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A Deadly Coronavirus Was Inevitable. Why Was No One Ready?

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43-54 minutes

Hunkered around conference tables at the World Health Organization's Geneva headquarters, a group of scientists debated which of the world's most frightening epidemic diseases deserved the greatest attention.

Ebola, a ferocious killer that drains its victims of bodily fluids, made the list. So did Nipah, which makes the brain swell before most of its victims die. So, too, did severe acute respiratory syndrome, or SARS, which burrows into the lungs, leaving the sick gasping for air.

At the end of the two-day gathering in February 2018, the group topped the list off with the most terrifying entry of all: Disease X.

It was meant to capture what scientists had warned about for decades: an unknown pathogen with no known treatment or cure that would likely originate in animals, jump to humans and start spreading silently and quickly.

Scientists couldn't predict the precise genetic makeup of the pathogen, or when it would strike. But they knew it would come. A succession of outbreaks and near misses since the late 1990s, along with increasingly sophisticated scientific research, made clear a major pandemic was inevitable.

Researchers pinpointed hot spots, including southern China, where such a virus might originate. They had ideas about how it might begin infecting people and how easily transmissible it could be. They even had plans for how to detect and stop it.

When Disease X actually arrived, as Covid-19, governments, businesses, public-health officials and citizens soon found themselves in a state of chaos, battling an invisible enemy with few resources and little understanding—despite years of work that outlined almost exactly what the virus would look like and how to mitigate its impact.

Governments had ignored clear warnings and underfunded pandemic preparedness. They mostly reacted to outbreaks, instead of viewing new infectious diseases as major threats to national security. And they never developed a strong international system for managing epidemics, even though researchers said the nature of travel and trade would spread infection across borders.

THE COVID STORM

The Wall Street Journal is examining the causes of the Covid-19 catastrophe and the bungled response that followed. Get alerts for each new installment, along with our daily coronavirus briefing.

The real-world Disease X has killed more than 750,000 and sickened more than 20 million. The virus and the response have wrecked economies, destroyed families and altered the fabric of daily life across the world.

Officials made mistakes earlier this year when the severity of the outbreak became clear. Some were understandable blunders made during a panic; others were simply blunders. Underlying it all was a failure that stretches back decades. Most everyone knew such an outcome was possible. And yet no one was prepared.

“They said we need strategies for ‘Disease X’ and gave it a cool name,” said Peter Daszak, a disease ecologist and virus hunter in New York who was at the 2018 WHO meeting. “The problem is, we never did anything about it.”

Two recent epidemics—SARS in 2002-03 and its viral cousin, Middle East respiratory syndrome, which emerged in 2012—made clear that coronaviruses were dangerous. Researchers including Dr. Daszak identified evidence of hundreds more coronaviruses that could strike, including one very similar to the virus causing the current pandemic.

“Essentially, SARS-CoV is alive and well in bats in Yunnan Province!” Dr. Daszak emailed officials at the WHO in 2015.

An EcoHealth Alliance field team in Guangdong. Scientists found SARS-related coronaviruses in bats.

Photo: EcoHealth Alliance

They found evidence over years of research that villagers in southern China were being exposed to coronaviruses. “They actually are infecting people,” Dr. Daszak said he told the WHO meeting in 2018, adding that with no pipeline for drugs or vaccines for the viruses, it was “a clear and present danger.”

Last year, a Chinese scientist he worked with published a specific forecast: “It is highly likely that future SARS- or MERS-like coronavirus outbreaks will originate from bats, and there is an increased probability that this will occur in China.”

Annual funding from America’s National Institute of Allergy and Infectious Diseases, part of the National Institutes of Health, for research on coronaviruses peaked after SARS and then fell for years, according to NIAID.

“The political and economic community took it for granted that everything could be dealt with,” said Malik Peiris, a virologist at the University of Hong Kong who has been on the front lines of epidemics for two decades.

More and more outbreaks

Humans today are exposed to more deadly new pathogens than ever. They typically come from animals, as global travel, trade and economic development, such as meat production and deforestation,

push people, livestock and wildlife closer together. The human population has more than quadrupled since the 1918 flu pandemic.

Scientists knew infectious disease outbreaks were becoming more common, with 2010 having more than six times the outbreaks of pathogens from animal origins than in 1980, according to data in a study by Brown University researchers.

Dr. Daszak, who is president of EcoHealth Alliance, a New York-based nonprofit that studies connections between human and animal health and the environment, said three-quarters of the new diseases afflicting humans since 1960 have originated in animals.

A village near bat caves in Yunnan province, where development is pushing into forest land.

Photo: Qilai Shen for The Wall Street Journal

In some ways, government leaders and scientists are far more prepared and smarter about pandemic risks than they were 20 years ago. Billions of dollars have been spent on technologies to make drugs and vaccines more quickly and to prevent and train for pandemics. Advances in genomics have made it easier to identify viruses quickly and track how they evolve.

Governments have plowed money into tracking new forms of influenza, which public-health leaders long considered the greatest pandemic risk. Influenza viruses are constantly circulating in animals and people, spread easily and can mix and mutate fast into forms potentially lethal to humans.

Ad hoc funding

Yet plenty was left undone, in areas including funding, early-warning systems, the role of the WHO and coordination with China. A big chunk of U.S. funding went toward protecting Americans against a bioterror attack. Government funding for pandemics has come largely in emergency, one-time packages to stop an ongoing outbreak.

Vaccine development has been hard to fund. Some might never earn profits for manufacturers because they are often distributed at low prices and are given less often than new drugs to treat lung cancer or diabetes.

Anthony Fauci, director of NIAID and a point man for the U.S. government on the Covid-19 response, put it plainly in an interview: “We undershot in our preparedness.”

Federal money to help U.S. states and cities prepare for pandemics and other emergencies fell 35% between fiscal 2003 and fiscal 2020.

“We have a cycle of crisis, and then we become complacent, and [then] the tendency is for the focus and the investment to be repurposed for other issues,” said Julie Gerberding, who was director of the U.S. Centers for Disease Control and Prevention from 2002 to 2009 and is now chief patient officer at Merck & Co.

She said a better solution would be to fund public health more like national defense, with much more guaranteed money, year in, year out.

A half-century ago, many scientists thought fearsome infectious scourges might be a thing of the past. Antibiotics and vaccines snuffed out outbreaks of polio, measles and other diseases. Smallpox was eradicated in 1980.

But a new generation of viruses began to emerge in the late 1970s and early 1980s, such as HIV and Ebola. A 1992 report by a U.S. Institute of Medicine committee warned that infectious diseases were evolving and posed a global threat.

Prominent scientists, including influenza expert Robert Webster at St. Jude Children’s Research Hospital in Memphis, Tenn., rang alarm bells, and warned that pandemics like the 1918 flu—which killed an estimated 50 million people—would happen again.

A New Zealander, Dr. Webster, now 88 and considered an elder statesman of pandemic preparedness, had studied birds—ducks in Canada, penguins in Antarctica—showing how deadly viruses might hop from animals to humans, causing devastating disease. He commissioned a stained-glass window for his home showing that process.

“Will there be another human influenza pandemic?” Dr. Webster asked in a paper presented at an NIH meeting in 1995. “The certainty is that there will be.”

Over the next decades, a series of outbreaks would show how that scenario could unfold and how the official reaction was found wanting.

‘Spillover’ infections

In May 1997, a 3-year-old Hong Kong boy named Lam Hoi-ka came down with a sore throat, stomach pains, cough and fever. A week later, the boy was hospitalized, struggling for air. He developed double pneumonia, blood clots and kidney failure. Five days after being admitted, Hoi-ka died.

“We all thought it was something mild,” Hoi-ka’s father told the South China Morning Post. “They sent my son to the intensive care unit, and he never came back.”

When doctors identified what killed him, the answer was a shock. It was a strain of influenza virus, named H5N1 after the mix of proteins on its surface, that was often deadly in birds but had never been known to infect humans.

Suddenly, Dr. Webster’s scenario of a lethal pandemic spreading from animals to people, through a process called “spillover,” looked more plausible.

Spillover happens when viruses living in one animal host, often harmlessly, come into contact with a new one. Often, the virus may not be able to infect the new host, or it may not cause illness or spread further. But viruses are always mutating and exchanging genes, and every now and then the result is lethal, as with rabies, which can hop from bats to other animals, including people.

Experts including Dr. Webster were particularly concerned about the potential for spillover in southern China, where large, densely populated cities were expanding rapidly into forests and agricultural

lands, bringing people into closer contact with animals. Two of the three influenza pandemics of the 20th century are thought to have originated in China.

Food-market vendors sold chickens, pigeons and ducks, with different types of birds sometimes sharing cages. Often markets were full of bird droppings. When a sale was made, stall proprietors would typically kill the bird, pluck it and gut it on the spot—throwing out a spray of blood and fluids that could carry viruses.

Chickens were destroyed in Hong Kong during the bird flu outbreak in 1997.

Photo: LARRY CHAN/Agence France-Presse/Getty Images

Right before Hoi-ka's death, researchers at the University of Hong Kong had been following a virulent outbreak of H5N1 influenza in chickens they suspected came from southern China—a "chicken Ebola," as Dr. Webster described it, with thousands of birds keeling over gasping for breath, blood oozing from their insides.

In November came a burst of new infections, including a 13-year-old girl, a 37-year-old bank worker and a 54-year-old dentist. Two young cousins who had lived together in the same apartment were infected and a third came down with symptoms, raising fears the virus was spreading between humans.

"All hell broke loose," recalled Dr. Peiris, the HKU researcher, whose lab became a hub for testing.

Dr. Webster flew to Hong Kong and found that 20% of the chickens his team examined had the virus. The government dispatched

officials to markets to kill more than a million birds, initially using carbon-dioxide gas, and then slitting the animals' throats when the gas ran out. A group of 80 monks led a chant for the birds' souls.

In all, 18 people were infected with H5N1 before it disappeared, with six dying.

The 1997 bird flu turned out not to spread easily between people and was snuffed out with the infected chickens.

Dr. Webster and others warned it could re-emerge or mutate into something more contagious. With U.S. funding, he set up an animal influenza surveillance center in Hong Kong. The WHO, which hadn't planned for pandemics before, started compiling protocols for a large-scale outbreak, including contingency plans for vaccines.

Yet outside of the scientific community, few people took the possibility of a pandemic seriously, said Keiji Fukuda, an American epidemiologist then at the CDC who had gone to investigate the Hong Kong outbreak. At a dinner back in the U.S., he remembers one guest saying, "Oh, you really needed to have someone in the U.S. to be impacted to really galvanize the government."

New look at coronaviruses

At the end of 2002, a mysterious and deadly new pneumonia began tearing through hospitals in southern China.

Dr. Webster and his colleagues in Hong Kong thought it was bird flu again. The symptoms were similar: Patients had high fevers, coughs and trouble breathing as the virus attacked their lungs. Some suffered from terrible muscle aches, exhaustion and diarrhea. The decline was rapid.

The disease would be named SARS, and it overturned much of the world's thinking about epidemics. It was caused by a lethal new bug that jumped to humans from animals, but to everyone's surprise, it wasn't an influenza virus.

It was a coronavirus—a pathogen thought so negligible at the time that it didn't even rate a chapter in the classic Manual of Clinical Microbiology, recalled Kwok-Yung Yuen, a microbiologist and physician at HKU, who with Dr. Peiris identified the virus.

A SARS patient in Guangzhou in 2003.

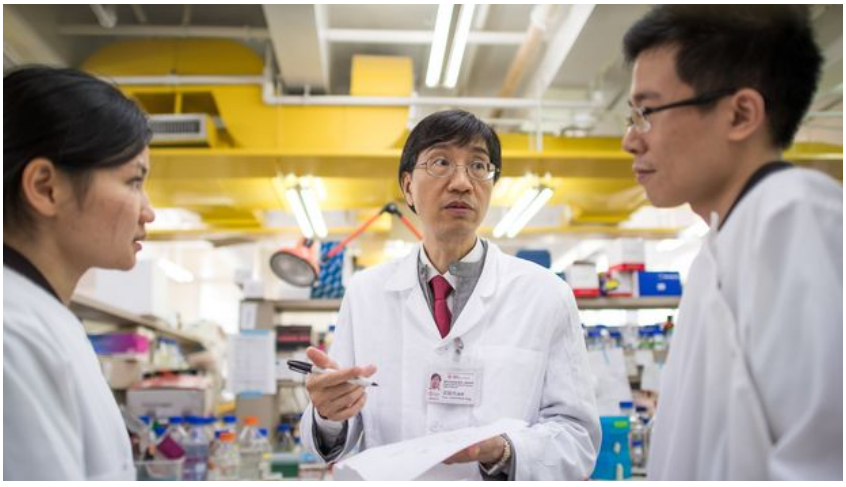
Photo: Agence France-Presse/Getty Images

It also spread more easily and widely, mostly through respiratory droplets, than the 1997 flu. At one point, 213 people in a Hong Kong apartment complex were diagnosed with SARS in five days.

A doctor visiting Hong Kong from mainland China gave the disease to his brother-in-law, wife, sister and daughter and eventually hundreds of others. Visitors staying at the same hotel as the doctor carried it back home, leading to 71 cases in Singapore, 29 in Canada, 58 in Vietnam, and one each in the U.S. and Ireland by the end of March alone.

That “drove home the reality in my own mind of globalization,” said Dr. Fukuda. SARS showed that viruses can crisscross the globe by plane in hours, making a local epidemic much more dangerous.

China was in the midst of a leadership change, and many officials initially covered up the extent of the outbreak, reluctant to rock the boat. Chinese hospitals didn’t share medical specimens, making it hard for scientists to investigate.



Dr. Kwok-Yung Yuen, shown at center in 2013, identified the SARS coronavirus with colleague Dr. Malik Peiris at the University of Hong Kong.

Photo: PHILIPPE LOPEZ/Agence France-Presse/Getty Images

The WHO's director-general, Gro Harlem Brundtland, publicly criticized China.

The government under new leaders reversed course. It implemented draconian quarantines and sanitized cities, including a reported 80 million people enlisted to clean streets in Guangdong.

China suspended trade in wild-animal markets, where barking deer, Himalayan palm civets and other animals were sold, often as novelty items on local menus or ingredients in traditional medicines. At one market, researchers found evidence of the SARS virus in three civets, a Chinese badger and a fox-like animal called a raccoon dog.

In Guangdong, authorities in "Operation Green Sword" confiscated more than 30,000 animals from markets, hotels and restaurants. Eventually, some 10,000 civets would be drowned, electrocuted or incinerated. Shanghai ordered the slaughter of more than a million pheasants, mallards and partridges.

By May 2003, the number of new SARS cases was dwindling. It infected around 8,000 people world-wide, killing nearly 10%.

A civet captured in Wuhan in 2003.

Photo: Agence France-Presse/Getty Images

After SARS, China expanded epidemiologist training and increased budgets for new laboratories.

It started working more closely in public health with the U.S., the world's leader. The U.S. CDC opened an office in Beijing to share expertise and make sure coverups never happened again. U.S. CDC officials visiting a new China CDC campus planted a friendship tree.

But cooperation between the U.S. and Beijing would fray.

New controls on the wild-animal trade in China were eased in August 2003, after pressure from businesses. What restrictions remained were loosely enforced, conservationists say. The risk of viral spillovers remained.

An awakening U.S.

In Washington in 2005, a powerful player started driving U.S. efforts to become more prepared. President George W. Bush had read author John M. Barry's "The Great Influenza," a history of the 1918 flu pandemic, over a long August vacation at his Texas ranch.

The 2004 book recounted the social and economic devastation a pandemic could cause. Mr. Bush had already had to lead the country out of 9/11, and more recently had seen the damage wrought overseas by SARS. Then, Hurricane Katrina struck, and his administration was criticized for a slow and disorganized response.

The H5N1 virus, which first jumped to humans in Hong Kong in 1997, had resurfaced in poultry flocks across Southeast Asia, causing more than 40 human infections in 2004. It had killed nearly 70% of the people it infected.

Dr. Webster, the Memphis-based flu expert, had published a paper saying the virus had been found at a major migration stop for wild geese in China, warning that the birds could carry it to India and Europe next.

Up to that point, Washington had poured billions of dollars into measures to protect Americans against smallpox, anthrax and other biological threats, a legacy of 9/11 and the subsequent anthrax attacks. It had apportioned relatively small amounts for animal-virus

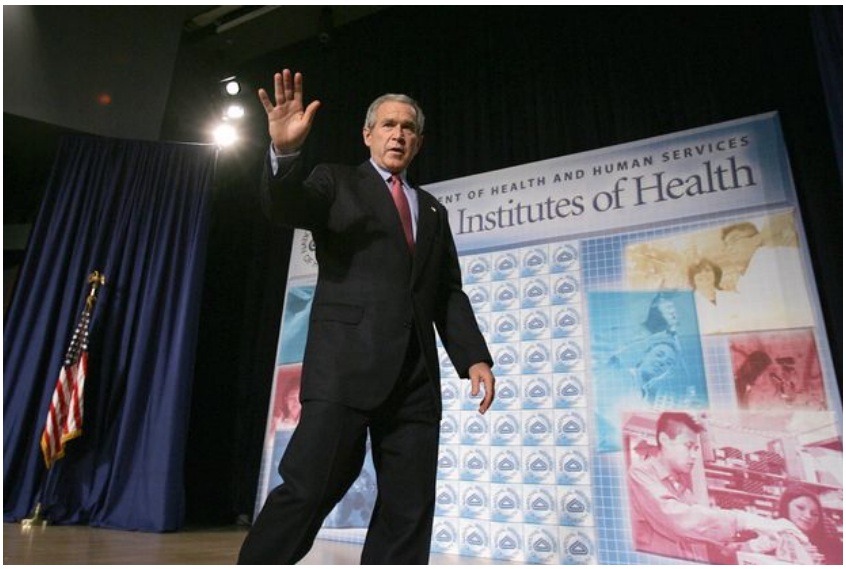
pandemics.

At an Oval Office meeting on the morning of Oct. 14, 2005, Rajeev Venkayya, Mr. Bush's special assistant for biodefense, summarized what the government was doing to respond to the latest H5N1 threat.

Mr. Bush leaned toward the group of 10 or so officials and said, "I want to see a plan," according to Dr. Venkayya.

"He had been asking questions and not getting answers," recalled Dr. Venkayya, now president of Takeda Pharmaceutical Co. 's global vaccine business unit. "He wanted people to see this as a national threat."

By the end of that month, health leaders pulled together a 12-page strategy involving stockpiling vaccines and antiviral drugs, expanding outbreak detection and otherwise improving pandemic responses. Mr. Bush launched the strategy in November, and Congress approved $6.1 billion in one-time funding.



President Bush launched a pandemic preparedness plan in 2005.

Photo: LUKE FRAZZA/Agence France-Presse/Getty Images

A fleshed-out plan had more than 300 action points, including responsibilities for the heads of each federal agency and teleworking guidelines for businesses.

The CDC began exercises enacting pandemic scenarios and expanded research. The government created the Biomedical Advanced Research and Development Authority to fund companies

to develop diagnostics, drugs and vaccines.

A team of researchers also dug into archives of the 1918 pandemic to develop guidelines for mitigating the spread when vaccines aren't available. The tactics included social distancing, canceling large public gatherings and closing schools—steps adopted this year when Covid-19 struck, though at the time they didn't include wide-scale lockdowns.

A year after the plan was released, a progress report called for more real-time disease surveillance and preparations for a medical surge to care for large numbers of patients, and stressed strong, coordinated federal planning.

The WHO also updated its pandemic preparedness plan in 2005 and revised longstanding International Health Regulations to require member countries to report diseases like SARS and new types of influenza.

A European vaccine makers' association said its members had spent around $4 billion on pandemic vaccine research and manufacturing adjustments by 2008.

Dangerous gaps

Most of the work on pandemics focused on influenza—a big threat, but not the only one. Funding for research on coronaviruses, which rose after the SARS epidemic, started declining. SARS hadn't come back, and other coronaviruses known to infect humans caused only common colds.

In 2004, NIAID awarded $104.7 million in funding for coronavirus-related research. Funding fell to $14.9 million by 2010, but climbed after another coronavirus, MERS, emerged. By 2019 it was $27.7 million, according to NIAID.

Researchers made some progress after SARS toward vaccines against the disease, which could have paid dividends later when Covid-19 emerged. While the two diseases are different, having a vaccine for another coronavirus could have made it easier to create a new one for Covid-19.

One potential SARS vaccine didn't get beyond the early stages, because NIAID couldn't find a pharmaceutical company willing to take it on, according to Dr. Fauci. Vaccines for epidemic diseases are "a risky business," he said. Demand is sporadic and an

epidemic can end before researchers finish testing it.

The $6.1 billion Congress appropriated for Mr. Bush's pandemic plan was spent mostly to make and stockpile medicines and flu vaccines and to train public-health department staff. The money wasn't renewed.

"The reality is that for any leader it's really hard to maintain a focus on low-probability high-consequence events, particularly in the health arena," Dr. Venkayya said.

Plan is tested

In early 2009, two children in Southern California fell ill with fever and coughs. Both recovered, but tests by the CDC showed they had been infected by a new strain of the H1N1 influenza virus, the type that caused the 1918 pandemic. Mexican health authorities then disclosed an outbreak there had killed at least 20 people. Soon, the virus popped up in Europe and elsewhere.

On the night of April 23, Nancy Cox, then the CDC's flu chief, called Dr. Fukuda, the former CDC official, from her car. Her Atlanta home had been struck by lightning in a thunderstorm and burned while she was at work. But she was determined to reach her colleague, who had left the CDC for the WHO four years earlier, in order to activate an emergency response.

Dr. Cox was alarmed that the new flu appeared to be a mix of pig, bird and human viruses, was appearing in multiple locations and was spreading rapidly from person to person—all hallmarks of a potential pandemic.

By 4 a.m., Dr. Fukuda had set up an emergency response center and the WHO started implementing its pandemic influenza preparedness plan, which outlined steps from handling surging demand for hospital beds to preparing vaccines.

In the U.S., President Barack Obama's administration put Mr. Bush's new plan into action for the first time.

By mid-June, swine flu, as it was dubbed, had jumped to 74 countries. The WHO officially labeled it a pandemic, despite some evidence suggesting the sickness was pretty mild in most people.

A doctor with swine-flu patients in Mexico City in 2009.

Photo: Luis ACOSTA/Agence France-Presse/Getty Images

That put in motion a host of measures, including some “sleeping” contracts with pharmaceutical companies to begin vaccine manufacturing—contracts that countries like the United Kingdom had negotiated ahead of time so they wouldn’t have to scramble during an outbreak.

In August, a panel of scientific advisers to Mr. Obama published a scenario in which as many as 120 million Americans, 40% of the population, could be infected that year, and up to 90,000 people could die.

H1N1 turned out to be much milder. Although it eventually infected more than 60 million Americans, it killed less than 13,000. In Europe, fewer than 5,000 deaths were reported.

Cried ‘wolf’?

The WHO came under fire for labeling the outbreak a pandemic too soon. European lawmakers, health professionals and others suggested the organization may have been pressured by the pharmaceutical industry.

The vaccine took so long to manufacture that the virus was ebbing when it was finally ready. In Europe, especially, governments had ordered huge numbers of doses, often at high cost, then tried to cancel them when it became clear they weren’t needed.

France ordered 94 million doses, but had logged only 1,334 serious cases and 312 deaths as of April 2010. It managed to cancel 50 million doses and sell some to other countries, but it was still stuck

with a €365 million tab, or about $520 million at the time, and 25 million extra doses.

Sanofi-Pasteur manufactured a swine-flu vaccine in 2009 in France.

Photo: THOMAS COEX/Agence France-Presse/Getty Images

The WHO had raised scares for SARS, mad-cow disease, bird flu and now swine flu, and it had been wrong each time, said Paul Flynn, a member of the Council of Europe's Parliamentary Assembly and a British lawmaker, at a 2010 health committee hearing in Strasbourg. The Council of Europe has 47 member-states and was set up in 1949 to protect human rights and the rule of law.

"I thought you might have uttered a word of regret or an apology," Mr. Flynn told Dr. Fukuda, who as a representative of the WHO had been called to testify.

Vaccine policy has to be decided early, before anyone knows how severe a disease will be, Dr. Fukuda replied.

Privately, he was seething, remembering all the efforts scientists and public-health officials had put into trying to tame outbreaks.

"To have that thrown back to you that you're trying to make money for somebody is really offensive," Dr. Fukuda said. Being accused of creating the idea of a pandemic is still one of the most painful experiences in his career, said the doctor, who is now at HKU's School of Public Health.

Ultimately, an investigation by the council's committee accused the

WHO and public-health officials of jumping the gun, wasting money, provoking “unjustified fear” among Europeans and creating risks through vaccines and medications that might not have been sufficiently tested.

Dr. Keiji Fukuda, a WHO official at the time, discussed MERS at a press conference in 2014.

Photo: FABRICE COFFRINI/Agence France-Presse/Getty Images

“There is a real danger of now having cried ‘wolf,’ ” the report concluded.

Scientific leaders

Many scientists were more convinced than ever that a devastating pandemic was coming. A handful believed there was a big threat in addition to the most obvious one, influenza, and they put their energies into studying coronaviruses.

One was Dr. Daszak, the New York-based virus hunter, a self-described reptile fanatic who kept pet vipers in his bedroom as a boy in the U.K. He grew interested in how human activities moved dangerous viruses around the world.

By 2004, Dr. Daszak had joined with two other scientists in a search for the source of SARS, the deadly coronavirus, in hopes of preventing its return. Linfa Wang, a Shanghai-born virologist, had spent years at a lab in Australia studying pathogens in bats. He suspected SARS resided in bats too—not in civets, as was initially thought.

For help in China the pair brought in Shi Zhengli, then a shrimp-disease researcher at the Wuhan Institute of Virology who had considered becoming a singer instead of a scientist. Dr. Shi would eventually publish the paper warning that a new coronavirus outbreak linked to bats was likely.

Peter Daszak, a disease ecologist and virus hunter at EcoHealth Alliance, at a wildlife farm in Guangxi in 2015.

Photo: EcoHealth Alliance

Dr. Shi has recently become known after U.S. officials and others suggested, without evidence, the coronavirus that caused Covid-19 emerged from her lab in Wuhan, which she has denied. International scientists generally believe the pathogen crossed into humans from animals.

Drs. Daszak, Shi and Wang, now at Singapore's Duke-NUS Medical School, sampled throughout China, including an area near Guangzhou, where limestone hills full of caverns, some the size of airplane hangars, housed thousands of bats.

Dr. Shi and researchers stretched nets on bamboo poles to capture the bats, placing each into cloth bags. After collecting and analyzing swabs, fecal pellets and blood samples, the scientists found SARS-like viruses.

It was among the first indications that SARS originated in bats, and a key part of the evolving understanding of the risk from coronaviruses.

Back in Washington, scientist Dennis Carroll, at the U.S. Agency for

International Development, was also convinced that flu wasn't the only major pandemic threat.

In early 2008, Dr. Carroll was intrigued by Dr. Daszak's newly published research that said viruses from wildlife were a growing threat, and would emerge most frequently where development was bringing people closer to animals.

Dr. Dennis Carroll, center, in a cave with Vietnamese colleagues in 2017 monitoring new bat viruses.

Photo: Dennis Carroll

If most of these viruses spilled over to humans in just a few places, including southern China, USAID could more easily fund an early-warning system.

"You didn't have to look everywhere," he said he realized. "You could target certain places."

He launched a new USAID effort focused on emerging pandemic threats. One program called Predict had funding of about $20 million a year to identify pathogens in wildlife that have the potential to infect people.

Dr. Carroll, who once worked in a leprosy colony in India, dived into tropical jungles and wildlife markets with Predict-funded researchers. The program operated in 30 countries, including China and the Democratic Republic of the Congo.

He frequently met with decision makers in Washington and urged them to expand the virus-hunting work. Accompanying him on one visit to the White House was Dr. Daszak, dressed in a suit, while Dr.

Carroll, known for his unique style, wore purple John Lennon-style glasses, white-and-blue saddle shoes and a fedora.

Drs. Daszak, Shi and Wang, supported by funds from Predict, the NIH and China, shifted their focus to Yunnan, a relatively wild and mountainous province that borders Myanmar, Laos and Vietnam.

Dr. Shi Zhengli in her virology lab in Wuhan in 2017.

Photo: Chinatopix/Associated Press

In one site known as the Shitou Cave, Dr. Shi's researchers found a huge variety of SARS-like coronavirus strains among horseshoe bats.

One key discovery: a coronavirus resembling SARS that lab tests showed could infect human cells. It was the first proof that SARS-like coronaviruses circulating in southern China could hop from bats to people.

The scientists warned of their findings in a study published in the journal Nature in 2013.

In another project, Dr. Shi found a coronavirus that was later determined to closely match SARS-CoV-2, the virus that causes Covid-19.

Evidence grew that showed people in the area were being exposed to coronaviruses. One survey turned up hundreds of villagers who said they recently showed symptoms such as trouble breathing and a fever, suggesting a possible viral infection.

In some caves, researchers found bottles, plastic bags or other

signs that people had been there. Dr. Daszak said he was told a sign went up on one of the caves saying “Do not enter.” Little else changed.

An EcoHealth Alliance field team in a Guangdong bat cave.

Photo: EcoHealth Alliance

Plans fall short

Over the next several years, governments in the U.S. and elsewhere found themselves constantly on the defensive from global viral outbreaks. Time and again, preparedness plans proved insufficient.

One, which started sickening people in Saudi Arabia and nearby countries in 2012, was dubbed MERS. It was a new coronavirus, carried by camels, and it killed about 34% of those it infected. It turned out to be relatively hard to spread, infecting only about 2,500 people over several years.

On a weekend morning in January 2013, more than a dozen senior Obama administration officials met in a basement family room in the suburban home of a senior National Security Council official. They were brainstorming how to help other countries upgrade their epidemic response capabilities, fueled by bagels and coffee.

Emerging disease threats were growing, yet more than 80% of the world’s countries hadn’t met a 2012 International Health Regulations deadline to be able to detect and respond to epidemics.

The officials jotted ideas on flip charts: The CDC, Department of Defense, USAID and other U.S. agencies would use their expertise to help other nations improve disease surveillance, build better laboratories and train epidemiologists.

Saudi men in 2014 wear masks around their camels to guard against MERS.

Photo: FAYEZ NURELDINE/Agence France-Presse/Getty Images

The session led to the Global Health Security Agenda, launched by the U.S., the WHO and about 30 partners in early 2014, to help nations improve their capabilities within five years.

Money was tight. The U.S. was recovering from the 2008-09 financial crisis, and federal funding to help U.S. states and cities prepare and train for health emergencies was declining. Public-health departments had cut thousands of jobs, and outdated data systems weren't replaced.

U.S. funding for the new GHSA relied initially on existing money in budgets, including $40 million for CDC activities in priority countries.

"It was a Hail Mary pass," said Tom Frieden, who was director of the CDC from 2009 to 2017 and a force behind the creation of the GHSA. "We didn't have any money."

Ebola wake-up call

Around then, Ebola was breaking out in West Africa, and the deadly

consequences of an underfunded, patchwork approach to global health became apparent.

At the WHO, Dr. Fukuda was in charge of health security. When the Ebola outbreak was found in March 2014, he and his colleagues were already stretched, after budget cuts and amid other crises.

After a few weeks, new Ebola cases appeared to be declining. But fearful families had hidden their sick loved ones. They were afraid of the Ebola treatment centers, where many who were taken in never came out, with the death rate soaring over 70% at times, and they chased away health workers.

A health worker in protective clothing carried a child believed to have Ebola in Liberia in 2014.

Photo: John Moore/Getty Images

It took the WHO until August to raise an international alarm about Ebola. By then, the epidemic was raging. It would become the largest Ebola epidemic in history, with at least 28,600 people infected, and more than 11,300 dead in 10 countries. The largest outbreak before that, in Uganda, had involved 425 cases.

The United Nations created a special Ebola response mission that assumed the role normally played by the WHO. Mr. Obama sent the U.S. military to Liberia, underscoring the inability of international organizations to fully handle the problem.

Congress passed a $5.4 billion package in supplemental funds over five years, with about $1 billion going to the GHSA. The flood of money, along with aggressive contact tracing and other steps,

helped bring the epidemic to a halt, though it took until mid-2016.

Global health experts and authorities called for changes at the WHO to strengthen epidemic response, and it created an emergencies program. The National Security Council warned that globalization and population growth “will lead to more pandemics,” and called for the U.S. to do more.

U.S. military and Public Health Service staff assisted in Liberia in 2014 during the Ebola epidemic.

Photo: Michel du Cille/The Washington Post/Getty Images

Dr. Carroll of USAID, who had visited West Africa during the crisis, and saw some health workers wrap themselves in garbage bags for protection, started conceiving of a Global Virome Project, to detect and sequence all the unknown viral species in mammals and avian populations on the planet.

Billionaire Bill Gates warned in a TED talk that an infectious disease pandemic posed a greater threat to the world than nuclear war, and urged world leaders to invest more in preparing for one. The Bill & Melinda Gates Foundation helped form a new initiative to finance vaccines for emerging infections, the Coalition for Epidemic Preparedness Innovations.

Yet when the next epidemic, Zika, came to the Americas in 2015, the CDC needed more supplemental funding to fight the epidemic, which caused severe birth defects in the unborn children of infected women. It took Congress so long to approve it that the agency had to divert funds from other public-health needs, including $38 million

from operations in West African countries recovering from Ebola.

Congress established a permanent Infectious Diseases Rapid Response Fund for the CDC in fiscal 2019, with $50 million for that year and $85 million in fiscal 2020.

A doctor in Brazil measured an infant suffering from the effects of Zika in 2016.

Photo: Mario Tama/Getty Images

Distractions and missteps

The Trump administration supported some pandemic-related programs, and worked with Congress to add funds to the GHSA when Ebola money ran out.

But many efforts were weakened by a revolving door of officials, among other distractions and missteps.

In May 2018, John Bolton, then President Trump's national security adviser, dismantled an NSC unit that had focused on global health security and biodefense, with staff going to other units. The senior director of the unit left.

Mr. Bolton and others have said the step was designed to improve NSC operations and that global health remained a priority.

It pushed emerging disease threats down one level in the NSC hierarchy, making pandemics compete for attention with issues such as North Korea, said Beth Cameron, a previous senior director of the unit. She is now vice president for global biological policy and

programs at the Nuclear Threat Initiative.

Deteriorating relations with China reduced Washington's activities there just as researchers were becoming more certain of the threat from coronaviruses.

The CDC cut personnel in China from 44 to 14 and said it expects to have 10 U.S. and local staff by the end of this year. The agency said it reallocated programs to other countries with greater needs.

EcoHealth Alliance, Dr. Daszak's group, has wrangled this year with NIH over its bat-research grant, which has also supported some Chinese researchers, Dr. Daszak said.

Dr. Carroll had earlier been ordered to suspend his emerging pandemic threats program in China.

Dr. Carroll pitched to USAID his Global Virome Project. USAID wasn't interested, he said. He left USAID last year. A meeting that Dr. Carroll planned for last August with the Chinese CDC and Chinese Academy of Sciences to form a Chinese National Virome Project was postponed due to a bureaucratic hang-up. Plans to meet are now on hold, due to Covid-19.

—Illustration by Angie Wang

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