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Mitigating disease outbreaks with smart mapping technology

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With Zika virus declared a 'public health emergency' by the World Health Organization (WHO), doctors and scientists world-over are turning to smart mapping technology to learn more about the disease ravaging the Americas and threatening other tropical and sub-tropical regions across the globe.

Only invoked in response to the most dangerous threats, the declaration represents the highest level of alert issued by the health authority.

To date, WHO has confirmed cases of Zika virus in more than 20 countries and anticipates as many as four million people will become infected by end of the year.

"In recent years, the threats from deadly disease outbreaks have increased in both number and complexity," says Esri Singapore's CEO Mr Thomas Pramotedham.

"In 2002 to 2003 we saw SARS sweep throughout Asia, then a decade later MERS emerged to affect the Middle East and Korea while at the same time the world was dealing with the largest and longest Ebola outbreak in history.

"In each case, the combination of transient populations and an increase in international trade has provided the perfect conditions for diseases like Zika to spread across borders at an exponential rate," he said. "For cities such as Singapore, the socio-economic implications of a disease outbreak happening within its shores is potentially disastrous."
In fact, during the height of the SARS outbreak in early 2003, local studies have shown tourist arrivals and city hotel occupancy rates plunged to an all-time low.

Stock prices fell and revenues at retail shops, restaurants, and tour operators registered a fall of up to 80% in sales.

"While many lessons have been learnt in combating SARS and other similar cases, those events have also underscored the importance of deploying state-of-the-art mapping technology as an active disease surveillance system," Mr Pramotedham said.

The battle against Ebola

Smart mapping technology - also known as geographic information system (GIS) technology - integrates data from multiple systems, presenting the findings in the format of a dynamic map.

By linking data through their common geography, users are able to analyze, visualize, and detect patterns and trends that might otherwise be missed by other types of analyses.

A great example of using smart mapping technology for disease surveillance and control was during the 2014 to 2015 Ebola outbreak in West Africa.

When the UN Mission for Ebola Emergency Response was launched, they set a goal to reverse the upward trend of new cases with what WHO called the 70 70 60 plan.

That is, 70 percent safe burials - as bodies remain contagious days after death - and 70 percent of the patients isolated within 60 days.

At the heart of the UN Mission's operations was smart mapping technology. Both the Centre for Disease Control and Prevention and WHO, leveraged the platform to: evaluate the spread of the disease; map the locations of site treatment units and specialty labs; and, understand cultural practices around burials, languages spoken, transportation routes and more.

With such a plethora of information, health authorities were able to effectively allocate resources and facilities for diagnosis, treatment, and care of infected patients.

Facilitating community awareness

Apart from using smart maps to monitor and control the spread of the disease, other organisations have also used the technology to keep the community informed.

"During the SARS crisis in Hong Kong, citizens were anxious and afraid to go outdoors simply for fear of coming into contact with the disease. Since many are aware that the disease spread through proximity, the importance of location suddenly became very real to citizens. They were curious as to where the infected cases were located, and which areas are free of the disease. As result a web-based smart map was launched," Mr Pramotedham said.

The smart map, which features data from authoritative sources such as WHO and various government departments, was developed by Esri Hong Kong and was used by residents and visitors to easily check which buildings in their neighbourhoods had, or were suspected as having, cases of SARS.

Another example is use of interactive story maps as a way to educate the general public on the Zika virus.

By doing so, the public are able to understand more about this threat, and the measures they can take to avoid becoming infected.

"Being able to see authoritative information clearly presented on a map helps alleviate fears and concerns in the community. By having access to such information, they are able to make well-informed decisions that can potentially help users protect themselves and their families," he said.

Location matters in Health

At the end of the day, place matters in health. Socrates, the father of medicine himself, recognised this in his writings.

"Whether its figuring out how you can deliver better health outcomes for the community or investigating how you can protect your constituents from a potential disease outbreak, the value of smart maps have brought a powerful advantage that have made healthcare initiatives more effective and impactful," Mr Pramotedham said.

"And though we might never know when the next SARS or Zika virus will hit our shores, the community can take comfort in knowing that through the deployment of advanced technologies such as smart mapping - our health authorities and

communities will be better prepared and equipped to respond it," he concluded.