Society's collective intelligence helped fight COVID, now it can fight future crises too

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Credit: Vanessa Loring from Pexels

A Global Pandemic Radar is to be created to detect new COVID variants and other emerging diseases. Led by the WHO, the project aims to build an international network of surveillance hubs, set up to share data that'll

help us monitor vaccine resistance, track diseases and identify new ones as they emerge.

This is undeniably a good thing. Perhaps more than any event in recent memory, the COVID pandemic has brought home the importance of pooling society's collective intelligence and finding new ways to share that combined knowledge as quickly as possible.

At its simplest, collective intelligence is the enhanced capacity that's created when diverse groups of people work together, often with the help of technology, to mobilize more information, ideas and knowledge to solve a problem. Digital technologies have transformed what can be achieved through collective intelligence in recent years—connecting more of us, augmenting human intelligence with machine intelligence, and helping us to generate new insights from novel sources of data.

So what have we learned over the last 18 months of collective intelligence pooling that can inform the Global Pandemic Radar? Building from the COVID crisis, what lessons will help us perfect disease surveillance and respond better to future crises?

People want to help scientists

Responding to new and emerging threats requires new methods for filling data and evidence gaps fast. Collective intelligence methods like citizen science have been widely used in the environmental sector for years, but savvy scientists quickly saw the opportunity to deploy these and other approaches to tap into the public's appetite to contribute to the COVID-19 response.

Before doctors had access to mass community testing or accurate forecasting, for instance, data provided by the public was a valuable early source of information. For example, researchers at King's College

London quickly developed the COVID Zoe symptom tracker app, to which over 4.6 million people have contributed their symptoms since March 2020. This data played a critical role in helping us understand how the virus affects different groups of people, exposing the variety of COVID-19 symptoms people have experienced.

Even gamers have played their part behind the scenes. Project Discovery is described as a citizen science "mini-game," in which gamers explore outer space while drawing polygons around clusters of cells. The cell populations they trace around are from flow cytometry data that would ordinarily be painstakingly pored over by scientists to see how a COVID infection affects different types of cell. Over 327,000 gamers have taken part since June 2020, saving scientists an estimated 330 years of research .

Perhaps more visibly, vaccine development efforts have also been fuelled by volunteers. Over 500,000 people signed up to the UK's COVID vaccine studies volunteer service.

Scientific training and research funding is not usually geared towards public participation and collaboration. That means, despite the potential, the public is typically excluded from participation in scientific research. Changing this might help us shift the dial on preventing the next pandemic and tackling a whole host of our other complex challenges, such as climate change.

Making sense of too much data

Alongside this rise in citizen science, 2020 was also a bumper year for scientific research, seeing a 15% increase in paper submissions. Over 475,000 COVID-related papers and pre-prints have been shared online as of June 2021.

This feverish scientific reporting, especially intense in the field of health and medicine, has raised concerns about quality control. Traditional processes of peer review have come under strain, with papers increasingly released as pre-prints, before they've been peer reviewed. Meanwhile, decision-makers face the challenge of finding the most relevant resources in the face of information overload.

The collaborative health evidence database, Epistemonikos, offers some relief to these challenges. It uses a combination of machine learning algorithms and crowd validation to identify all of the clinical systematic reviews related to the search query entered by the user.

In the past, it was used by policymakers in Chile to accelerate the process of public health legislation. Since 2020, the team behind Epistemonikos has identified more than 6,000 systematic reviews related to COVID-19 within their database. Highlighting these has helped health professionals and decision-makers find what they're looking for amid the noise.

It isn't just scientific research that has proved difficult to make sense of. The flood of data about the pandemic has also required careful collation, seeing as it often comes from multiple sources and is scattered across different websites and open databases, many of which follow different standards and formats. Data about a crisis is only useful if it's synthesized and presented in ways that decision makers can understand.

One retrospective study showed how Google searches involving pandemic-related keywords, like "pneumonia," could have been used to spot the early warning signs of COVID-19 spreading in Europe. The same finding was reached using Twitter data, and could in the future be reached with data from wearable technology. For now, these novel sources of data aren't integrated into wider surveillance efforts, but doing so could help governments get better at anticipating crises in the

future.

In the US, the absence of a publicly available system for aggregating COVID-related data led to the creation of the COVID Tracking Project. A community of over 300 volunteers collected, curated and analyzed data sources to produce the most comprehensive public source of information about COVID in the US. Their efforts helped process under-reported data on those in long-term care and the incidence of COVID organized by race and ethnicity.

However, another promising pandemic initiative, the Collective and Augmented Intelligence Against COVID-19 (CAIAC) project, failed to get off the ground, despite the support of UNESCO and the Stanford Institute for Human-Centered Artificial Intelligence. The lesson: productively combining human and machine intelligence could help us deal with overwhelming amounts of data, but it isn't easy. Creating and maintaining new global data infrastructures takes time, effort and significant investment.

Diversity enhances collective intelligence

There's more we can do to properly harness collective intelligence when facing future crises. More data certainly helps, and those who organize that data can help thrust it before key decision makers as quickly as possible. But who makes the decisions matters too.

With the world taken by surprise, it seems that COVID-19 decision making followed the usual modus operandi of excluding the voices of women and minorities. An analysis of 115 COVID-19 decision-making and expert task forces from 87 countries, including the UK and the US, found that just 3.5% had gender parity in their membership, while 85.2% were majority men. Would the disproportionate impact of COVID-19 on black and ethnic minority communities and women have

been as severe if these expert groups had been more diverse?

The collective intelligence literature has long pointed to the potential of diversity in problem solving, but these positive effects can only be realized if institutions actively seek out a variety of voices. Without finding better ways to bring diverse perspectives into decision making, we're not going to get too excited about how equally the benefits of the Global Pandemic Radar, and other future efforts to pool data and intelligence, will be felt.

While COVID has elevated AI-enabled modeling to the heart of government decisions, there is still a long way to go before these models are accessible to ordinary people—something which could help diversify decision making. This is where more creative participatory methods, aimed at helping members of the public explore the consequences of policy decisions and collective behaviors, may have a part to play.

The Corona Minister game allows people to explore the consequences of different policy interventions as they navigate trade-offs between public health, the economy and civil rights. Elsewhere, researchers in Denmark have created a VR gaming experience where citizens navigate through crowded scenes and try to avoid infection. The aim of the experience is to help participants engage with the complexity of disease spread and the role played by vaccination.

Making progress in how we can effectively think, decide and act together is an area that receives almost no research investment. We think using AI to make the most of the distributed collective intelligence of large, diverse groups is a major frontier for innovation, and a huge opportunity to prepare the population for a future crisis.

Invest in bottom-up initiatives

From Ebola to COVID, we've learned time and again that crises require both top-down and bottom-up responses. So while the Global Pandemic Radar is a great step forward, governments who are serious about crisis prevention and response need to start supporting the digital and social infrastructures that enable communities to act intelligently themselves.

In 2020, we saw how existing systems of community action were able to pivot quickly to focus on COVID-19. One of them was MetaSUB, a global project to build microbial portraits of urban transit systems that's been around since 2015. With a network of volunteers and scientists in over 100 cities, they take regular swabs from trains and escalators, testing the pathogens they find for any markers of antibiotic resistance.

The pandemic saw them quickly set up the MetaCOV project, applying their previous methodology to see how microbial samples changed during the pandemic. Their data helped show that the longer COVID-19 was on a surface, the less likely it was to make someone sick.

Then there's the FluCast forecasting system, which has been tapping into the "wisdom of crowds" to predict seasonal flu trends for the US Centers for Disease Control since 2015. The system was swiftly repurposed into COVIDCast in 2020, which relies on open data sources and the participation of volunteers. COVIDCast now offers real-time data across a range of indicators—including mask wearing and COVID-related visits to doctors—to forecast regional spikes in COVID infections and hospitalisations.

That these systems were already present and connected meant they could rapidly be deployed to serve pressing new requirements. Many community-led responses have, of course, emerged to play a vital role without any existing institutional support, such as groups creating PPE for struggling hospitals, and communities in India and Nepal tracking oxygen supplies and hospital bed availability. Many of these new groups

should be supported so that they can mobilize swiftly in future emergencies.

On top of that, greater proactive investment, following the lead of organizations like the Omidyar Network, should now be directed towards community infrastructure. And government institutions should acknowledge that it's currently too difficult for community projects to connect into institutions. If they're excluded from formal planning, such groups can't offer their collective intelligence for the collective good.

Harnessing collective intelligence

At its best, collective intelligence can help us respond to crises with greater confidence, clarity and cooperation. But we need to start building and reinforcing these schemes and systems now—before the next crisis.

The pandemic has been tough. But it has also thrust our collective intelligence under the spotlight, whether through neighborhood WhatsApp groups or international scientific research. As we move towards COVID recovery, placing our bets on new initiatives like the Global Pandemic Radar, we must ensure these lessons aren't forgotten. We must now invest in the combined power of data, technology and people, which will help us avoid the next outbreak and counter society's next big crisis.

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