

## The Future of Public Health: Crash Course Public Health #10

In 2017, American epidemiologist Anthony Fauci said there was “no doubt” that the country would be confronted by an infectious disease outbreak within the next three years. And in June 2019, Fauci described public health’s biggest nightmare as “a respiratory-borne illness, that spreads rapidly, that’s new.” Less than a year later, Fauci’s greatest nightmare was realized with COVID-19, a new, rapidly spreading respiratory virus that resulted in the deadliest pandemic in U.S. history. How did experts see this coming? And what could we have done differently to prepare for it? The answer, it turns out, isn’t in a crystal ball. It has to do with infrastructure, surveillance, technology, and pretty much our entire planet. Hi, I’m Vanessa Hill, and this is Crash Course Public Health! And in our last episode, we’re going to take a journey into the future. [Music].

One of the somewhat obvious problems with talking about the future is that we don’t know what we don’t know. Like, if I walked up to someone in the mid-18th century and said, “I was scrolling on my iPhone and I found a great Groupon for a dermatologist on Facebook,” that person would probably be like, what language are you speaking? So, sure, we don’t know what the next big scientific breakthrough is going to be or what futuristic diseases we’ll encounter. But when it comes to our health, we actually have a pretty good idea of what could be next. And we also have some ideas about what we need to do today to prepare. It’s true that in a lot of ways, the future of public health is as unknowable to us as the iPhone was to people in 1850 and also for people in the year 2000, for that matter. But there are also a lot of ways in which public health is somewhat foreseeable. Like, consider COVID-19. Experts didn’t necessarily see COVID-19 coming. Instead, they recognized that disease outbreaks like COVID-19 had always been a part of human history. And they also recognized that the current global healthcare system wasn’t equipped to deal with this kind of virus. That’s one reason we hear so much about infrastructure.

Infrastructure includes all of the structures that society needs to operate. Traditionally, we think of physical things like buildings, roads, and power plants. But it also involves less tangible things like telecommunication and education systems and a workforce to operate those systems. In public health terms, infrastructure means creating a health system that can handle any issue we throw at it, from mental illness to a global pandemic. One major piece of public health infrastructure that we hear about is disease surveillance. This basically consists of the systems that hospitals, health agencies, and entire countries use to track and analyze disease emergence, levels, and spread in a population. Like a meteorologist predicting the weather days in advance, health experts use disease surveillance to forecast things like the upcoming flu season or a new virus. One of the first recorded instances of disease surveillance actually occurred as early as the mid-1600s, when an amateur scientist in London by the name of John Graunt began analyzing and surveying the London Bills of Mortality, a weekly report on disease and death released by the city. Graunt published his findings in a book titled “Natural and Political Observations Mentioned in the Following Index, and made upon the Bills of Mortality” which people usually just called observations.

In his book, Graunt analyzed publicly available death records with a population approach, which allowed him to notice larger patterns in disease and mortality. For instance, Graunt noted that while

rates of chronic diseases were pretty stable, contagious diseases tended to surge or fall depending on neighborhood or time of year. Today, disease surveillance looks at more than just germs, like crowd-sourced traffic data, Google searches, airline travel history, and in the case of COVID-19, even sewage, literally your poop. At a time when people and information are traveling faster and more often than ever before, health experts are learning how to use all these data points to forecast emerging disease outbreaks and trends before they come knocking on civilization's door. When they're working effectively, these surveillance systems create a global network of understanding and communication. However, when there are gaps in these systems due to a shorthanded workforce, outdated systems, or lack of financial support, health experts lack the best tools and resources to keep people healthy and safe. While disease surveillance remains an important public health tool, public health experts are also going beyond monitoring disease spread to understand how human systems can unwittingly cause or worsen illness. This is where some experts have proposed a planetary approach to health.

If public health is the recognition that health is shared between all people, then a planetary approach to health is the recognition that the health of the entire planet is connected, from marine biologists working on the Great Barrier Reef, to the levels of CO2 in the atmosphere, to the shrinking of the Amazon rainforest, to all the animals that live in that forest. And science has shown that a planetary approach to health isn't just possible it might be necessary. Let's go to the Thought Bubble. Consider our food supply. As it is, we already use about half of the planet's livable surface to feed ourselves with agriculture and livestock. As climate change leads to more droughts and floods, experts project that there will be less food available. This will likely drive up the price of food, meaning that even more people will go hungry or rely on nutritionally-deficient foods. This is already happening in many nations, leading to the migration of people to places where food is more available, which leads to international tensions flaring up as countries attempt to control these resources. Meanwhile, we're turning diverse ecosystems into places for cows to hang out, or for the production of cash crops. And as corporations hack away at these once-vibrant ecosystems, like forests in Central and South America, we're destroying the habitats of animals with unknown viruses and bacteria, all of which could potentially jump to humans. The more contact we have, the higher the risk of this happening.

Reports have shown that from 1980 to 2020, the number of disease outbreaks around the world each year has more than tripled. A growing reason for this is that human interference in nature results in more contact between humans and disease-carrying animals. And 6 out of every 10 infectious diseases in people come from an animal. West Nile virus came from birds and is transmitted to humans by mosquitoes. HIV is thought to have come from chimpanzees infected with simian immunodeficiency virus, or SIV, which was likely transmitted to humans when they came into contact with the blood of infected animals while handling their meat. And according to one study, rodents on their own are carriers of as many as 68 diseases that can affect humans. So, what feels like a food problem turns out to be kind of an everything problem. Thanks, Thought Bubble.

It's also pretty hard to discuss the future without talking about technology. Some experts say we're in the information age, a time that began around the 1970s, when developments in computer technology and human connectivity made more information accessible to more people than ever.

One of the biggest culprits for this sudden information explosion is the Internet. Ah, the Internet, that pristine fountain of information from which all truth, objectivity, and mutual respect flows forth, said no one ever. The Internet is probably most famous for being both really awesome and also a verifiable mess. It's a jungle of memes, chat rooms, Wikipedia rabbit holes, articles, more articles explaining why those other articles are wrong, and then more articles explaining why those articles are wrong and, yeah, you get the point. And this wild west where everyone has access to bottomless information feeds has posed some big challenges for public health. In fact, one of the most difficult battles that public health experts are fighting isn't even a health battle, per se, it's an information battle or more accurately, a misinformation battle.

In a world and a marketplace that values clicks, views, and smashing that subscribe button "don't forget", a video with a title like "Could onion juice be the cure for cancer?" will always be more popular than an article or YouTube video explaining that onions are not in fact full of cancer-curing properties. This may be due to the fact that many platforms are designed to promote engagement with novel information that inspires emotions like surprise or disgust, which even when false, is more likely to be shared than the plain old truth. The fact is that while the Internet is very good at providing access to information, it's very bad at prioritizing which of that information is, you know, correct. This is a problem for public health experts, who can have trouble competing with cancer-curing-onion headlines to get out their slightly less eye-catching message around, say, the importance of getting vaccinated or regular check-ups. And sure, this is an Internet-y problem. But it's also the responsibility of health experts to build trust with the public, an ongoing never-ending task. This involves listening to people and community leaders and addressing their concerns about public health measures. It also involves working with communities to spread public health messages, and engaging at the local level in a trusted way so that people in the community understand and trust experts when a crisis rolls around. And it also means communicating with the public in a way that's clear, concise, and relevant.

Okay, so there's obviously a lot of work to do if we want to build a future where everyone has the opportunity to live their healthiest life. And public health experts have given us lots of models, strategies, and plans for how we can start building that world today. When public health is working, it can feel invisible. Over the course of this series, we've created a lens that you can use to see public health in action literally everywhere. And when we have this lens handy, we can also begin to see places where public health needs to do better. That's where health equity comes in. Because public health is only really doing its life-improving job when it's doing that job for everyone. And when we understand the stories and people that led to the public health systems of today, we can see who those stories left out and why our systems need to do a much better job of including them now. In the end, the things that make public health work for everyone are going to be the same things that have made every worthwhile human endeavor successful. Collaboration that fosters innovation. Empathy that's reflected in our policies and in where we invest our resources. Curiosity and the endless pursuit of "what if's" that lead to discovery. But it also means building systems that turn these awesome parts of being human into real drivers for change.

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