

THE PODD PROJECT

STOPPING PANDEMICS AT THE SOURCE



QUICK HIGHLIGHTS



In July 2014, Global Threats Fund gave a \$2 million, two-year grant to Chiang Mai University in Thailand to create a first-of-its-kind community-owned pandemic surveillance and response system; a second grant was issued in July 2016 to help scale the program to other regions of Thailand.



The goal of the Participatory One Health Disease Detection (PODD) project is to enable early detection of zoonotic disease outbreaks and prevent them from becoming pandemics. The grant funded the development and launch of a Thai-built mobile app that local volunteers could use to report suspected outbreaks and other dangerous events, as well as the development of a protocol for coordinating fast evaluation and response among local government officials, veterinarians, and public health experts.



The PODD program had 300 trained local volunteers at launch, growing to more than 4,600 volunteers two years later.



Within the first few months, volunteers were reporting more suspected animal disease events than had been reported in the whole province in the whole previous year. Within 16 months, 1,340 abnormal events were reported. Among those, a total of 36 incidents of dangerous zoonotic diseases were verified.



The early detection of one case of foot-and-mouth disease, stopped before it could spread, saved \$4 million.



PODD volunteers are now also using the system to report a range of other hazards, from fraudulent medication sales to flash floods and forest fires.



In July 2016, Chiang Mai University transferred ownership of the PODD tool to the Chiang Mai government, which, with renewed SGTF funding support, plans to expand the project to additional provinces and eventually nationwide.



THE IDEA

In 2008, a team of researchers from the faculty of veterinary medicine at Thailand's Chiang Mai University published a paper with troubling findings. Four years earlier, Thailand and Vietnam had been at the epicenter of an avian flu outbreak that killed more than 50 people, sickened hundreds, and resulted in an economic loss of roughly \$1.7 billion.¹ The research team had studied the outbreak, the local response, and the country's current state of preparedness. Their conclusion: While preventing another pandemic would require both the ability to detect an outbreak early and a coordinated plan for stopping its spread, Thailand, like many countries, didn't have either.

The task of creating these capabilities was daunting. Almost half of Thai citizens rely on backyard animal production for their livelihood, with many millions of animals living outside the formal agricultural system. The researchers found that very few of these farmers had knowledge of avian flu or other zoonotic diseases capable of hopping from animals to humans. Despite the recent pandemic, many were still consuming or selling chickens, cows, or other animals that died of unknown causes, and those who buried the carcasses weren't taking measures to protect themselves. In the rare event that a farmer reported an illness or outbreak to their local government, they seldom got a response—in part because these governments had no budget, bandwidth, or strategy for disease control. The paper's lead author was Dr. Lertrak Srikitjakarn, former dean of Chiang Mai University's veterinary medicine program. A soft-spoken but vocal advocate of pandemic preparedness, Srikitjakarn believed that Thailand needed a new kind of disease detection system, one that made spotting and reporting sick animals—and responding to outbreaks-routine and easy, and that encouraged and empowered local citizens and local governments to play a leading role in accomplishing both. "If we had an

effective community-based surveillance system, we could have fast detection and fast response," Srikitjakarn explained. "We could stop a pandemic at its source, and also protect backyard animal production."

The system that Srikitjakarn envisioned was the embodiment of "One Health," an approach to addressing global and local health challenges that acknowledges the deep interconnectedness of humans, animals, and the ecosystems they share. Chiang Mai Province had a longstanding interest in this approach, already boasting a One Health committee established by gubernatorial decree. After Srikitiakarn's paper was published, the Chiang Mai government started convening conversations about the idea. Meanwhile, Srikitjakarn began looking for outside funding to help jumpstart the project and support its development.

In 2013, Mark Smolinski, director of Skoll Global Threats Fund's Pandemics program, and Jennifer Olsen, manager of SGTF's Pandemics program, traveled to Thailand to meet with Srikitjakarn. Southeast Asia has long been a hotspot for emerging and reemerging zoonotic disease outbreaks, so the chance to test whether a communityowned surveillance system covering detection through response could really work in the region was significant. That the project would embrace the principles of One Health was another strong draw. "Nobody on the planet to date had ever shown what it means to do One Health at the community level," said Smolinski. "We immediately realized the potential."



"If we had an effective community-based surveillance system, we could have fast detection and fast response."





In March 2014, SGTF hosted an epidemiology hackathon, or "Epihack™," in Chiang Mai to explore what this system might look like. The event brought together a multidisciplinary team of experts-from veterinarians, physicians, and environmental health specialists to technologists, economists, anthropologists, engineers, and local government representatives. More than 40 participated, most of them Thai. Out of the event came a number of prototypes that were then further refined into a system design. In July 2014, SGTF announced a two-year, \$2 million grant to Chiang Mai University to create and operationalize that system, now dubbed the Participatory One Health Disease Detection project, or PODD. Pronounced phonetically, "pohdeedee" is Thai for "look closely and you will see."

Over the next six months, PODD team members crafted both a project strategy and the infrastructure to support it. They would pilot the project in 75 of the 210 subdistricts within Chiang Mai, each of which had both a high density of livestock and, critically, a local government willing to participate.

PODD team members ran focus group discussions with local government officials, so that they could express their ideas and suggest ways to finetune the system. These discussions surfaced a high level of interest, strong commitment, and a good understanding of the types and level of support they would give to the PODD project, which would be critical to ensuring rapid response.



Pronounced phonetically, "pohdeedee" is Thai for "look closely and you will see."

Meanwhile, each of the 75 subdistricts were asked to select four community members to serve as PODD reporters. Those 300 volunteers would be responsible for reporting incidents within their subdistricts. Intriguingly, some of the chosen volunteers were either housewives or car mechanics—two groups of individuals highly plugged into local gossip. Each volunteer received training on animal health, clinical signs of illness, and disease prevention and control practices. Each also received a mobile phone, along with technical training on PODD's disease reporting system.

The reporting system itself was designed to be simple and intuitive. Volunteers would report potential animal disease outbreaks or environmental hazards through the PODD

app loaded onto their phone. To start a new report, the volunteer would take a photo of the animal or hazard, or select one from a photo gallery. The GPS location of the photo would be instantly captured or the location selected from a predefined list. Then the app would walk the volunteer through a series of short questions (animal type, number of sick animals, etc.) that captured what they were seeing. The app was simple enough that 89 percent of volunteers could use it agilely after basic training, even though half had never owned a mobile phone. The average time it took to submit a report was 2.43 minutes. To ensure constant engagement, volunteers were also required to report in every day, regardless of whether they had an event to report.

All volunteer reports were fielded by the PODD Epicenter, a sort of central hub at Chiang Mai University staffed by analysts and researchers, many of them veterinarians. If a report was concerning, an analyst would first call the volunteer to ask clarifying questions, then if needed send a team to investigate and collect specimens. If something significant was found, the case would shift to "suspected outbreak" status and email alerts would be automatically sent to the volunteer, the village headman, local government officials, public health officers, and the district livestock office. These authorities would then stage a coordinated response—from quarantine and vaccination to eliminating animals, disinfecting the area, and communicating the risk publicly—with each group playing a specific predefined role. During the response, real-time updates would be sent to all stakeholders to avoid gaps in information and awareness.

During outbreaks and in between, these stakeholders could review incoming reports or pull up a dynamic situations map that showed all active events under investigation, offering a systems view of the PODD case landscape.

The PODD app, database, and infrastructure were built by Opendream, a Thailand technology company with prior experience in building health communication software. A condition of the grant was that all the code underlying the PODD project would be open source, so that the system—should it prove effective could be easily adopted by other provinces, other ASEAN countries, and elsewhere. Once PODD launched, Opendream planned to modify and improve the system every three months. The PODD team would also convene volunteers and local government stakeholders four times a year to assess progress and discuss potential changes to the system, as well as hold regular trainings to further educate volunteers on recognizing the signs of a potentially dangerous outbreak.



89% of volunteers could use it agilely after basic training, even though half had never owned a mobile phone.



The average time it took to submit a report was

2.43min

EARLY IMPACT & LEARNING

In January 2015, the PODD pilot went live. Although an extensive public awareness campaign had introduced the project to villagers, and volunteers seemed enthusiastic to begin their monitoring, there was still concern that the pilot could fail. "In the beginning, we were worried that nobody would use the tool and it would be useless," admitted Srikitjakarn. But the opposite happened: Within the first few months, volunteers were reporting more animal disease cases in Chiang Mai than had been reported in the whole country in the previous year. In the first 10 days, there were 190 reports of animals bites, sick animals, or outbreaks. Within 16 months, 1,340 abnormal events were reported, 77 percent of which proved accurate. Among those, a total of 36 incidents of dangerous zoonotic and animal disease

PODD Pilot Launch January 2015

In the first 10 days **190** reports of animal bites, sick animals, or outbreaks

Within 16 months **1,340** abnormal were reported, 77 percent of which proved accurate

July 2016



outbreaks were detected, investigated, and verified. Twenty six were "chicken pest"

-the villager's term describing abnormal sudden high mortality in chickens, which can also be indicative of presymptomatic avian flu. There were also four incidents of foot-and-mouth disease outbreak, a devastating illness of pigs and cattle. "It's one of the most terrible diseases from an economic and trade standpoint," said Jennifer Olsen, who oversees SGTF's participation in the project. "In one instance, there was a single farmer who had a few cases of foot-and-mouth disease in his cattle herd. If that had moved to neighboring farms, it would have changed the course of Thai economics pretty significantly. Within the whole piloting period between January 2015 and July 2016, almost 30 percent of the 29 FMD outbreaks might have gone undetected or delayed reporting if PODD was not functioning in the area. Importantly, in villages where incidents and outbreaks occurred, the PODD team canvassed the area, helping to

educate villagers on the importance of

early detection and reporting. Charuk Singhapreecha, a Chiang Mai University economist embedded with this team, talked to farmers about the economic impact of disease outbreaks. "I tell them how an outbreak can affect not just their income but their neighbors' income," Singhapreecha explained, adding that farmers were often surprised by this news. He also talked to local government officials. "They have to spend a lot to control a disease, so before they would wait until it had spread," he said. "Now they know it's better to stop at the beginning stage, or else nobody can help." Singhapreecha also regularly analyzed the value of PODD reporting from a wider trade and tourism standpoint. His analysis showed that the early detection of one case of footand-mouth disease, which was stopped before it could spread, saved \$4 million.

These assessments are just part of what is helping to shift local culture around disease awareness and action in Chiang Mai. Another key factor? Help comes much faster with the PODD system than it ever did before. Most PODD volunteers



REPORT OF SUSPICIOUS FOOT AND MOUTH DISEASE IN PIG AND CATTLE JANUARY 2015 - JULY 2016



"Analysis showed that the early detection of one case of footand-mouth disease, which was stopped before it could spread, saved \$4 million."

point to this as the biggest reason why the PODD project is proving so successful. "I can just take a photo and get a very rapid response," said one volunteer who lives in a remote mountain village. Another said that farmers who would not report problems before are willing to do so now because they trust that their local government will respond. And these governments, for their part, are now far more equipped to help. As the PODD coordinator for one district put it: "People in local government now can solve these problems by themselves, which makes them care more about these issues."

Community engagement has also increased significantly. "Villagers talk about these problems a lot now, much more than ever before," said one PODD volunteer. "Now they have more contact between people in the community in their area," reported another. "It has brought the community together." This heightened engagement has taken other forms as well. Some communities are building designated quarantine areas in their village, while others have asked to learn how to do vaccinations themselves. "It's a building out of response that we hadn't anticipated," said Olsen. Some local governments have even put their own money into the program, primarily to fund additional volunteers. Multiple local leaders have said that if PODD funding went away, they would find the money to continue the project in their district. Another unexpected early outcome is



"Villagers talk about these problems a lot now, much more than ever before."

that villagers and local governments have expanded the kinds of information being reported through the PODD app. PODD volunteers are now reporting on fraudulent medication sales as well as on food safety issues, particularly the reuse of cooking oil, a known carcinogen affecting more and more people in the region. Soon, natural disasters, such as landslides and flash floods, will be added to the events that volunteers will report on and monitor. And it is clear from conversations with local government officials and PODD volunteers alike that still more categories might be added in the future. There was even one suggestion to add births and deaths to the events being reported.

While some of these events may not be specific to the ability to detect and report outbreaks faster, their addition does signal that the PODD surveillance model has proved even more valuable locally than anticipated. "They're not only reporting disease, they're reporting the license plate on the truck that's selling illegal drugs," said SGTF's Mark Smolinski. "That was not planned, but that's the whole point. The communities are just so engaged." Added Olsen: "It's become a community awareness tool. Any kind of disaster that can make people sick or harmed, they put it in there."



LOOKING AHEAD

In July 2016, Chiang Mai University transferred ownership of the PODD tool to the government. While it was always the plan for the government to take PODD inhouse, the quickness of the handover signaled strong confidence in the tool and its potential. "I'm told that's pretty fast timing," said Olsen. July 2016 also marked the end of Skoll Global Threats Fund's original grant, and the planning for a second \$2 million grant geared toward providing sustainability funds to help support and expand the PODD volunteer program and develop a "train the trainer" model for new volunteer education. Earlier in the year, more than 4,000 public health volunteers asked to be added to the PODD volunteer roster, bringing the total number of registered PODD volunteers in Chiang Mai Province to 4,615. The hope is that having even more volunteer reporters will help further embed these new systems into the daily practices of local communitieseven as the system itself continues to be

modified to meet local needs.

And still more changes are coming. SGTF's second grant will also help the PODD program expand from covering 600,000 people in Chiang Mai to covering all of the province's roughly 1.7 million residents. Additionally, this funding will help expand the program to two more provinces, with the Chiang Mai team training and supporting the universities that will lead implementation in these new areas, as well as to create toolkits for implementation of PODD outside of Thailand. For its part, the Thai government plans to expand the PODD project to 10 or 15 more provinces soon and then scale it nationwide within a few years, which will require additional funding.

Earlier in the year, more than 4,000 public health volunteers asked to be added to the PODD volunteer roster, bringing the total number of registered PODD volunteers in Chiang Mai Province to 4,615. SGTF's second grant will also help the PODD program expand from covering 600,000 people in Chiang Mai to covering all of the province's roughly 1.7 million residents.

But any future iteration or replication of the PODD project will invariably run up against the same question: How do you effectively scale a program that is so deeply community driven? "We don't have a great grasp yet how this will work outside of Chiang Mai," admitted Olsen. Many of the key factors that have made the PODD project work so well in Chiang Mai-such as a committed academic partner, experienced local technology experts, and strong government and village-level participationmay not be present elsewhere. "It's hard not to wonder, 'Is this just the great spirit of the people of Chiang Mai that really makes this project what it is?" said Olsen. "It will be important to test the tool in various settings-urban, rural, and coastal-to understand more about what is replicable and what isn't."

Gaining that understanding will be even more important when and if the PODD program expands to other ASEAN countries, which was always in mind while the Chiang Mai pilot was being designed and built. "We should be doing it in at least two or three other places to figure out what we're getting right," said Mark Smolinski. But no matter where PODD moves to next. Smolinski believes that one criteria is absolutely essential. "You can't really take it somewhere unless you have a local champion. The reason for this success is Dr. Lertrak. He is so passionate and is a known community leader, and that's what it takes. We can't just go to a country and say, 'Do you want to replicate this model?' That would be the biggest mistake."

"From this project we've learned a great deal about how we do our business in pandemics and about how we set up partners for success," said Olsen. But there is still much to be learned. "We're just at the beginning of exploring how that model works. We have so many questions but so much excitement for how this can move forward from here."

¹ Srikitjakarn et al, 2008, Research Abstract on Participatory Surveillance Model, Thailand Research Fund.



TIMELINE



