garrett, L., 2009. The Path of a Pandemic. *Newsweek*, (online) Available at: ⟨http://www.newsweek.com/2009/05/02/the-path-of-a-pandemic.html⟩ (Accessed on July 25, 2011).

Garske, T., et al., 2009. Assessing the severity of the novel influenza A/H1N1 pandemic. British Medical Journal 339 (2840) [online] Available at: ⟨http://www.bmj.com/content/339/bmj.b2840.full⟩ (Accessed on July 25, 2011).

Giles-Vernick, T., Craddock, S., 2010. Influenza and Public Health: Learning from Past Pandemics. Earthscan, London.

Ginsberg, J., Mohebbi, M.H., Patel, R.S., Brammer, L., Smolinski, M.S., Brilliant, L., 2009. Detecting influenza epidemics using search engine query data. Nature 457, 1012–1014.

Gostin, L., 2009a. Influenza A(H1N1) and pandemic preparedness under the rule of International Law, 301. JAMA, 2376–2378.

Gostin, L., 2009b. Swine flu vaccine: what is fair? Hastings Center Report 39 (5), 9–10.

Gostin, L., Fidler, D., 2011. The WHO pandemic influenza preparedness framework: a milestone in global governance for health. JAMA 306 (2), 200–201.

Häkli, J., 2007. Biometric identities. Progress in Human Geography 31 (2), 1–3.

Harvey, D., 2006. Spaces of global capitalism: Towards a theory of uneven geographical developmentVerso, New York, NY.

Hatakeyama, S., et al., 2007. Emergence of influenza B viruses with reduced sensitivity to neuraminidase inhibitors. JAMA 297, 1435–1442.

Hunter, M., 2010. Love in the Time of AIDS: Inequality, Gender and Rights in South Africa. Indiana University Press, Bloomington.

Heggenhougen, H.K., 2005. The epidemiology of inequity: will research make a difference? Norsk Epidemiologi 2, 127–132.

HSS, 2009. Assessment of the 2009 Influenza A (H1N1) Pandemic on Selected Countries in the Southern Hemisphere. The White House, (online) Available at: ⟨http://www.flu.gov/professional/global/southhemisphere.html⟩ (Accessed on July 25, 2011).

IHME, 2011. Global Burden of Disease Study. *Global Burden*, (online) Available at: ⟨http://www.globalburden.org/index.html⟩ (Accessed on July 25, 2011).

Isin, E., 2004. The neurotic citizen. Citizenship Studies 8 (3), 217–235.

Indian Ministry of Health, 2010. Cases of Influenza A H1N1. *Press Information Bureau, Government of India*, (online) Available at: ⟨http://www.pib.nic.in/newsite/erelease.aspx?relid=63868⟩ (Accessed on July 25, 2011).

Jefferson, T., 2009. A Whole Industry is waiting for a Pandemic. Spiegel Online International. (online) Available at: ⟨http://www.spiegel.de/international/world/0,1518,637119,00.html⟩ (Accessed on July 25, 2011).

Kay, A., Williams, O. (Eds.), 2009. Global Health Governance: Transformations, Challenges and Opportunities Amidst Globalization, Palgrave Macmillan, New York.

Kim, J.Y. (Ed.), 2000. Dying for growth: global inequality and the health of the poor, Common Courage Press, Monroe.

Khoon, C., 2010. Equitable Access to Pandemic Flu Vaccines. *Third World Network*, (online) Available at: ⟨http://www.twnside.org.sg/title2/intellectual_property/info.service/2010/ipr.info.100311.htm⟩ (Accessed on July 25, 2011).

Kleinman, A., 2010. Four social theories for global health. The Lancet 375, 1518–1519.

Krantz, J., 2009. Investors Look for Stocks that could Gain from Swine Flu. *USA Today*, (online) Available at: ⟨http://www.usatoday.com/money/perfi/stocks/2009-09-21-swine-flu-stock-investors_N.htm⟩ (Accessed on July 26, 2011).

Kulkarni, S., Levin-Rector, A., Ezzati, M., Murray, C., 2011. Falling behind: life expectancy in US counties from 2000 to 2007 in an international context. Population Health Metrics 9 (16).

Lacey, M., 2009. Even as Fears of Flu Ebb, Mexicans Feel Stigma. *New York Times* (online) Available at: ⟨http://www.nytimes.com/2009/05/05/world/asia/05china.html?_r=1⟩ (Accessed on July 26, 2011).

Lowe, C., 2010. Viral clouds: becoming H5N1 in Indonesia. Cultural Anthropology 25 (4), 625–649.

Major, C., 2008. Affect work and infected bodies: biosecurity in an age of emerging infectious disease. Environment and Planning A 40 (7), 1633–1646.

Marmot, M., Wilkinson, R.G., 2006. Social Determinants of Health. Oxford University Press, New York.

Martin, V., Pfeiffer, D.U., Zhou, X., Xiao, X., Prosser, D.J., 2011. Spatial distribution and risk factors of highly pathogenic avian influenza (HPAI) H5N1 in China. PLoS Pathog 7 (3), e1001308. doi:10.1371/journal.ppat.1001308.

Mastroianni, A., 2009. Slipping through the net: social vulnerability in pandemic planning. Hastings Center Report 39 (5), 11–12.

McMichael, A.J., 1999. Prisoners of the proximate: loosening the constraints on epidemiology in an age of change. American Journal of Epidemiology 10, 887–897.

Media Matters, 2009. Paranoia Pandemic: Conservative Media Baselessly Blame H1N1 Outbreak on Immigrants. *Media Matters*, (online) Available at: ⟨http://mediamatters.org/research/200904270037⟩ (Accessed on July 25, 2011).

Migliori, G.B., et al., 2009. Defining priorities: swine-origin H1N1 and the MDR-TB epidemic. The Lancet 373, 2108.

Mitchell, K., 2004. Crossing the NeoLiberal Line: Pacific Rim Migration and the MetropolisTemple University Press, Philadelphia.

Please cite this article as: Sparke, M., Anguelov, D., H1N1, globalization and the epidemiology of inequality. Health & Place (2011), doi:10.1016/j.healthplace.2011.09.001

Mitchell, K., 2007. Geographies of identity: the intimate cosmopolitan. Progress in Human Geography 31 (5), 706–720.

Moscona, A., McKimm-Breschkin, J., 2007. News about influenza B drug resistance that cannot be ignored. JAMA 297 (13), 1492–1493.

Mosse, D., 2010. A relational approach to durable poverty, inequality and power. Journal of Development Studies 46 (7). 1156–1178.

Navarro, V. (Ed.), , Baywood Publishing, New York.

Nerlicha, B., Koteyko, N. Crying wolf? Biosecurity and metacommunication in the context of the 2009 swine flu pandemic. Health and Place, forthcoming.

NPR, 2009. Will Tamiflu Shortage Drive U.S. to India's Version? *NPR*, (online) Available at: 〈http://www.npr.org/templates/story/story.php?storyId=120254536&sc=emaf〉 (Accessed on July 26, 2011).

Orford, S., Dorling, D., Mitchell, R., Shaw, M., Smith, G.D., 2002. Life and death of the people of London: a historical GIS of Charles Booth's inquiry. Health & Place 8, 25–35.

Ortiz, J.R., et al., 2011. Monitoring influenza activity in the United States: a comparison of traditional surveillance systems with Google flu trends. PLoS ONE 6 (4), e18687. doi:10.1371/journal.pone.0018687.

Osborne, J., 2009. Mexico Criticized for Slow Response to H1N1. *Fox News*, (online) Available at: 〈http://www.foxnews.com/story/0,2933,518258,00.html#ixzz15g1zaerO〉 (Accessed on July 26, 2011).

Padlock, A., 2009. Sales of Flu Drug Improve Results at Roche. *New York Times*, (online) Available at: 〈http://www.nytimes.com/2009/07/24/business/24roche.html〉 (Accessed on July 26, 2011).

Pollack, A., McNeil, D., 2009. A Nation Battling Flu, and Short Vaccine Supplies. New York Time, October 25 Available at: 〈http://www.nytimes.com/2009/10/26/health/26flu.html?pagewanted=all〉 (Accessed on August 30, 2011).

Raimondo, M., 2011. Epidemics Near Me? Citizen Geographers confront Promiscuous Publics in the H1N1 Flu Pandemic. Paper presented at the meetings of the Association of American Geographers in Seattle.

Rose, N., Novas, C., 2005. Biological Citizenship. In: Ong, A., Collier, S. (Eds.), Global assemblages: technology, politics and ethics as anthropological problems, Blackwell, Oxford, pp. 439–463.

Reuters, 2009. Major U.S. Carriers cut Mexico Service Amid Flu. *Reuters*, (online) Available at: 〈http://uk.reuters.com/article/idUKNN012962320090502〉 (Accessed on July 26, 2011).

PBS, 2010. Unnatural Causes: is Inequality Making us Sick? *PBS*, (online) Available at: 〈http://www.pbs.org/unnaturalcauses/〉 (Accessed on July 25, 2011).

Reuters, 2007. Australia's CSL says Bird Flu Vaccine Test a Success. *Reuters*, (online) Available at: 〈http://www.reuters.com/article/2007/01/31/idUSSYD79700〉 (Accessed on July 25, 2011).

Saez, C., 2011. WHO Members on Verge of New Framework for Pandemic Flu Response. Available at: 〈http://www.ip-watch.org/weblog/2011/05/23/who-members-on-verge-of-new-framework-for-pandemic-flu-response/〉 (Accessed on Sept 1, 2011).

Sedyaningsih, E., et al., 2008. Towards mutual trust, transparency and equity in virus sharing mechanism: the avian influenza case of Indonesia. Annals Academy of Medicine 37, 482–488 Available at: 〈http://www.annals.edu.sg/pdf/37VolNo6Jun2008/V37N6p482.pdf〉 [Accessed on July 25, 2011].

Shaw, I., Robbins, P., Jones, J.P., 2010. A bug's life and the spatial ontologies of mosquito management. Annals of the Association of American Geographers 100 (2), 1–19.

Sipress, A., 2005. Bird Flu Drug Rendered Useless. Washington Post, June 18. Available at: 〈http://www.washingtonpost.com/wpdyn/content/article/2005/06/17/AR2005061701214.html〉 (Accessed August 30, 2011).

Sparke, M., 2011. The Look of Surveillance Returns. In: Dodge, M. (Ed.), Classics in Cartography, Wiley, New York, pp. 379–392.

Sparke, M., 2009a. Unpacking economism and remapping the terrain of global health. In: Kay, A., Williams, O. (Eds.), Global Health Governance: Transformations, Challenges and Opportunities Amidst Globalization, Palgrave Macmillan, New York, pp. 131–159.

Sparke, M., 2009b. On denationalization as neoliberalization: biopolitics, class interest and the incompleteness of citizenship. Political Power and Social Theory 20, 287–300.

Sparke, M., 2008. Political geographies of globalization (3): resistance. Progress in Human Geography 1, 1–18.

Sparke, M., 2006a. Political geographies of globalization: (2) governance. Progress in Human Geography 2, 1–16.

Sparke, M., 2006b. A neoliberal nexus: citizenship, security and the future of the border. Political Geography 2, 151–180.

Sparke, M., 2005. In the Space of Theory: Postfoundational Geographies of the Nation-State. University of Minnesota Press, Minneapolis.

Sparke, M., 2004. Political geographies of globalization: (1) dominance. Progress in Human Geography 6, 777–794.

Van der Vries, E., Stelma, Foekje F., Boucher, Charles A.B., 2010. Emergence of a multidrug-resistant pandemic influenza A (H1N1) virus. New England Journal of Medicine 363, 1381–1382.

Virchow, R., 2006. Report on the typhus epidemic in Upper Silesia. Social Medicine 1, 11–27.

Virchow, R., 1985. Collected Essays on Public Health and Epidemiology. Science History Publications, Cambridge.

Waitzkin, H., 2006. One and a half centuries of forgetting and rediscovering: Virchow's lasting contributions to social medicine. Social Medicine 1, 5–10.

Wald, P., 2008. Contagious: Cultures, Carriers and the Outbreak Narrative. Duke University Press, Durham.

Wallace, R., 2009a. Breeding influenza: the political virology of offshore farming. Antipode 41 (5), 916–951.

Wallace, R., 2009b. The NAFTA Flu. Available at: 〈http://farmingpathogens.wordpress.com/2009/04/28/the-nafta-flu/〉, accessed April 26, 2010.

WHO, 2005. Use of Antiviral Drugs in Poultry, a Threat to their Effectiveness for the Treatment of Human Avian Influenza. Available at: 〈http://www.who.int/foodsafety/micro/avian_antiviral/en/index.html〉 (Accessed on August 30, 2011).

WHO, 2007. Pandemic Influenza Preparedness: Sharing of Influenza Viruses and Access to Vaccines and Other Benefits. *World Health Organization* (online) Available at: 〈www.who.int/gb/ebwha/pdf_files/WHA60/A60_R28-en.pdf〉 (Accessed on July 25, 2011).

WHO, 2009a. Human Infection with Pandemic (H1N1) 2009 Virus: Updated Interim WHO Guidance on Global Surveillance. *World Health Organization*, (online) Available at: 〈http://www.who.int/csr/resources/publications/swineflu/interim_guidance/en/index.html〉 (Accessed on July 26, 2011).

WHO, 2009b. Global Health Risks: Mortality and burden of disease attributable to selected major risks. World Health Organization, Geneva.

WHO, 2009c. Transmission dynamics and impact of pandemic influenza A (H1N1) 2009 virus. Geneva; *World Health Organization*, (online) Available at: 〈http://www.who.int/wer/2009/wer8446.pdf〉 (Accessed on July 25, 2011).

WHO, Western Pacific Region, 2009. Influenza and Pandemic H1N1 2009 Bulletin. *Communicable Disease Surveillance and Response* 2(1). (online) Available at: 〈http://www.wpro.who.int/NR/rdonlyres/B89007E1-FC03-4060-848C-E3616E333B3B/0/H1N1BulletinVol2Issue120100119.pdf〉 (Accessed on July 25, 2011).

Wilkinson, R., Pickett, K., 2010. The Spirit Level: Why Greater Equality Makes Societies Stronger. Bloomsbury Press, New York.

Wilkinson, R.G., 1996. Unhealthy Societies: the Afflictions of Inequality. Routledge, London.

Please cite this article as: Sparke, M., Anguelov, D., H1N1, globalization and the epidemiology of inequality. Health & Place (2011), doi:10.1016/j.healthplace.2011.09.001