



## Stopping Pandemics at the Source



### Highlights

- In July 2014, Skoll Global Threats Fund (SGTF) gave a \$2 million, two-year grant to Chiang Mai University in Thailand to create the **Participatory One Health Disease Detection (PODD)** project—a first-of-its-kind community-owned pandemic surveillance and response system. SGTF issued a second grant in July 2016 to help scale the program to other regions in Thailand.
- The goal of PODD is to enable **early detection of animal-borne (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 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 reported more animal disease events in those districts using PODD than had been reported in the whole province of Chiang Mai in the 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 **landslides and flash floods**.
- In July 2016, Chiang Mai University transferred ownership of the PODD tool to the **Thai government**, which, with additional funding, could expand the project to additional provinces and eventually nationwide.

### The Idea

In 2008, a research team 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 more, and resulted in an economic loss of roughly \$1.7 billion.<sup>1</sup>

The team had studied the outbreak, the local response, and the country's current state of preparedness. Their conclusion: Preventing a pandemic would require both the ability to detect an outbreak early and a coordinated plan for stopping its

spread. And Thailand, like many countries, had neither.

Filling these gaps proved a daunting task. Almost half of Thai citizens rely on backyard animal production for their livelihood, meaning many millions of animals live outside the formal agricultural system. The researchers found that very few of these farmers knew about avian flu or other diseases capable of hopping from animals to humans.

Despite recent concerns, many were still consuming or selling chickens, cows, and other animals that died of unknown causes. Those who buried the carcasses weren't taking measures to protect themselves. In the rare event that farmers

reported an illness or outbreak to the local government, they seldom got a response—in part because 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. 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. One that encouraged and empowered local citizens and local governments to play a leading role in these critical tasks.

<sup>1</sup> Srikitjakarn et al, 2008, Research Abstract on Participatory Surveillance Model, Thailand Research Fund.



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 Srikitjakarn’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.

In 2013, Mark Smolinski, director of SGTF’s global health threats program, and Jennifer Olsen, manager of SGTF’s pandemics practice, met with Srikitjakarn. Southeast Asia has

long been a hotspot for emerging and reemerging zoonotic disease outbreaks, so the chance to test whether a community-owned surveillance system covering all steps from 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 had ever shown what it means to do One Health at the community level,” said Smolinski. “We immediately realized the potential.”

## The Design

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 over 40 experts, most of them Thai, that included:

- Veterinarians, physicians, and environmental health specialists
- Technologists
- Economists
- Anthropologists
- Engineers
- Local government representatives

Out of the event came numerous prototypes that were then further refined into a system design.

**Four months later, 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 “poh-dee-dee,” PODD 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 sub-districts within Chiang Mai, each of which had both a high density of livestock and, critically, a local government willing to participate.

## Powered by the People

PODD team members ran focus group discussions with local government officials so they could express their ideas and suggest system improvements. 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.

Meanwhile, each of the 75 sub-districts was asked to select four community members to serve as PODD volunteer reporters responsible for reporting incidents. Intriguingly, some chosen volunteers were either housewives or car mechanics—two groups of individuals highly plugged in to 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. They could take a photo of the animal or hazard or select one from a photo gallery. GPS would tag the photo location, or volunteers could choose from a predefined list. Then





the app would walk the volunteers through a series of short questions that captured what they were seeing. To ensure constant engagement, volunteers had to report in every day, regardless of whether they had an event to report.

All volunteer reports were fielded by the PODD Epicenter, a central hub at Chiang Mai University staffed by analysts and researchers, many of them veterinarians. If a report was concerning, an analyst would 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—ranging from quarantine and vaccination to eliminating animals, disinfecting the area, and communicating the risk publicly.

During the response, all stakeholders would receive real-time updates to avoid gaps in information and awareness. Stakeholders could always review incoming reports or pull up a dynamic situations map that showed all active cases, offering a systems view of the PODD case landscape.



*The PODD app was simple enough that 89% of volunteers could use it agilely after basic training, even though half had never owned a mobile phone. On average, users required less than 3 minutes to submit a report.*

## Early Impact & Learning

In January 2015, the PODD pilot went live. Despite some initial concerns, the project took off:

- Within the first few months, volunteers reported more animal disease events in those districts using PODD than had been reported in the whole province of Chang Mai 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% of which proved accurate.

Among those events, a total of 36 incidents of dangerous zoonotic diseases were detected, investigated, and verified. Twenty-six were “chicken pest”—the villager’s term describing sudden, abnormal high mortality in chickens, which can also be indicative of avian flu.

There were also four incidents of foot-and-mouth disease (FMD), 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. “One farmer had a few cases of foot-and-mouth disease in his cattle herd. If that had moved to neighboring farm, it would have changed the course of local Thai economics pretty significantly.”

## Built to Share

*The PODD app, database, and infrastructure were built by Opendream, a Chiang Mai-based technology company with prior experience in building health communication software. A condition of the grant required using open-source code for the PODD project, so that the system could be easily adapted by others.*

*Once PODD launched, Opendream planned to modify and improve the system every three months. The PODD team would also hold regular meetings to assess progress, discuss potential system changes, and further educate volunteers on recognizing the signs of outbreaks.*







Within the piloting period between January 2015 and July 2016, almost 30% of the 29 FMD outbreaks might have gone undetected or delayed reporting if PODD was not functioning in the area.

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 FMD case, stopped before it could spread, saved \$4 million.

### Ready to Respond

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 now comes much faster with the PODD system. Most PODD volunteers point to this as the biggest reason why the 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 are

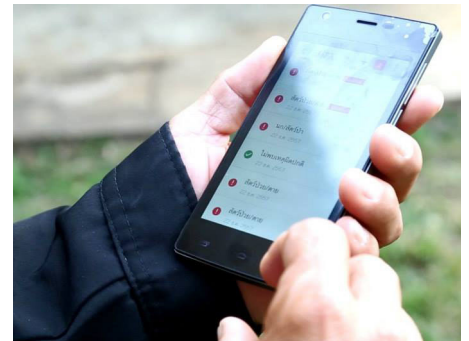
more willing to report problems because they trust that their local government will respond.

For their part, governments 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 more than ever before,” said one PODD volunteer. “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, 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: 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 many people in the region. Soon, natural disasters such as landslides and flash floods will be added to the reportable events, among other categories.





## 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 in house, the quickness of the handover signaled strong confidence in the tool and its potential.

That month also marked the end of SGTF's original grant and the planning for a second \$2 million grant geared toward supporting and expanding the volunteer program. 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.



## Investing in Change

And still more changes are coming. In the near term, the Thai government plans to expand the PODD project to 10 or 15 more provinces and then scale it nationwide within a few years. There are also talks of enabling any Thai citizen to use PODD to report an event. Private philanthropy, in partnership with governments, has the power to advance the pandemic-halting benefits of PODD to not only more provinces throughout Thailand, but to neighboring countries as well.

"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 the true potential of this model and how it works," said Olsen. "We have so much excitement for how PODD can save lives and economies moving forward."



## Timeline

**March 2014** — Chiang Mai Epihack™

**August 2014** — Two-year grant to Chiang Mai University begins

**December 2014** — Stakeholder trainings begin

**January 2015** — PODD launches

**July 2016** — Ownership of PODD transferred to government; second-round grant begins



To learn more about PODD, please visit <http://www.skollglobalthreats.org/tag/podd>