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# *Can Smart Thermometers Track the Spread of the Coronavirus?*

A company that makes internet-connected thermometers has followed the flu more closely than the C.D.C. can. Now the devices may be turning up cases of Covid-19.

**By Donald G. McNeil Jr.**

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A company that uses internet-connected thermometers to predict the spread of the flu says it is tracking the coronavirus in real time — something that had been impossible, given the lack of testing for the disease.

Kinsa Health has sold or given away more than a million smart thermometers to households in which two million people reside, and thus can record fevers almost as soon as consumers experience them.

For the last few years, Kinsa's interactive maps have accurately predicted the spread of flu around the United States about two weeks before the Centers for Disease Control and Prevention's own surveillance tool, the weekly FluView tracker.

The thermometer data "acts as an early warning system for illness spreading," said Inder Singh, the company's founder. The C.D.C.'s system lags because it relies on weekly reports from hundreds of doctors' offices and hospital emergency rooms about what symptoms they are seeing in patients.

Company scientists are uniquely positioned to identify unusual clusters of fever because they have years of data for expected flu cases in each ZIP code. A sudden spike that far exceeds estimates for flu for a given date may well indicate the coronavirus has arrived.

Medical experts were enthusiastic about the possibility that smart thermometers could be used to track the virus in the United States. Having millions of data points allows Kinsa to produce daily maps showing which counties are seeing spiking fevers.

The most common symptoms of infection with the coronavirus is a fever — about 90 percent of patients suffer from it, according to the World Health Organization.

"This is very, very exciting," said Dr. William Schaffner, a professor of preventive medicine at Vanderbilt University. "This is 21st-century disease surveillance, and we've been rooted in the mid-20th century with something very labor intensive."

Dr. Peter J. Hotez, dean of the National School of Tropical Medicine at Baylor College of Medicine in Houston, said: "If this tells you where there are new major clusters of fever, it tells you where to swoop in with your test kits."

Kinsa's latest map of fever spikes shows areas that are known to have many cases of Covid-19, the illness caused by the coronavirus. But the data also point to spots in Florida, Michigan, Arizona and eastern Texas, where not as many cases have been reported.

Just last Saturday, Kinsa's data indicated an unusual rise in fevers in South Florida, even though it was not known to be a Covid-19 epicenter. Within days, testing showed that South Florida had indeed become an epicenter.

"We can't say for sure that these anomalous fever spikes are Covid-19, but we believe this is the earliest signal of where it's occurring," Mr. Singh said.

Normally, Mr. Singh said, the company submits its data to peer-reviewed medical journals. But because of the national emergency, it will post its maps and data Friday on medRxiv, an online repository of medical articles.

The latest data will be available on Friday on a new website, www.healthweather.us, he said.

“We’re nervous about putting this out there because we’ve built it so fast,” said Mr. Singh, a former executive at the Clinton Health Access Initiative, which gets medicines to the poor.



This map tracks fever levels thought to be attributable to the flu or similar seasonal illnesses. Kinsa and Oregon State University



The map above shows clusters of fever that Kinsa’s software suggests are unusual in the year’s flu season. Kinsa and Oregon State University



“But we think this could be super helpful even without peer review, and we think there’s a moral imperative to do this right now so everyone can see it and judge it,” Mr. Singh added.

Asked for comment about Kinsa’s proposal, a C.D.C. spokeswoman said the agency “is not working directly with this particular company, but appreciates the efforts of so many private sector companies to address this new threat.”

Dr. Nirav Shah, a former New York State health commissioner who is an adviser to Kinsa, said real-time fever data “could speed up public health the way Twitter sped up the news cycle.”

Demand for Kinsa’s smart thermometers has skyrocketed since the coronavirus pandemic began, Mr. Singh said, and the company is now selling 10,000 a day, which is creating production problems but also multiplying the amount of data coming in each day.

The thermometers connect to a cellphone app that instantly transmits their readings to the company. Users can also enter other symptoms they feel. The app then gives them general advice on when to seek medical attention.

Temperature readings have been far more timely and accurate than other rapid measures, such as cough medicine sales, electronic medical records or Google searches for “flu,” Dr. Shah said.

Because influenza usually produces higher, more protracted fevers than common colds do, the company’s software estimates which ZIP codes appear to be hit by flu rather than by other, milder cold viruses.

For a few months now, Kinsa has worked with Benjamin Dalziel, a disease modeler at Oregon State University who uses electronic medical records, C.D.C.’s influenza surveillance network and other data to map the way the flu season historically rises and falls across the country.

The company’s thermometer readings “are by far the most high-quality data set I’ve ever worked with,” Dr. Dalziel said. “Our results suggest that we can now accurately forecast flu out 12 weeks or more.”

Kinsa’s maps accurately detected this season’s early start in the Deep South and its unusual midwinter double peak, and did so about two weeks before these signs appeared in the C.D.C.’s FluView.

In a conference call with a reporter, Dr. Dalziel and Kinsa’s senior data scientist, Sam Chamberlain, showed twin maps overlaying one another: the first showing where this year’s flu season currently is, and another showing ZIP codes where high fevers are two or three times as common as they ought to be, according to the flu model.

“For a sanity check on our data, we compared this to what happened in Houston back when flu season began,” Dr. Chamberlain said. On that chart, a spike of green data points appears, rising to twice the height recorded in a typical season.

That marked the early, unusual outbreak of B-strain influenza that hit Louisiana and Texas in November.

The current flu season in Brooklyn is waning as winter ends. Beginning on Feb. 24, however, another spike of fevers began to grow out of the downward slope of the normal flu recordings.

“We can't say what that is, but it's very different from what we’d normally expect,” Dr. Chamberlain said.

“This is where the local health department might want to direct its testing,” Dr. Dalziel added.