

Towards effective emerging infectious disease surveillance *Evidence from the politics of influenza in Cambodia, Indonesia, and Mexico*

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EDITOR'S NOTE. In this plenary talk given at the annual meeting of the Association for Politics and the Life Sciences at Texas Tech University last October, Professor Sophal Ear, then of the U.S. Naval Postgraduate School in Monterey, discussed his research on the political economy of emerging infectious disease (EID) surveillance programs. His talk reviews lessons learned for U.S. military medical research laboratories collaborating with developing countries and is comprised of three case studies: Cambodia (U.S. Naval Area Medical Research Unit 2 or NAMRU-2), Indonesia (also NAMRU-2 in the context of H5N1 or Highly Pathogenic Avian Influenza),¹ and Mexico (that country's handling of A/H1N1 or Swine Flu in 2009).² Professor Ear's research provides policymakers with tools for improving the effectiveness of new or existing EID surveillance programs. His work also offers host countries the opportunity to incorporate ideas, provide opinions, and debate the management of political and economic constraints facing their programs. In this analysis, constraints are found for each case study and general recommendations are given for improving global emerging infectious disease surveillance across political, economic, and cultural dimensions.

I want to explore with you today emerging infectious disease surveillance programs in the context of the politics of influenza in Indonesia, Cambodia, and Mexico. But first, just to give you a little more context, I want to tell you who I am and where I'm coming from with respect to this research. Erik's introduction was fabulous. Thank you for that. And of course, I want to set it in the context of my two books (right, always have to promote the books!): *Aid Dependence in Cambodia: How Foreign Assistance Undermines Democracy*³ and *The Hungry Dragon: How China's Resource Quest Is Reshaping the World*⁴ (co-authored with Sigfrido Burgos Cáceres). *Aid Dependence in Cambodia* is about how foreign aid affects tax revenues, namely by lowering them, which

then affects accountability and democracy between people and their government. *The Hungry Dragon* came out a couple of months after the Cambodia book and is about how China is looking to countries like Angola, Brazil, and Cambodia to buy resources but also to influence their policies.

I'm a TED fellow. I've had the opportunity to give a TED talk. I'm a Young Global Leader of the World Economic Forum and a Term Member of the Council on Foreign Relations. I also serve as an Independent Trustee of the Nathan Cummings Foundation. But more relevant to the Association for Politics and the Life Sciences, I am the vice chair of a nonprofit called the Diagnostic Microbiology Development Program, which last year won a \$600,000 contract with the Defense Threat Reduction Agency (DTRA) to build diagnostic capacity of labs in Cambodia.

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Gardening as metaphor

Now a bit about what I do in terms of teaching, I teach courses on the political economy of Asia and comparative political economy. So I try to explain things like the difference between the haves and have nots, why there is inequality, what poverty and development mean, and why, frequently, there isn't development. And I do that at the U.S. Naval Postgraduate School in Monterey, California, where my students are junior military officers who have often been to Iraq and Afghanistan and who are very good at breaking things but maybe not so good at rebuilding them. So I teach courses on nation-building and post-conflict reconstruction. And the students often want to know the A through Z of how to rebuild a country, maybe even get a *Nation Building for Dummies* book (to be fair, I use *The Beginner's Guide to Nation-Building*⁵). But I often have to tell them that it is more complicated than that. And though it might *seem* like a nation can be set up from a blueprint where you have an architectural plan, and you can design where the rooms are, the kitchen, and bathroom, and so on, things seldom go according to plan.

And even if you can map out the counterinsurgency dynamics of why the central government of Afghanistan doesn't get the support it needs—in this notorious “death by PowerPoint slide” that made the rounds a few years ago—I think that the work that we do, the work that my students are going to end up doing, is more like gardening. This metaphor is inspired by the work of David Korten and his learning process approach.⁶ So gardening as metaphor. Why? Because gardening is something that locals know best. They know the weather conditions. They know the soil conditions, and they know what grows here and what doesn't. They know when to prune and when not to prune. It's really this illusion of control that I'm trying to take away from my students.

Gardeners have no illusion of control. We create the right growing conditions, nurture healthy soil life, set up our lifestyle so we have time to tend our crops, and we plant a diverse variety of sturdy and healthy plants, and watch them grow. We adjust as we go along, removing excess weeds, mulching, watering, fertilizing when necessary, and picking off pests. Ultimately, the end result almost always includes crop failures and unexpected successes.

And we feel more like stewards—sometimes even observers—than masters of our domain.⁷

So of course I sound like a master gardener but I invariably forget to water my plants or I water too much, causing death and destruction. So I hope you will keep this caveat in mind.

Previous work

The research I am going to talk to you about today started a few years ago. I consulted with the Institute of Development Studies–Sussex to write about the political economy of highly pathogenic avian influenza in Cambodia. That was because in my doctoral dissertation⁸ at UC Berkeley I had written about pro-poor livestock policy in Cambodia and, as a result, had to look at H5N1 when it arrived there in 2003. That led to work that was published by *Politics and the Life Sciences* on the political economy of disease control in Cambodia,⁹ which eventually resulted in DTRA becoming interested in giving me a grant to look at U.S. Navy and Army labs around the world. There are these labs all over the world that are owned by the U.S. military and they are supposed to do research to stop, or to prevent essentially, mission failure by our armed services in terms of our ability to go to different countries, in different parts of the world, by minimizing the risk that some disease is going to prevent them from completing their mission.

So these labs are doing critical work in terms of testing samples that come through, in terms of publishing papers, and creating vaccine products. But they aren't always welcome, and one of the reasons for my research was that one lab in particular in Indonesia was kicked out of the country. The results I'll talk about come from a paper that was subsequently published in *Asian Security* comparing Indonesia and Cambodia's experience with the U.S. Naval Area Medical Research Unit 2 (NAMRU-2).¹⁰ How many of you have heard of NAMRU-2—nobody? Well, NAMRU-2 became quite famous a few years ago for what happened to them in Indonesia. And then, subsequently, DTRA commissioned me to do research on the politics of A/H1N1 in Mexico and Mexico's reaction to a disease that—based on available evidence—could possibly kill millions of people. If A/H1N1 had the mortality rate of H5N1 (over 50 percent), for example, it could have cost a lot of lives.

And of course, DTRA needed to know how to handle an outbreak like this in the future. Work since then has taken me to Kenya, Peru, and Thailand, as well as the U.S.-Mexico border, to look at more military labs and a civilian program called Early Warning Infectious Disease Surveillance.¹¹

In the next set of papers I talk about, I look at politics, economics, and culture. I know that if Gad were here—not God, but Gad Saad¹²—he would probably object to the word *culture*, but it is true that culture matters in terms of how one does surveillance in a given country, how people react when asked to contribute blood samples, for example, and how belief systems can determine outcomes (the Caduceus, or snake, symbol of medicine is seen as sorcery in some rural parts of Kenya, for example). This leads me to the question of why some countries report disease outbreaks while others do not. How can countries be incentivized to perform surveillance and report disease outbreaks? The problem, essentially, is that countries are sovereign and they don't have to report if they don't want to. If they are part of the World Health Organization, they've signed up to international obligations like the International Health Regulations. But while in theory they *should* abide by them, if they don't, what's going to happen to them? If nothing serious is going to happen, they can get away with essentially not reporting outbreaks.

To give you a sense of my methodological approach, I conduct comparative case studies. I use elite surveys, semi-structured interviews, and content analysis of interview transcripts. In this presentation, I will first frame the problems that are present in resource-poor environments. I next examine Indonesia, Cambodia, and Mexico as comparative cases, then wrap up with some concluding thoughts.

The problem of patchy surveillance

Among the myriad problems for disease surveillance, and in particular emerging infectious disease surveillance, one that stands out is poor-to-nonexistent disease surveillance in a lot of these countries. You've got poor diagnostic lab capacity in these countries combined with a disincentive to report because if you report a problem, tourists are not going to come to your country, which means you'll lose money—and in

the end, so much of this is about money. Adding insult to injury, you will have to do things to your people for which you will be punished at the ballot box—like killing their chickens to control the disease. And then there's this problem of viral sovereignty, one that emerged in Indonesia. According to a report from the Institute of Medicine:

In 2006, Indonesia claimed “viral sovereignty” over samples of H5N1 collected within its borders and announced that it would not share them until the WHO and developed countries established an equitable means of sharing the benefits (e.g., vaccines) that could derive from such viruses (p. 213).¹³

Okay, so viral sovereignty was invoked by Indonesia in 2006 when the country claimed that samples of viruses found within its borders were essentially its intellectual property. Viral samples are just like finding an animal or a plant particular to Indonesia, and therefore you couldn't just take it out. You had to ask for permission and, if permission was not granted, you could not remove the sample. This was seen as a real global health threat. The late Richard Holbrooke coauthored an op/ed in the *Washington Post* saying that Indonesia was risking global health by not sharing samples because if an outbreak were to start there, and certainly H5N1 was a problem at that time, the disease could spread to the rest of the world and by the time you figured things out you might have a pandemic on your hands and no vaccine produced as a result.¹⁴

All this is also happening at a time when these poor countries are spending a fraction, a very small fraction, of what rich countries are spending on healthcare. In 2001, the Government Accounting Office (GAO) reported that, in the poorest countries “per capita expenditure on all aspects of health care [is] 3 percent that of expenditures in high-income countries” and that medical staff in over 90 percent of these countries are “not familiar with quality assurance principles. . . more than 60 percent of laboratory equipment is outdated or not functioning” (p. 3).¹⁵

I wanted to see if it was still the case 10 years later, so I asked an expert who worked for the CDC and now is based at a major U.S. university. He said that from his experiences in countries in Central Asia, Southeast Asia, India, and Sub-Saharan Africa he thought the status had not changed much from the time of the

GAO report.¹⁶ So, it's really a situation where we have very poor health infrastructure, inadequate healthcare facilities, and disease outbreaks happening.

To give you historical context from the last century and the number of outbreaks that have taken place, the first one is the 1918 Spanish Flu, and I should say that the first slide that I showed for my presentation is from the Spanish Flu episode. Does anybody know why it was called Spanish flu? [Audience member answers correctly that it was because Spain was a neutral country during World War I, censors allowed stories of influenza to be published about Spain while early reports of illness and mortality in Germany, Britain, France, and the United States were censored.] Exactly, so the newspapers write about it, and Spain gets credit for being the origin of this horrible new disease.

Every century you've got outbreaks of deadly diseases, but at the pandemic level what you see are about two to three pandemics per century. Already we have seen the first pandemic of the 21st century in the form of A/H1N1, first dubbed Swine Flu. So that turns out to be, of course, one of several we can expect in the coming decades. The downside of globalization is that diseases can hop on planes and travel anywhere a passenger will travel to. And what you see from this map here of Severe Acute Respiratory Syndrome (SARS) in 2002–2003 is an idea of where SARS started—at the Metropole Hotel in Hong Kong—and then how it infected China and other nearby countries. But surprisingly enough, the second most affected country is Canada because many Hong Kongers obtained Canadian nationality before the 1997 hand-over and continued to maintain very close ties in cities like Vancouver and Toronto. They travel to Toronto as well as the United States in the third category here.

So what kinds of diseases are we talking about now in terms of emerging diseases? I've talked about SARS, I've talked about H5N1 already. You've heard of West Nile, I'm sure. And certainly there's A/H1N1, Ebola in Africa, and the Nipah and Hendra viruses. The spread of Chikungunya, a mosquito-borne disease common in Africa and Asia, in the Eastern Caribbean has been alarming.¹⁷ At the same time that diseases are spreading, emerging, and re-emerging if you look at a map of healthcare around the world, you see immediately that the parts of the world that have unsuitable healthcare are much of Africa and parts of Asia—places where disease outbreaks could happen and

Table 1. Key issues identified by interview subjects in Indonesia

<i>Issue</i>	<i>Respondents referring to issue*</i>
Poor host-donor relationship	13 of 26 (50 percent)
Differing host and donor priorities	8 of 26 (31 percent)
Low salaries	7 of 26 (27 percent)
Decline in Ministry of Health quality	6 of 26 (23 percent)
NAMRU-2 is misunderstood	6 of 26 (23 percent)
Poor compensation for culling	4 of 26 (15 percent)
Local levels don't see reporting translated into response	4 of 26 (15 percent)

Note: Content analysis was performed on interview notes and tagged for key themes; these tags were then analyzed for frequency.

*By proportion of interview sessions.

spread. The other problem is that a disease like H5N1 happens in the context of countries where poultry and humans live in close proximity. So, it's going to be very likely that if the virus originates from somewhere with a long history of raising poultry in close quarters, it's going to be very difficult to separate people from this important food source, given that there's a long tradition of essentially having backyard poultry and keeping it there as a sort of small change savings account, while the cow is your marriage and funeral major expense.

The case of Indonesia

Let me talk about Indonesia as a case study. Indonesia was the country that after four decades of hosting the U.S. Naval Area Research Unit 2 suddenly kicked them out, essentially refusing to renew the visas of the American military officials who worked there. I interviewed NAMRU-2's commanding officer, a U.S. Navy captain, and I asked him why he thought NAMRU-2 was getting the boot. He pointed to Indonesia's Minister of Health, Siti Fadilah Supari, who in the narrative of the commanding officer's story was after NAMRU-2 and wanted the research unit gone. Supari had conspiracy theories that NAMRU-2 was doing bioweapons research and testing American vaccines on Indonesians and Muslim children the world over, which she expounded about in her book, *It's Time for the World to Change: In the Spirit of Dignity, Equity, and Transparency: Divine Hand Behind Avian Influenza*.¹⁸ Unfortunately for research, this played into the "global war on terror" crusade narrative. It was definitely true that she had something

to do with it, but what I discovered in interviewing additional informants was that perhaps there was more to it than just one person going after a lab. As shown in Table 1, there were several reasons why the Naval Area Research Unit in Indonesia, and this lab in particular, was having issues.

The first reason, of course, is a poor host-donor relationship, which definitely soured relations between the Minister of Health and NAMRU-2. But then you also had things like differing host and donor priorities. So maybe NAMRU-2's goal had been increasingly to publish research papers, and Indonesia's goal was actually to find products (cures) that could help its citizens improve their lives, not necessarily NAMRU-2's mission. As well, the compensation of Ministry of Health staff in Indonesia had stagnated, and as with most developing countries, the quality of the Ministry of Health staff itself was low. Of course, NAMRU-2 could be misunderstood in terms of its benefits and contributions to Indonesia and that was certainly the case. And, in Indonesia the problem with controlling a disease like H5N1 is that you've got to kill the birds, you've got to cull the poultry within a certain radius, and if you are not compensating people or inadequately compensating them, or taking too long to compensate them, you are making it impossible for them to report outbreaks because when they call you, you are going to come and destroy their livelihoods. So that's definitely a problem, and it's something that we will see again in the case of Cambodia.

And finally, if the locals don't see the results translated into benefits fast enough, that becomes a major problem. If a local doctor has a patient who has a mystery disease and the sample, let's say, gets sent to NAMRU-2, there's not necessarily a call back from NAMRU-2 that says, "Hey this is actually what you have." NAMRU-2 is not there for diagnosis and treatment. They do testing, but they are not there to do diagnostic testing for individuals. And actually, since we're here at Texas Tech, in a university environment, the mission of NAMRU-2 isn't that different from the university's mission: you've really got to publish or perish and that is driving scientific personnel's incentives. One of NAMRU-2's goals was to produce publications, when perhaps the Indonesians were not as interested in that.

In fact, one narrative I heard was that the kind of American scientists who came to NAMRU-2 to work

Table 2. Key issues identified by interview subjects in Cambodia

<i>Issue</i>	<i>Respondents referring to issue*</i>
Low salaries	5 of 12 (42 percent)
Donor dependence culture	5 of 12 (42 percent)
Poor staff management/HR	4 of 12 (33 percent)
Patronage networks	4 of 12 (33 percent)
No compensation for culling	4 of 12 (33 percent)
Differing host and donor priorities	3 of 12 (25 percent)

Note: Content analysis was performed on interview notes and tagged for key themes; these tags were then analyzed for frequency.

*By proportion of interview sessions.

had changed over time. When NAMRU-2 started, four decades earlier, there were senior scientists who came to NAMRU-2 and they maybe were no longer in a publish-or-perish phase of their professional lives where they needed to publish as much as possible. They were there to provide advice. More recently, in the last decade, the types of officials who came were younger scientists who needed to burnish their credentials, and so the drive to publish was much stronger. Compensation for culling poultry in Indonesia was not rejected as a policy, as happened in Cambodia, but it was dysfunctional at best, so much so that the World Bank project's compensation mechanism failed to disburse on time or altogether.

The case of Cambodia

Let me turn to the case of Cambodia and start off with this image here of the first, well actually he is the ninth victim of H5N1, but the first to actually survive. And he was found because of sentinel testing done by NAMRU-2 in Cambodia. He walked into a hospital feeling ill, gave a sample of his blood, probably got a bag of noodles as compensation for that, and two weeks later was somehow found because they tested the blood and discovered that this guy had H5N1. Well the next person after him also survived, thanks to the fact that NAMRU-2 also found him. What are the odds of that? The first person, the first human victim of H5N1, officially, in Cambodia is actually not even found in Cambodia—she's found in Vietnam, where a hospital there was taking care of her. And she died there. They tested her and discovered that she had H5N1.

So the narrative is one of "look at how a country like Cambodia with its poor health infrastructure, with its

terrible healthcare system, look at how it can't even find its own victims. You have to stumble across the border and die for somebody else to find you!" And, I should add, her brother actually died before her and was cremated, so he might have been the first victim. For surveillance to work requires that essentially one detect the first case, i.e., to find the canary in the coalmine. So the canary discovers leaking gas and dies. In this case if you want surveillance to work you've got to find the animals before the humans die. And in this map of Cambodia showing the animal outbreaks for the period of 2004–2008, if you look at where the dots are—and I'm going to now switch over to the human victims—what you see is, more or less, an overlay of human victims and animals. Except that, of course, it was the human victims that were found first, and then the culling of poultry began around where the human victims lived. So it's totally the reverse—humans are the canaries—which isn't useful, obviously, for the purpose of surveillance.

As shown in Table 2, the types of issues that were raised in Cambodia were somewhat similar to Indonesia but the priorities were different.

The top issue raised in Cambodia was low staff compensation, which has always been a problem in Cambodia. The level of compensation for the Ministry of Health is abhorrent really—\$50 a month in pay. In terms of donor dependence, that's something I write about in my *Aid Dependence in Cambodia* book.¹⁹ It's really this idea that donors are calling the shots. The host country, Cambodia, is more or less going along and when the money runs out, they stop doing whatever it is the donors want. So, there's really no buy-in or ownership from that standpoint. Again, we see poor staff management and human resources issues cited; that's pretty typical in a poor country. Patronage networks on the basis of patron-client relations are also very common. And, certainly in Cambodia as opposed to Indonesia—which saw at least some willingness to compensate, even though much of the money the World Bank had allocated was never spent—there was no compensation at all for culling.

So there was no desire at all from the government. I suspect that the reason for why Cambodia's government did not allow compensation was to avoid setting a precedent. If you get money for something that happens to your poultry, people would then expect that if the government takes away my land, I would expect

to be compensated for that, too. So, you don't want to start down that road, especially when you already have bad governance. And there were certainly some differing host and donor priorities, in terms of goals of the donors and goals of the country itself. For one, it was clear that donor countries wanted to reduce the pandemic potential of the disease reaching their own borders.

So how to make sure that a disease discovered in another country, in a poor country, could be stopped there before it got on a plane and reached a donor country? That's a valid goal, but foreign aid isn't only about, or at least shouldn't only be about, protecting and aiding donor countries. Even so, a lot of foreign aid is designed to support donor countries by forcing the host or receiving country to say, buy American, fly American, and do all kinds of things that bring the money back. This is called "tied-aid." In the mid-1990s, USAID's administrator testified before Congress, saying proudly that 84 cents of every dollar of foreign aid now returns to the U.S. That's not necessarily something you want to brag about to the receiving countries, even if it does play well in Congress.

In terms of patronage, if you can imagine a constellation of Cambodia's political elite, imagine that they are all tied-together—literally, as in-laws—because they are almost invariably married to one another through complex networks of trust and commitment (see Figure 1). I know it looks very complicated. You don't have to worry about anything except the fact that in the middle is the prime minister; and all the orange and yellow are his in-laws who run different parts of the government, and their kids of course. There's very little political instability as a result of that but as well there are going to be highly vested interests. A lot of these people own hotels. A lot of these people are engaged in tourism. Their interests are to keep things quiet in terms of infectious disease outbreaks.

Here's a photo of the Prime Minister casting his ballot in 2008. I only show this because for the entire year before the July 2008 election, there was not one outbreak of H5N1 reported. Meanwhile, all around Cambodia—in Thailand, Vietnam, and Laos—there were reported outbreaks. Yet in Cambodia for some reason, the virus knows to stay out of Cambodian politics. That's telling. Of course, there were rumors that tests of poultry came up positive for H5N1 but the

IT'S A FAMILY AFFAIR

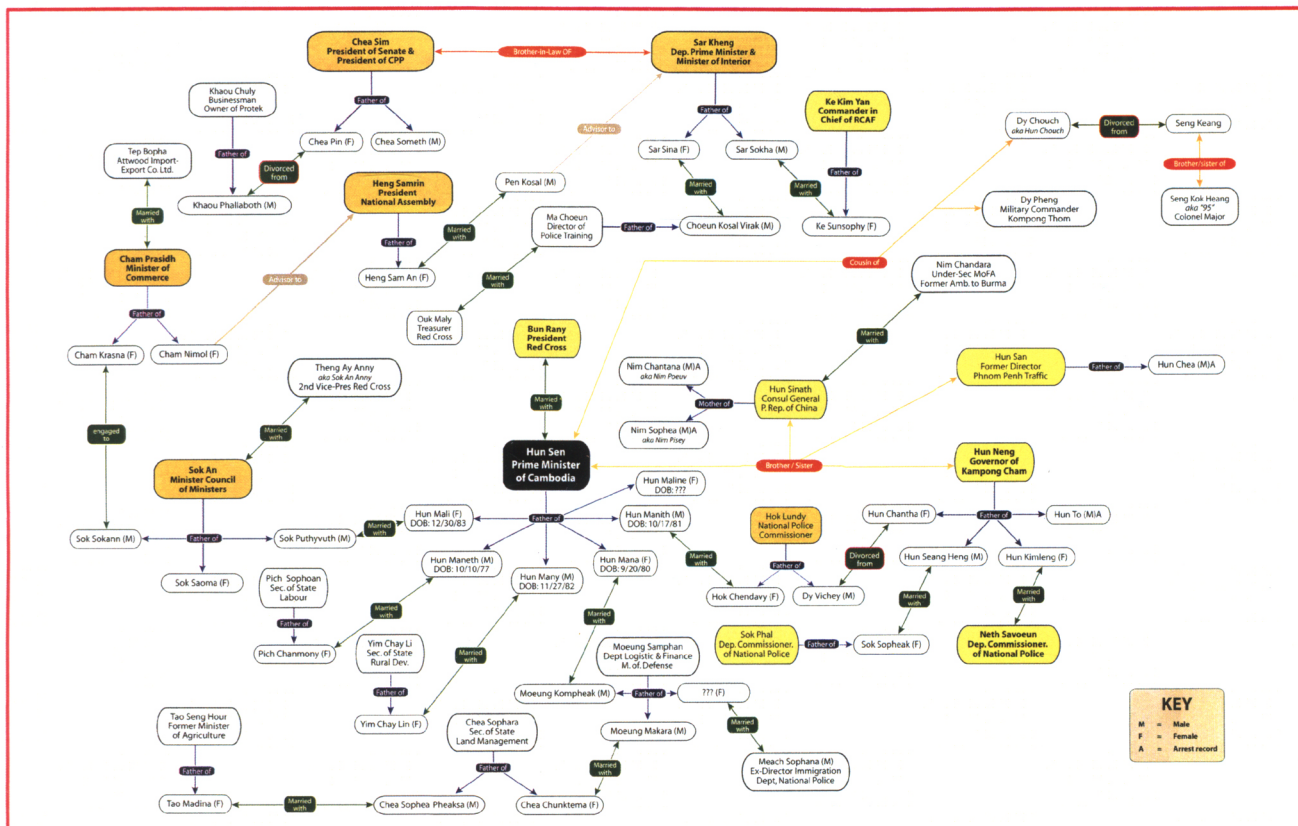


Figure 1. Intermarriages and intersecting political spheres in Cambodia. Reprinted with permission, *Phnom Penh Post*.

results were suppressed. The reason is simple: they were not culling poultry and offering compensation. They didn't want to go out there and damage potential votes by destroying their property. So the solution is just don't report. Or, if you do find positive results, don't say they are positive. That way you don't have to go and destroy people's property and suffer their wrath at the ballot box.

I mentioned tourism: 14 percent of Cambodia's economy is based on tourism. This dependence provides an incentive not to report on disease outbreaks that generate the kind of publicity that prevents people from visiting because they're afraid of what might be happening there. The compensation for culling remains a fraught issue. As of October 17,

2013, a few days ago, there have been 21 cases of H5N1 in humans in Cambodia for the year. That's equal to the *total number of cases* prior to 2013. So there's been an acceleration of cases just this year. Of the 42 cases overall that have been confirmed, 31 were children under the age of 14, and 25 were women. Just 10 out of the 21 cases reported this year have survived. If you are looking at that kind of mortality rate, it's obviously over 50 percent.

The kinds of communication campaigns that donors engaged in were simple messages about behavior change. In Cambodia, the Ministry of Health, the UN, and the Australian Agency for International Development are sponsoring messages about washing your hands, cooking your food properly, latrine use,

using, I guess, tissue when you blow your nose, and not handling dead poultry (although it looks like it's saying handle dead poultry, unless you can read Khmer!). The message here is pretty clear: Don't touch dead birds. The interesting thing is after these types of campaigns, people's awareness of how to handle poultry improves. If you ask them, they know they should wash their hands, they know they should do this or that. The problem, however, is they don't do it. The reason is that telling them to do it isn't going to make a difference unless you make it easier for them, that is, if you incentivize them—if you make it economically viable for them to undertake sanitary practices.

There were other wacky ideas including Super Chicken, for example, a superhero character intended to promote education among farmers about handling chickens. One bit of advice is to quarantine new poultry when you introduce it to your flock—quarantine it for 10 days before allowing new and old poultry to mingle together. But this is a very expensive and time-consuming practice and the \$30 million that was allocated to Cambodia through various publicity campaigns, behavior change campaigns, and donations of personal protective equipment did not include any money to actually change people's incentives. There is still no compensation for culling poultry in Cambodia.

The case of Mexico

Let me now move to the third and final case, that of Mexico and that country's experience with A/H1N1. I want to set the scene here: it's early on in the outbreak in Mexico and at the presidential palace, the president of Mexico—Felipe Calderón, at the time—had to decide whether essentially to go China's way or Canada's way in terms of reporting this outbreak of a new disease. Now, thank goodness for the world he chose the transparent Canadian approach to reporting as opposed to suppression of information as China did in the case of SARS. But the actual hero of the story it also turns out is Canada, because at various points in the story, it's Canada that turns out to save the day.

When the disease was identified, samples of the new virus were sent to both the U.S. and Canada, and even though the U.S. should have gotten it first, it was stopped by U.S. Customs and Border Protection for fear of introducing some sort of unknown biological

agent into the U.S. It's the Canadians who, from a phone call alone, were able to arrange for a Mexican military plane to land in Canada and drop off a sample there the next day. So the testing then ends up being done by the Canadians before the U.S. could even get its act together. The A/H1N1 vaccine that was produced, if you'll remember, actually took a lot more resources and required a longer production time than was first anticipated. So when the Mexicans asked the U.S. Ambassador to Mexico for 2,000 doses of vaccines for their health workers, the ambassador knew, even then, that it was unlikely that we could actually fill that request. Hopefully, this did not happen when Wall Street bankers were discovered to have appropriated the A/H1N1 vaccine for themselves, ahead of other high-risk populations.²⁰

Ultimately, it was the Canadians who ended up giving Mexico the requested doses. In terms of economic impact, I don't have to tell you, the Great Recession happened at the same time. So in 2009, Mexico experienced a 6.5 percent drop in GDP. But one percentage point of that was a result of A/H1N1, which is more than 15 percent of the 6.5 percent drop in GDP. And with an economy of 1.8 trillion dollars, that's at least 18.3 billion dollars, which is far more than anything Mexico could have hoped to get from the international community in terms of compensation to ease the pain. So if Mexico was thinking that by reporting this disease there would be this pot of gold that would be a kind of reward for the country later on to, you know, sustain less damage to its economy, the most that it got from the World Bank on healthcare was a couple hundred million dollars, which is far less than the losses it suffered from the social distancing practices that were imposed in Mexico City.

In terms of how the Minister of Health of Mexico handled the outbreak, in this comic strip here, on television the Minister of Health makes a statement that, "Of the 159 deaths, 26 have been proven to have the virus and 7 are confirmed," and an onlooker says "Seems like the virus first attacks the capacity to do math." So there's certainly, I think, a risk in being transparent and in making statements as soon as you are able to share some information with the world: the problem involves making mistakes and looking like a fool. Obviously, there will be situations where information isn't as accurate perhaps as it ought to be.

There will be a trade-off between expediency and accuracy.

Conclusion

I'll close now by going back to the cases of Indonesia and Cambodia and just share with you an email I got from a senior Indonesian scientist around the time of NAMRU-2's closure. He writes (or she, I'm not sure): "Namru-2 Jakarta is shutting down. I have been very sad. Not only because I am losing my job, but more than that, Indonesia will loss [sic] an established laboratory research coz [sic] of political reasons."²¹

And this is really the takeaway message that I have for the military and for anybody doing work in this area. Technology and financial resources are great, but technology and money alone are not going to be enough to prevent a diplomatic incident, or to fend off political problems. Churchill had a famous quote about this. He said, "Scientists should be on tap, but not on top." By this he meant, essentially, that scientists could perhaps advise politicians about how to undertake policies that would benefit the public, but they're not politicians. They are not the elected officials. All they can do is simply give advice and let the politicians decide.

So as not to offend the scientists among us, I have changed that to: "Technology should be on tap, but not on top." But more seriously, it is a critique of our overreliance on technology to avoid doing the really hard work of building laboratory capacity on the ground, not only for the 18 or so bioterrorism agents/diseases that interest us in the industrialized world but the deadly diseases that afflict our partner nations.

Another quote from Churchill: "Now this is not the end. It is not even the beginning of the end. But it is, perhaps, the end of the beginning." For NAMRU-2, certainly, the expulsion from Indonesia was sort of an end-beginning situation. The commanding officer of NAMRU-2 in Jakarta ended up leaving because his visa was not renewed. Hopefully, NAMRU-2 will realize that the relationship between itself and the host country in which it operates needs to be far more finessed than it has been in the past. NAMRU-2 headquarters moved to Hawaii after Indonesia and has now moved to Singapore. Let's hope in Singapore it will have a better relationship. But in Singapore you're dealing with a place that doesn't have the kinds of

diseases that Indonesia or another poor country would have. That's a loss, I think, for our ability to do sentinel studies and surveillance of diseases where the rubber meets the road.

Thank you very much.

Note

I want to thank Erik Bucy and the journal's transcribers for doing the heavy lifting of putting my spoken words (often nonsensical) into a coherent transcript. All errors remain my own. The views expressed in this article are those of the author and do not represent the views of the U.S. Navy or U.S. government.

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