MALADIES SANS FRONTIERS: CONTAINING AND CONTROLLING PANDEMICS ACROSS BORDERS

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From the plague that raced across oceans from China to Europe aboard trade ships in the fourteenth century to the airborne spread of SARS across 25 countries under four months in 2003[2], diseases and vectors have unfortunately always accompanied the opening of borders and trade routes. The explosion in air travel and sea traffic in the past 50 years[3] due to the modernization of transport and technological capabilities as well as globalization have only accelerated this phenomenon.

The pandemic prophecy

The past 300 years have witnessed 10 pandemics, three of them having occurred in the last century. The discovery of at least 39 new infectious diseases in the past 30 years[4] and the reemergence of older ones such as tuberculosis have all revived latent fears. In 2005, there were 8.8 million new tuberculosis (TB) cases, half of them in the six Asian countries of Bangladesh, China, India, Indonesia, Pakistan and the Philippines.[5] While the tentacles of TB and mosquito-borne diseases such as malaria and chikungunya extend far and wide, the most infamous pandemic of all is influenza. The last deadly strain – the Spanish flu – occurred in 1918 and infected one-fifth of the world's population, decimating up to 50 million.[6] With the H5N1 strain having killed 100 percent of infected poultry and more than 50 percent of infected human beings, its virulence is feared to resemble the 1918 strain. If a quarter- to a half-million people die of the normal flu and two to three million become seriously ill every year[7], and the H5N1 transmutes into a more resistant form or a human-to-

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[2] Bowen Jr., J.T. and Laroe, C. 2006. Airline networks and the international diffusion of severe acute respiratory syndrome (SARS). *Geographical Journal*. 172(2):130 – 144.
[3] Air travel passenger numbers have increased by nearly 9 percent per annum, while shipping traffic has increased by 27 percent since 1993. Zachcial, M. & Heideloff, C. 2003. *ISL Shipping Statistics Yearbook 2003*. Bremen: Institute of Shipping Economics and Logistics.
[4] Gardner J. 2007. Control infectious diseases at source, not at border. *Internal Medicine News*, September 15.
[5] *2007 Tuberculosis Facts*. 2007. Geneva: World Health Organization.
[6] Beattie-Moss, M. 2006.Pandemic Evolution. Pennsylvania State University's research webpage. http://www.rps.psu.edu/indepth/avianflu1.html (accessed January 6, 2009).
[7] Reinberg, S. 2008. Seasonal Flu Outbreaks Start in Asia: Study. *Healthday*. April 16.

human form, the impact of a new, virulent pandemic on global losses would be devastating.

The World Health Organization (WHO) warns that the world "has moved closer to a pandemic than at any time since 1968".[8] With the exception of "the establishment of efficient human-to-human transmission", all prerequisites for another pandemic have been met. Asia, in particular, is ripe as its source.[9] Scientists have now determined that the new strains of virus that produce yearly seasonal flu epidemics around the world emerge from East and Southeast Asia.[10] Additionally, outbreaks of the H5N1 virus continue to recur despite persistent control measures such as the culling of more than 140 million poultry.[11] In the words of Dr. Michael Osterholm, "Make no mistake about it, pandemics are like earthquakes, hurricanes, and tsunamis — they occur".[12] All that remains unclear is just when and how severe the next pandemic will be.

Assessing border control

Common wisdom dictates prevention over cure or mitigation. Disconcertingly, however, the WHO further warns that in risk-prone countries, the early warning system is weak, expensive and under-resourced.[13] Vaccination and antiviral drugs – "two of the most important response measures for reducing morbidity and mortality during a pandemic"[14] – will be inadequate given present trends.[15] Even if this problem is resolved before the next pandemic hits, there is also the ethical dilemma of how those will be equitably delivered, particularly at the start of a pandemic.

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[8] 2005. *Responding to the avian influence pandemic threat: recommended strategic actions*. World Health Organization. http://www.who.int/csr/resources/publications/influenza/WHO_CDS_CSR_GIP_05_8-EN.pdf (accessed January 6, 2009).

[9] *Ibid*.

[10] Reinberg, *op. cit.*

[11] Responding to the avian influence pandemic threat, *op. cit*.

[12] *Council on Foreign Relations Conference on the Global Threat of Pandemic Influenza, Session Two: Containment and Control*. 2005. Rushed transcript. New York. November 16. http://www.cfr.org/publication/9244/council_on_foreign_relations_conference_on_the_global_threat_of_pandemic_influenza_session_2.html (accessed January 6, 2009).

[13] *Responding to the avian influence pandemic threat, op. cit.*

[14] *Ibid*.

[15] Influenza vaccine is produced commercially in only Australia, Canada, France, Germany, Italy, Japan, the Netherlands, the United Kingdom, and the United States containing only 12 percent of the world's population. Osterholm, M.T. 2005. Preparing for the Next Pandemic. *Foreign Affairs*. July/August. http://www.foreignaffairs.org/20050701faessay84402/michael-t-osterholm/preparing-for-the-next-pandemic.html (accessed January 6, 2009).

Border control, as rightly pointed out by this session's problematique, is the last line of defence in the event of a pandemic. And yet, with a virtually unstoppable flow of two billion airline passengers worldwide per year,[16] the boom of low-cost travel in Asia, and China emerging as the largest market for commercial aircraft outside the United States,[17] even this frontier buffer seems highly fallible.

Sheer numbers aside, the effectiveness of border control on curbing a pandemic raises several complications. First, even with departure and arrival screening, there is a limited probability of successfully detecting an asymptomatic incubating virus. Without any obvious signs or symptoms of infection, it would be very difficult to detect a known disease let alone identify a hitherto unknown strain. Taking the example of the 2003 outbreak of SARS, WHO concluded that the best estimate of the maximum incubation period is 10 days.[18] By contrast, many flights within Asia and onward take less than 24 hours. Thus, an individual who has not displayed symptoms of a pandemic may be free to enter into contact with the wider public until full onset of the disease. As an example, a study of border control measures undertaken in Canada at the height of the SARS outbreak revealed that none of the five SARS patients entering Canada from March through May 2003 bore signs of symptoms of the disease during transit through airports.[19]

A longer journey time of 48 hours may or may not detect infection but this would also depend on the ready availability of adequate and rapid diagnostic tests at the point of departure or entry. In the event that symptomatic infected arrivals do not recognize their symptoms as those of a pandemic, they may not voluntarily present themselves for screening by medical authorities at the port of entry. Worse still, they may falsify information if they do indeed have information about their disease.

While no additional cases of airline transmission of SARS spread after the WHO recommended exit screening on March 27, 2003, research data from China

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[16] Facts and figures. Air Transport Action Group. http://www.atag.org/content/showfacts.asp?folderid=430&level1=2&level2=430& (accessed January 7, 2009).

[17] China comprises 41 percent of the entire Asia-Pacific region airplane demand. Morton, R. 2008. The Changing Map of the World's Trade Routes. *Outsourced Logistics*. December 1. http://outsourced-logistics.com/global_markets/changing_map_worlds_trade_routes_1208/ (accessed January 6, 2009).

[18] The incubation period is "the time from exposure to a causative agent to onset of disease." 2003. *Update 49 – SARS case fatality ratio, incubation period*. Geneva: World Health Organization. May 7. http://www.who.int/csr/sarsarchive/2003_05_07a/en/ (accessed January 6, 2009).

[19] St. John, R.K. *et al*. 2005. Border Screening for SARS, *Emerging Infectious Diseases* 11(1). January. Atlanta: Center for Disease Control.

(including Hong Kong and Taiwan) indicate that only 1 probable case of SARS was detected among 1.8 million travellers who completed exit health questionnaires.[20]

Second, where an infected traveler develops and displays symptoms in-flight and quarantining is instituted, modeling has shown that the risks of in-flight infection are actually lower than perceived. This finding assumes that aircraft ventilation and filtration system are operational.[21] A study published in the *Lancet* revealed that although there is a risk of TB within the aircraft cabin, no case of active TB transmitted by air travel has been reported. Transmission is more likely within two seat rows over a flight longer than eight hours. The risk drops if 50 percent of the cabin air is recycled. Even with a highly elevated transmission rate in-flight, the delay of infection would only be marginal. [22] Further, simple practices of good hygiene have been proven to reduce the risk of disease transmission. Although SARS was spread on board five flights in March 2003, no additional on-board transmissions occurred after the WHO issued in-flight precautionary guidelines urging passengers to frequently wash their hands, and cover their mouth and nose when coughing. It recommended the use of face masks only for symptomatic passengers.[23]

Third, border controls that include mandatory testing, conditional entry, and quarantining raise the spectre of discrimination and violation of an individual's freedom of movement and dignity of person. These rights and liberties may undoubtedly be derogated from in the event of a threat to public health,[24] such as a fatal pandemic, but may appear discriminatory to at-risk individuals, for example those living with HIV/AIDS. The WHO's position is that there is no public health justification for entry restrictions that discriminate solely on the basis of a person's

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[20] Bell, D.M. 2004. Public Health Interventions and SARS Spread. *Emerging Infectious Diseases.* 10(11). Atlanta: Center for Disease Control. http://www.medscape.com/viewarticle/490561_1 (accessed January 7, 2009).

[21] Generally, one air exchange removes 63 percent of airborne organisms suspended in the cabin. Mangili, A. and Gendreau, M.A. (2005). Transmission of infectious diseases during commercial air travel. *Lancet.* 365:989 – 996.

[22] Caley, P.; Becker, N.G. and Philp, D.J. 2007. The Waiting Time for Inter-Country Spread of Pandemic Influenza, PLoS ONE 2(1):e143. doi: 10.1371/journal.pone.0000143. January 3.

[23] Summary of SARS and air travel. 2003. World Health Organization. May 23. http://www.who.int/csr/sars/travel/airtravel/en/index.html (accessed January 7, 2009).

[24] The Siracusa Principles on the Limitation and Derogation Provisions in the International Covenant on Civil and Political Rights under the United Nations Economic and Social Council, for example, provides for the limitation of certain rights to "allow a state to take measures dealing with a serious threat to the health of the population or individual members of the population", with due regard for the WHO's international health regulations.

HIV status. However, in the past two decades, there have been more countries imposing various forms of travel restrictions on HIV-positive people.[25]

Fourth, border control is not always pragmatic because of their low cost-benefit yield. Travel advisories often create a negative chain impact on the travel, tourism and hospitality industries causing an economic disruption that is not always proportional to the health threat in question. As it turned out, SARS was not as contagious and dangerous as the 1918 Spanish flu but in light of SARS in 2003, Cathay Pacific reduced its services within Asia by 4 percent while Qantas reduced its international flights by 20 percent from April till July 2003.[26] Tourist arrivals dropped between 20 to 70 percent in April 2003 for the SARS-hit economies in Asia though as the outbreak tempered, the declines became smaller.[27] The Asian Development Bank (ADB) priced the total cost of SARS to East and Southeast Asian economies in 2003 as US$18 billion in nominal GDP terms, or US$60 billion in the overall loss of demand and business revenue.[28]

Moreover, entry and exit screenings for all passengers not only result in additional delays at airport points but are also not always complete, accurate, or easy to navigate. An Australian study of international arrivals at Darwin airport during the SARS outbreak showed that of the 384 people interviewed from Southeast Asia, 16 percent did not hear the in-flight announcements for screening and 7 percent did not understand English.[29] More significantly, combined results from Canada, China (including Hong Kong) and Singapore revealed that no cases of SARS were detected by thermal scanning upon entry among more than 35 million international travelers scanned from March to July 2003.[30] Similarly, no cases of SARS were detected through thermal exit scanning among more than 7 million travellers.[31] Probable or

[25] In 1999, a study by Deutsche AIDS Hilfe found 101 of 164 countries surveyed imposed some form of HIV-related travel restrictions. Khanal, P. 2005. Emerging diseases fuel health screening. *Bulletin of the World Health Organization* 83(10). October. Geneva: World Health Organization.
[26] Fleming, A. SARS affects the health of air travel. About.com. http://airtravel.about.com/cs/safetysecurity/a/SARS.htm (accessed January 6, 2009).
[27] Assessing the Impact and Cost of SARS in Developing Asia. 2003. *Asian Development Outlook 2003 Update*. http://www.adb.org/Documents/Books/ADO/2003/Update/sars.pdf (accessed January 6, 2009).
[28] *Ibid.*
[29] Samaan, G. *et al*. 2004. Border screening for SARS in Australia: what has been learnt? *The Medical Journal of Australia.* 180(5): 220 – 223.
[30] Bell, D.M. *op.cit.*
[31] *Ibid*.

suspected SARS was diagnosed in 21 (0.03 percent) of 80,813 travellers into Taiwan though none of them were detected by thermal scanning upon entry.[32]

Conclusion: necessary but insufficient

Certainly, border control for pandemics is essential in a shrinking world where travel times have been shortened and international air travel is now available to the masses on an unprecedented scale. Nevertheless, on balance, studies reveal that non-pharmaceutical public health interventions targeting travellers have a limited effect on containing or controlling dangerous, infectious diseases. In particular, border control can create an illusion of security and reassurance that, measures notwithstanding, can quickly be shattered with the onslaught of a pandemic across borders. The WHO notes that "the value of border screening in deterring travel by ill persons and in building public confidence remains unquantified".[33]

Research results and findings from the SARS outbreak in 2003 – the best probable modern-day example of a pandemic – show that the resources invested in expensive thermal scanning machines should have been better applied to strengthen screening and infection control capacities at points of entry into the healthcare system.[34] As one study note, "short of preventing international travel altogether, eradicating a nascent pandemic in the source region appears to be the only reliable method of preventing country-to-country spread of a pandemic strain of influenza".[35] Until such unlikely time, resources would be better directed to educational, preventive and healthcare frameworks and institutions in this region, within and among countries.

[32] *Ibid*.
[33] Bell, D.M., *ibid*.
[34] St. John, R.K. *et al*., *op.cit.*, Wilder-Smith, A. 2003. The severe acute respiratory syndrome: Impact on travel and tourism. *Travel Medicine and Infectious Disease*. 4(2): 53 – 60, Bell, D.M., *op.cit*.
[35] Caley, P. *et al*, *op cit.*