

The Road Ahead: Charting the coronavirus pandemic over the next 12 months — and beyond

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Think back through the pandemic. Think about the moments that stand out as beacons in the haze — signposts of how it would change all of our lives.

Not all of these moments were clear at the time. China's decision to shut down cities of millions of people in January was staggering, but to most Americans, this new coronavirus remained an ocean away, not something that would demand our own version of a lockdown.

Other moments form pits in our stomachs when we look back. Perhaps, for you, it's when the Centers for Disease Control and Prevention touted it was developing its own test for SARS-CoV-2 instead of relying on international designs. Or when leaders in New York delayed containment plans as cases

built. Or when President Trump [embraced](#) the unproven and ultimately fruitless hydroxychloroquine as a miracle drug.

Then there were moments when the new reality arrived with the subtlety of a sonic boom. Take March 11: Trump halted most travel from Europe. Tom Hanks and Rita Wilson announced they had Covid-19. The NBA suspended its season.

Now — with health authorities saying it may not be until at least the end of 2021 before there's a degree of post-Covid normalcy in our lives — look forward. Imagine the next 15 months and what life will be like.

In this project, STAT describes 30 key moments, possible turning points that could steer the pandemic onto a different course or barometers for how the virus is reshaping our lives, from rituals like Halloween and the Super Bowl, to what school could look like, to just how long we might be incorporating precautions into our routines.

This road map is informed by insights from more than three dozen experts, including Anthony Fauci and Bill Gates, people on the frontlines at schools and hospitals, as well as STAT reporters. It largely focuses on the U.S.

Perhaps making forecasts during what's habitually described as "unprecedented" is foolish. "I'm kind of done predicting — none of my predictions worked out for me," Kelly Wroblewski of the Association of Public Health Laboratories said, with a resigned laugh, about when she thought the testing problems that have dogged us from the earliest days might get resolved. And indeed, some of the events will unfold in different ways and at other times than we've charted out.

Yet for all that's caught us off guard about Covid-19, some factors — like how a virus spilled from animals and swept around the world — are straight out of pandemic playbooks. We can see the coming crossroads.

So many challenges still lie ahead. Flu season. An ongoing child care quandary. A tumultuous election and potential transition of power. Whoever wins, we'll need them to shepherd a vaccine rollout — a logistical and public relations campaign without (here's that word again) precedent.

"The virus is not through with us yet," said family physician and epidemiologist Camara Phyllis Jones of Morehouse School of Medicine. "The virus has only one job. And that's to replicate itself, and to go from person to person to person — and it doesn't care which person."

Throughout the pandemic, what's maddened U.S. public health experts has been the nation's inability and unwillingness to take the steps that could reduce illness and death, steps that other countries have used with success. Instead, we're trying to force the activities — commerce, schools, and festivities — that controlling the virus in the first place would enable but that, in our case, are contributing to infection counts.

"There's this attitude that public health measures are getting in the way of opening up the country," Fauci, the country's most prominent infectious disease expert, told STAT. "It's exactly the opposite. In a prudent way, the public health measures are the gateway, the vehicle, the pathway to opening the country. That's the point that gets lost in this that's so frustrating."

As Fauci monitors the coronavirus' trajectory, so do the rest of us, wondering what other hallmarks the pandemic will soon touch — like Thanksgiving feasts. At Adams Turkey Farm in Westford, Vt., they're anticipating this year selling fewer of their "signature" birds around 24 pounds — "Oh my gosh, they're beautiful," said owner Judy Adams — and more smaller birds. The holiday meal will still happen; there just might be fewer people squeezing around the table.

"We've weathered different things — certainly not a pandemic — but I just trust in the holiday, I trust in the turkeys," Adams said. "But if this is the year

that we make less money, well, that will be OK, and we will get through this."



Fall starts: Will it be wrenching, or really wrenching?

Overstretched ambulance crews. Overflowing hospitals. Overstuffed morgues. The grimmest images from the spring and summer peaks could appear again this fall and winter if the country doesn't drive its case count down urgently.

"If we're not going into the fall with a huge running start in terms of having cases at very, very low levels ... we run the risk of having uncontrollable

outbreaks," said Michael Mina, an epidemiologist at Harvard's T.H. Chan School of Public Health.

People are returning to offices or schools and interacting with others more. Residents of the northern half of the country, who embraced al-fresco summers, will move indoors. States and cities are inclined to keep easing restrictions.

Then there's the virus itself.

While this is our first fall with SARS-2, experts believe that its activity could accelerate as temperatures drop, as is the case with other viruses, including the four coronaviruses that cause common colds. These viruses survive longer in cold, dry settings, tied to a measure called absolute humidity.

But the virus spread like gossip this summer in the South. Was the heat really slowing it down?

To an extent, experts think. But whatever advantage summer provided was overtaken by the fact that none of us was protected against the virus, and that restrictions like closing bars were lifted. "The summer epidemic probably would have been worse if it had been winter," said disease ecologist Marta Shocket of UCLA.

Some communities will have one partial shield this fall: a level of population immunity. Most people who recover from Covid-19 will be protected from a second case for some time, it's thought. In hard-hit areas, 20% of residents or more have had the illness already — many without knowing it — meaning fewer people can be infected and spread the virus.

"We're not dealing with a situation like we were in February and March when it was a totally naive population," said epidemiologist Wafaa El-Sadr of Columbia University. These areas have not reached herd immunity — when the percentage of protected people is high enough that the spread burns

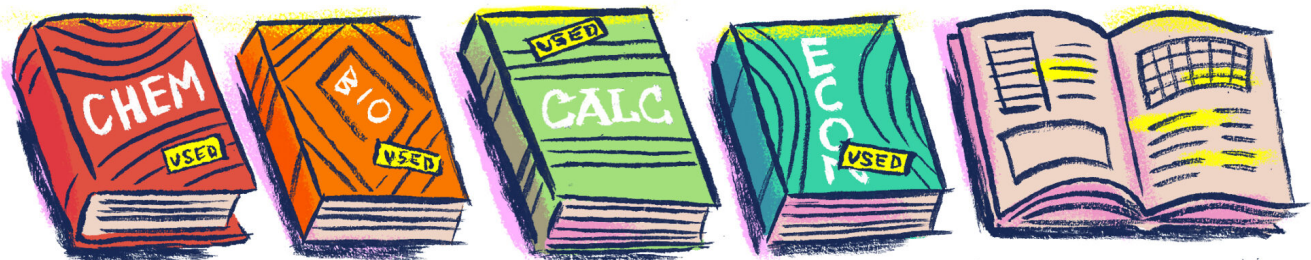
out — but, El-Sadr said, “it’s a plus.”

Mathematical epidemiologist Gerardo Chowell of Georgia State University has what could be considered an almost optimistic autumnal outlook: a flat number of cases, as increases in the northern half of the country offset declines in the South and some safeguards are kept up.

But Chowell doesn’t imagine the real glass-half-full scenario: cases going down. “Having seen how U.S. society is split on face masks, I’m not very hopeful,” he said.

It’s possible the fall won’t realize our worst fears. The flu season could be mild. Outbreaks in nursing homes and prisons could be prevented. But we’re approaching the danger zone with lots of virus circulating, when it was presumed that the country would be in a better position.

Ahead of the fall, “we were envisioning that there would be a continued downward trajectory of Covid-19, new infections and deaths,” Brian Hainline, the NCAA’s chief medical officer, said in August. “That there would be a national surveillance system, national testing, and national contact tracing that would allow us to really navigate this pandemic and to resocialize both in sport and in the rest of society. And that hasn’t happened.”



Sept. 28: A college quarantine strategy faces the test

For colleges, there’s one over-arching dilemma: How can they safely keep

students on campus?

As we look for clues, the University of Wisconsin-Madison is one to watch. Desperate to contain the virus, the school this month mandated that residents of two dormitories and 22 Greek houses quarantine for two weeks. "I literally felt like I was being arrested," one student [told a TV reporter](#).

As the students emerge in the coming days, it will become clear whether the gambit worked.

If it does, it could show that universities might be able to hem in the virus and slog through this semester. If it doesn't, it might be a sign that more schools will have to throw in the towel, following the likes of Colorado College and the University of North Carolina in canceling their in-person plans after students showed up. [Some schools](#) have gone from in-person to virtual teaching and then given in-person another chance.

College clusters are fueling a sizable portion of new Covid-19 infections around the country. But some schools are soldiering on: The University of Illinois at Urbana-Champaign and schools in New England, for example, have unveiled ambitious testing schemes. Some are holding lectures in basketball gyms or in tents.

But colleges, by design, bring packs of people close together. If cases crop up, they easily beget more. And if one thing's clear from the start of the semester, it's that college kids like to party, Covid or not.

"It would be pure luck if you didn't have clusters of cases" at some point during the semester, said epidemiologist Nita Bharti of Pennsylvania State University.

The colleges that allowed students to return did so in part because it's what students wanted. They pleaded they were missing out on spontaneous 3

a.m. philosophical discussions and intellectual breakthroughs that come only after a group all-nighter. But for the schools, it was also a grasp at a financial lifeline as budgets collapsed.

“Universities are in such a hard place,” said Meira Levinson, an educational ethicist at Harvard. “They are educating people who have the transmission patterns of adults but who are developmentally not making choices the way older adults would.”

The deeper impact of college closures could come if schools don’t sequester students before sending them home. Absent that, they could spray the virus across the country like shrapnel.



Sept. 29: At first debate, Trump and Biden square

off over Covid

You can practically mouth the script: On stage at Case Western Reserve University in Cleveland (and before a limited audience), former Vice President Joe Biden lambastes Trump for the nation's disastrous pandemic response and for failing the American people. Trump tries to convince millions of viewers that the U.S. has turned a corner — that his administration defeated the virus and is *this close* to a vaccine.

And with that, experts say, the election discourse poses real risks.

Since the beginning of the pandemic, scientists have struggled to address Covid-19 misinformation from the administration. While they would normally advise looking to the Food and Drug Administration or CDC, the agencies at times have become megaphones for White House messaging.

"We have offices that have credibility and we have noncredible people in those offices," said Penn State's Bharti. "That has created a disconnect for us for how to handle misinformation."

Trump's attempts to paint a rosier picture of the situation could make it worse, experts say. If politicians prematurely declare victory, it sends the message that people no longer need to wear masks or distance from others.

"I'm worried that if leaders say to the public like they did back in April or May, that this will be over, if those messages come back, it will confuse people again and we'll see another surge in cases," said Tom Inglesby, director of the Johns Hopkins Center for Health Security. "It's really important for leaders not to sugarcoat things when they are not going well."



Oct. 2: 'A lost generation of workers'?

Picture the cable news coverage of September's unemployment report, a crucial proxy for the economy and the last one before the election. A flashing chart showing the pandemic's toll on jobs, and an immediate pivot to the political implications. Trump will likely be watching.

There had been hopes that the economy would bounce back from the depths of the spring in a V-shaped recession. Jobs returned as states allowed more business activity heading into the summer, but only to an extent, and hiring has since cooled. A bad or stagnant jobs report, then, could drive Trump to demand that states lift the remaining restrictions meant to keep a lid on Covid-19.

But the central reason for the sputtering economy, economists say, is the uncontrolled epidemic. Government restrictions certainly dampened activity, but much of the persistent drag is because people do not feel safe traveling or hitting the town or spending money in their usual ways.

"People look around and say, 'the risks are too high, I'm not going to go about my activities,'" said economist Kosali Simon of Indiana University.

This recession stands out for how quickly the economy cratered and for how it devastated select industries while leaving others unscathed. It's also amplified the divide between white-collar workers who could slide into working from home, and lower-wage employees, many of whom lost their jobs or risked infection at their workplaces.

The looming concern is that the pain may spread. Government spending

has kept components of the economy treading water. If that support ends before a vaccine arrives, demand could collapse, unemployment could become long-term, and the recession could become entrenched.

“We’re setting the stage for another decade of massive unemployment and a lost generation of workers,” said Harvard economist James Stock. A public health response is not only about saving lives, “it’s holding the economy in its hands.”

The solution is not another lockdown, said Stock, who’s [studying the effectiveness](#) of interventions. Simple but sustained strategies, he said, can sufficiently drive infections down: donning masks, minimizing super-spreading opportunities, maintaining distancing, and restricting indoor activity. Build up testing. If cases get low enough, contact tracing becomes feasible.

It’s essential that the country embraces these measures uniformly, Fauci said. “If one area in the country does it really well, and another area is careless and it surges up, that’s like playing whack-a-mole.”



Early October: After 100 million tests, it’s still not enough

It’s too early to say we’ve overcome all the horrors of testing, from a CDC test that didn’t work to shortages of swabs and reagents to delayed (and thus meaningless) results.

But, perhaps, finally, things are looking up. “A lot more ubiquitous testing is coming,” Ashish Jha, the dean of Brown University’s public health school, said at a [STAT event](#) in September. “I’ve been saying that for months, but

maybe now it will actually be coming."

Faster and cheaper tests are becoming available, supported by a National Institutes of Health program. The Trump administration is distributing millions of antigen tests (which detect viral proteins) to nursing homes. Employers and universities have hatched ambitious testing strategies that could be models.

A potentially more potent tool could also arrive in the coming months: rapid, at-home coronavirus tests, akin to pregnancy tests. This type of antigen test, which could use a saliva sample and is still in development, is not as accurate as PCR diagnostics (which detect the virus' genetic material). But the vision is that it could offer individuals a pretty good clue as to whether they have infectious Covid-19 within minutes — information that would allow them to go about their lives (with precautions) or isolate themselves. "Having a test that can find you when you're transmissible is the whole goal," Harvard's Mina said.

Still, plenty of challenges remain. Experts say [testing capacity needs to be expanded](#) many times over. Test kits abound on movie sets and in professional sports, yet many people still have trouble locating one. Whatever national testing strategy exists is defined by deferring to states, leaving local labs more vulnerable to supply chain snags and to getting overwhelmed.

"The idea of what a rational testing plan looked like — you know, we were on the phone with all the key people in the federal government in those key months [February and March], and it just didn't happen," Bill Gates told STAT.



Mid-October: Can more K-12 schools get students back?

Within two weeks of schools in Cherokee County, Ga., [opening in August](#), when local coronavirus transmission was still high, more than 1,000 students and staff found themselves in quarantine and three high schools reverted to online learning.

In the Northeast, as schools considered welcoming students for in-person instruction in September, communities generally had low Covid-19 rates — the surest signal that schools can reopen safely. But even there, last-minute snafus threw some plans into disarray, showing the difficulty of trying to hold together a strategy in a changing pandemic.

New York City, which planned to open schools for a mix of classroom and remote learning Sept. 21, delayed for another week on Sept. 17. In Carle Place School District on Long Island, the superintendent made the call to

switch to virtual learning two days before school started, after parties led to a spike in Covid-19 cases. "As we are learning the hard way, the actions of a few can impact the many," Superintendent Christine Finn wrote in [a letter](#) to families.

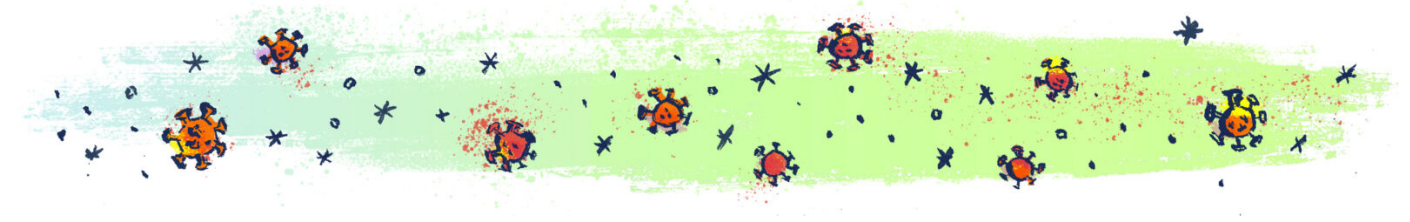
By mid-October, the northeastern schools that did welcome students back will be a month in — time for a report card on their strategies. Rhode Island, for example, opened [schools in most districts](#), starting with some students as they moved toward full classes. There will also be signals whether schools that needed more time to get staff on board with in-person plans or to retrofit classrooms to meet safety standards can get kids back.

Other countries have made it clear that low community transmission levels and rigorous strategies can enable schools to reopen and stay open. In [a recent editorial](#) in Science, researchers wrote that with distancing, limited classroom size, ventilation, and masks, "transmission within schools has been rare." But in the U.S., schools haven't been prioritized. In some places, movie theaters and gyms and indoor dining came back, even as local viral levels were deemed too high for in-person teaching. "We're making choices that don't necessarily make a lot of sense," said Zoë McLaren, a health policy expert at the University of Maryland, Baltimore County.

Cases will be detected at school, experts stress. The question is what happens then. Districts need plans for how extensive quarantines should be, how many cases would trigger a shutdown, and how long that should last.

Returning to school, of course, is not just about the risk to kids, who are much less likely to get serious Covid-19 cases than adults. About 40% of teachers and 40% of adults living with children have health conditions that increase the likelihood of more severe Covid-19, according to one [study](#). Many children live with a grandparent. Households have been key transmission points during the pandemic, and kids can't isolate from their family. "If your kid gets sick, you're probably going to get sick too," said

Maia Majumder, a computational epidemiologist at Boston Children's Hospital.



Mid-October: SARS-2 treatments start to arrive

The first treatments specifically crafted to fight SARS-2 could join clinicians' armaments this fall.

Called [monoclonal antibodies](#), they are designed to block the virus from slipping into cells. A number of candidates are in clinical trials, with results possible starting in October.

The real boon could be if monoclonals keep patients with mild Covid-19 from progressing to more severe illness. They are also in earlier-stage testing to see if they can stop infection, akin to a vaccine.

"What we really need are therapies that can be administered early to prevent someone from actually needing to go to the hospital," Fauci said. "That's the big gap that we have."

When the pandemic erupted, the world's medicine cabinet was bare of any coronavirus therapies. Researchers adapted, finding that an experimental antiviral called [remdesivir](#) helped hospitalized patients recover faster and that [common steroids](#) reduced deaths. They're exploring blood thinners to stop clots, and ways to calm overhyped immune systems that paradoxically cause many patients' deaths. And then there's the still maybe-beneficial [convalescent plasma](#) — an antibody-rich blood component donated by people recovered from Covid-19.

Monoclonals have been seen as providing a bridge for the pandemic — a

treatment for patients who get sick while vaccines are being rolled out. But [there are questions](#) about whether their development will take too long to make a real impact. There hasn't been a significant push, for example, to manufacture them en masse.

"It makes sense for something like Ebola, sure, when there aren't that many people" who get infected at a time, said Juliet Morrison, a University of California, Riverside, virologist. But with Covid-19, "can we scale up to really do that for the whole population?"

Oct. 22: The FDA's vaccine advisory committee meets in a showdown over scientific integrity

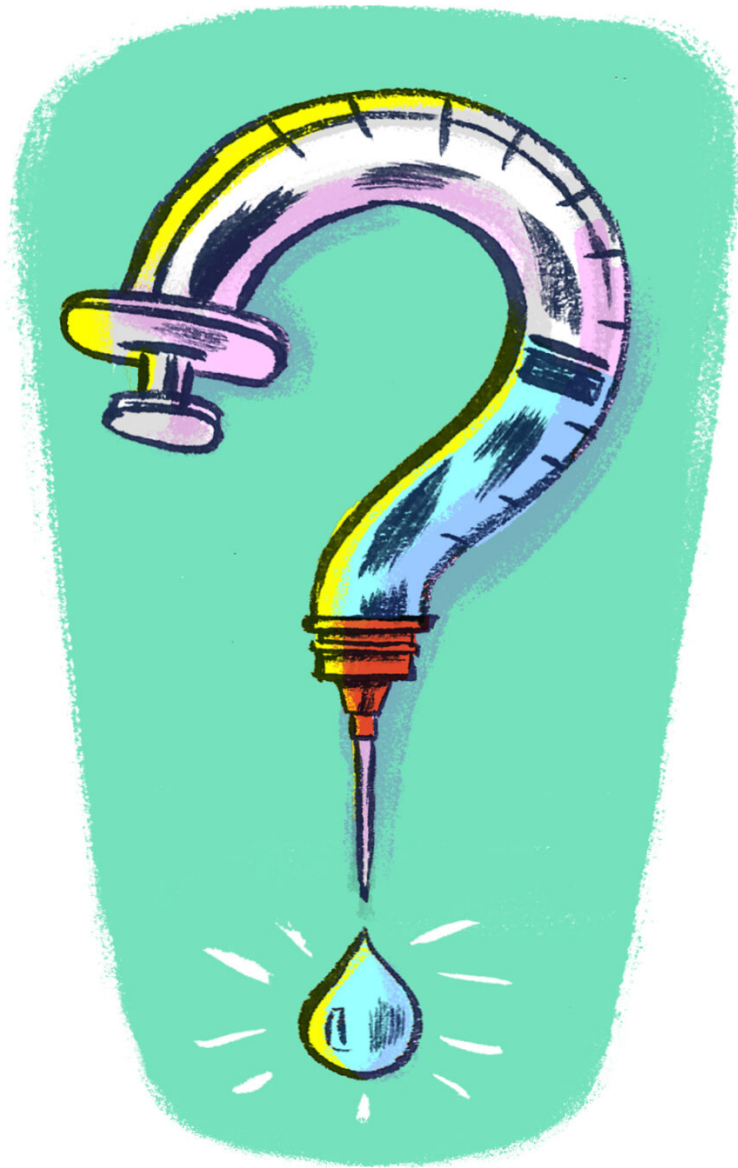
Usually, these meetings are eye-glazing to anyone beyond scientists and drug companies, yet another expert gathering in a conference room at the FDA's suburban Maryland campus. But the topic will be Covid-19 vaccines, and given the timing — 12 days before the election — people nervous about potential White House interference in the FDA's evaluations have this date circled on their calendars.

At a routine meeting of these outside scientific advisers, the group might discuss the composition of that year's flu shot or debate clinical trial data for a vaccine. At this one, it's expected that results from Covid-19 vaccine candidates won't be ready. Still, the (virtual) meeting could be a chance for the experts to build up a scientific bulwark against meddling from Trump — a moment when they will punctuate the importance of a rigorous review of immunizations, conducted only once adequate safety and efficacy data are available.

"The medical science community must stop this dance as we get closer to rolling out a vaccine for Covid-19 because we now know that we won't get any help from the federal government," Holden Thorp, the editor-in-chief of the Science journals, wrote in [an editorial](#). "We're on our own."

FDA Commissioner Stephen Hahn has said that the meeting is part of the agency's commitment to being "as open and transparent as possible" and that it will help the public understand "the data needed to facilitate [vaccines'] authorization or licensure." Hahn has pledged that politics and pressure from the White House won't force the agency's hand.

But the president has already accused the agency of harboring the "deep state" and slowing treatment development. He's also staked his reelection on a vaccine, promising at the Republican National Convention that "we will produce a vaccine before the end of the year, maybe even sooner," without mentioning the uncertainty around clinical trials.



Oct. 23: A vaccine gets a divisive FDA emergency authorization

OK, so this one might not happen.

But if it does, imagine the juxtaposition. A spike-the-football Trump tweet, and scientists fretting that a hastily released vaccine desecrated the regulatory process.

To be clear, there is [a small but legitimate possibility](#) that, should one of the vaccine candidates be wildly effective, clinical trials could demonstrate that by the end of October. Executives at Pfizer have said they could have results by then. But most experts think that the requisite data won't be available until later.

Everyone involved in the vaccine review process, including the companies testing them, says they are committed to ensuring the safety and efficacy of immunizations. And yet ... experts still can't shake the feeling that something untoward might happen before the election. Call it an October surprise, pandemic style.

Perhaps the FDA will try to thread the needle. Hahn has suggested a possible authorization for a vaccine for certain populations, such as health workers. But the great fear is that, if some issue emerges with a vaccine after it is authorized, it will only steepen the uphill climb vaccine campaigns are facing. A not insignificant portion of Americans are dubious about Covid-19 vaccines. Unforced errors could only entrench their uneasiness.

"If [the FDA] is bullied on this for vaccines, there are going to be a lot of people who stand up and say, 'I wouldn't get this vaccine.' And then what you've done is you've scared people and you only get one chance to make a first impression," Paul Offit, director of the Vaccine Education Center at Children's Hospital of Philadelphia, [said](#) in August.

Even if a vaccine meets the standards for an emergency use authorization, it might still raise eyebrows. "The track record of the FDA for EUAs with Covid has not been good," said UMBC's McLaren, citing [the flip-flop](#) on the hydroxychloroquine EUA and [the politicization](#) around the convalescent plasma EUA.

"The endgame is not vaccine No. 1," McLaren said, noting that the world will need multiple vaccines to have enough supply. "If trust in the EUA pathway is further damaged with vaccine No. 1, it's going to hurt vaccines No. 2, 3,

4."

Oct. 31: A scary Halloween indeed

Parents, it may be time to have a difficult talk with your children.

Los Angeles County has advised against trick-or-treating. Towns in Ohio [have canceled](#) public trick-or-treating events. And in Salem, Mass., a city of 43,000 that normally hosts a monthlong Haunted Happenings festival that welcomes half a million people, "pretty much all the events had to be canceled, rescheduled, or go virtual," said Kate Fox of Destination Salem. Fox said people will still make the pilgrimage to Salem, but stressed that Massachusetts requires a negative Covid-19 test or a quarantine for people coming from most states.



Nov. 3: A momentous election indeed

Perhaps nothing will change, or everything will.

If Biden is elected, he has said his [first post-election phone call](#) would be to Fauci, with a request that the scientist continue his service. He has a plan to assemble a new team of health officials to guide the country out of the pandemic. If Trump is re-elected, don't expect any major shifts in strategy.

But it's not Covid-19 policy differences driving voters, said Robert Blendon of Harvard, an expert on the intersection of politics and health policy. When it comes to the pandemic, voters are thinking pragmatically — how a Trump

or Biden presidency would affect whether they can go to work and send their kids to school, or whether their businesses will survive.

And, Blendon added, "What's important to understand is that if there was some public health miracle in October, the polls would change dramatically."

November: Covid, meet flu

In 2018, so many people came down with the flu that Pennsylvania's Lehigh Valley Health Network threw up tents to handle the influx of patients. In April of this year, the hospital almost had to turn operating rooms into ICUs for Covid-19 patients. The question for Lehigh Valley is: What would a double whammy look like?

"My hope is that with all the education of the public, maybe it's not as bad," Jennifer Rovella, the system's chief of critical care, said about the approaching flu season.

It's clear why experts worry about a wave of Covid-19 coinciding with a bad flu season — what's been dubbed the twindemic. But it's also possible that all the precautions against SARS-2 will reduce transmission of influenza; the Southern Hemisphere's flu season, for instance, was remarkably mild.

Health officials aren't taking chances. They're warning that people could get infected by both viruses, potentially making them more likely to get seriously ill. They're pleading with the public to get flu shots, which, even if they don't prevent infection, reduce the chances of severe disease. "We've ordered about twice the number of flu vaccines as we normally do," said Rachel Levine, Pennsylvania's health secretary.

Beyond the threat to health systems, distinguishing between the infections will be a head-scratcher for clinicians. Flu and Covid-19 have overlapping symptoms, including cough, fever, and aches. Doctors often don't even test for flu and diagnose a case based on an exam, but they won't be able to do

that this year. Some tests that detect both viruses are being rolled out, but the urgency to tell if someone has flu or Covid-19 or both — with implications for isolation and contact tracing — could worsen bottlenecks.

“You rely on the same laboratories and very similar testing supplies and equipment,” said the lab association’s Wroblewski.



Thanksgiving: Will holiday travel set us back?

Can you break a wishbone over Zoom?

The thought of people traveling for Thanksgiving and the December holidays, at the same time that college students who make it through the semester will be scattering home, makes experts anxious, to say the least.

Still, some families will get together. The safest way would be for everyone to quarantine for two weeks and gather with people within driving distance. Whatever the plan, they’ll need to have the Covid version of “the talk”: sussing out exactly what risks others are taking — are they seeing friends? are they going to the gym? — and establishing ground rules for the weeks leading up to the holidays.

“People like to think their friends and family are like them, and their risk behaviors are the same as mine, but so often that’s not true,” said Boston Children’s Majumder.

Summer travel was down by 15%, the first decline since 2009, with air, rail, and cruise trips taking huge dives, according to AAA estimates. But with the virus potentially and silently piggybacking on travelers, even pared-back holiday journeys could seed new spread.

Family gatherings pose specific risks. The number of contacts people have over the holidays drops from regular days, but as demographer Audrey Dorélien of the University of Minnesota said, "the age of those contacts changes." People could pick up the virus at work or at school or among friends, and then, in addition to the gravy boat, pass it to grandma and grandpa.

50,000
250,000

Late November: The 250,000th American death

When the official U.S. death toll hit 100,000, the New York Times dedicated its front page to the names of the dead. When it hit 200,000, Time [put a black border on its cover](#) for only the second time ever; the first was Sept.

11. How do you memorialize a quarter of a million Americans dead?

"The numbers are so shocking compared to the numbers of people who are often commemorated on public monuments, like war dead," said Kirk

Savage, a professor of the history of art and architecture at the University of Pittsburgh. "That raises the question, if we've got more numbers, why aren't we recognizing it?"

We've grown a bit numb to the pandemic's despair. We've cocooned ourselves from bad news, like we've trained ourselves to guard against SARS-2. But when the confirmed death count hits 250,000 (an undercount by some unknown amount), it might shake us out of our stupors. We'll, for a time, consider the lives lost, and the family members who didn't get to hug and kiss and hold their loved ones as they died.

While the scale is difficult to comprehend, many have felt the impact.

The staff at Carmon Community Funeral Homes in Connecticut faced an incredible sprint in March, April, and into May. They were arranging so many more funerals while adapting to the strictures of the pandemic. Churches weren't open, so they found other spaces for services. They webcast hundreds of funerals.

The firm typically arranges about 1,500 funerals a year. "This year we will probably have served over 2,000 families," said John Carmon.

The death count will mean different things to different people. Some might compare it to historical milestones or scale it to other data points: five times the number of U.S. combat deaths in Vietnam, the equivalent of 500 747s crashing, more than 80 Sept. 11ths.

Savage, who studies monuments, thinks that such a tragedy ultimately deserves a memorial. It might not be a statue or wall of names, but "something where people could congregate and mourn and just process what we have not been able to process."

However it's commemorated, by the time the 250,000th death is recorded, the 250,001st death will be close behind.

Late November: 50,000 deaths among Black Americans

The pandemic has rumbled through the U.S. like an excavator, digging up and magnifying generations-deep inequities. We've had to confront the fragility of access to housing, jobs, and health care. And no disparities have been more sobering than the fact that, according to [data from APM Research Lab](#), Black, Pacific Islander, Indigenous, and Latino Americans all have age-adjusted Covid-19 death rates triple that of white Americans.

People of color "are more likely to get infected, and when we get infected, we're more likely to die," said Jones, the Morehouse epidemiologist. In the spring, for example, as much of the country's attention was on Covid-19 in the Northeast, the infection rate in [Navajo Nation eclipsed all others](#).

Many people of color contracted the virus at work — risking exposure while trying to sustain their communities. Black transit drivers got other essential employees where they needed to go. Latino farm workers kept grocery stores stocked. "You cannot plant strawberries at your home," said David Hayes-Bautista, director of UCLA's Center for the Study of Latino Health and Culture.

It's not just infections that are falling unevenly. The recession is taking a greater toll on communities of color. Children of color are more likely to fall behind in school with virtual learning. In Louisiana, researchers found that even as the number of car crashes dropped during the shelter-at-home period, the share of drivers involved who were non-white increased — a sign, perhaps, of who was still going to work and who was doing all the deliveries for people at home.

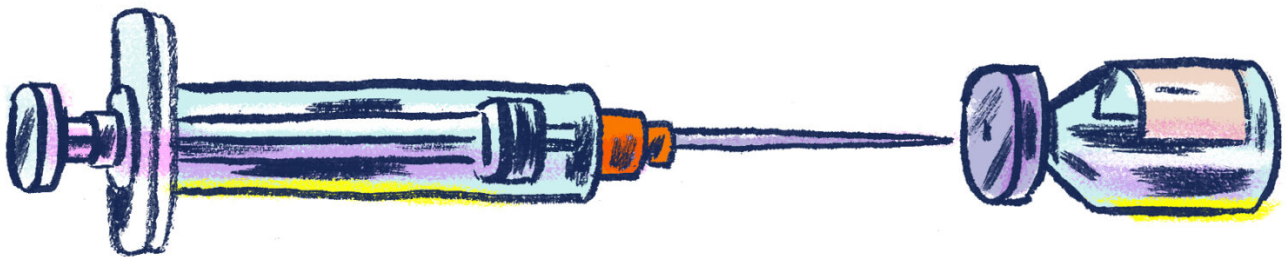
And it's not just that Black and Latino Americans are dying at higher rates than white Americans from Covid-19 — they're dying [at younger ages](#). They are losing more years of life, are more likely to leave young children behind, and, Hayes-Bautista said, "it's taking people out of their peak working and

earning years.”

It would be difficult to change the composition of the labor force on a dime, or quickly undo many of the other factors that explain Covid-19’s burden on communities of color. But that ignores that choices made during the pandemic, such as where testing sites were set up, created new roadblocks. And it elides the actions that experts say policymakers and employers could take right now to narrow the gap in infections and deaths: More testing in certain neighborhoods, better protective gear for workers, a more aggressive decarceration movement, offering places for people to isolate themselves if they get the virus, and continuing to pay people if they get sick so they stay home from work.

There is progress around the edges — some meatpacking employees have gotten better PPE, for example — but experts don’t see changes happening to the extent necessary to winnow the gulf.

“They could be done, but they’re not being done, because we’re not valuing all individuals and populations equally,” Jones said.



December: The results of crucial vaccine trials arrive

Remember, one possibility is that a vaccine simply doesn’t work. But let’s say that some prove safe and effective (fingers crossed).

The trials are generally testing whether vaccines reduce the chances of symptomatic Covid-19. But experts will also examine the data to see if

vaccines are blocking infections, how they work across age groups, and what side effects people might expect.

“Is the vaccine preventing infection or is it functioning by reducing the severity of disease?” said biostatistician Natalie Dean of the University of Florida. “Is there any signal that it can reduce infectiousness if it’s not reducing infection entirely?”

Then comes a presumably speedy FDA authorization, and the next challenge: Getting the shots to people.

Public health experts have already been cobbling together [an allocation blueprint](#) for who should get vaccinated first. The U.S. government has been paying vaccine makers to manufacture doses before trials are completed, with supplies of ineffective products destined for the garbage. A [behind-the-scenes distribution apparatus](#) involving glass-vial producers, transportation logistics, and cold storage is revving up. It’s all to ensure there’s a supply of vaccine ready to go as soon as one is given the green light.

Most experts agree that certain hospital workers and other frontline employees should be first to get vaccinated. Older people and those with underlying health conditions may come next. Some advocates are calling for prioritizing Black and Latino communities, on whom the pandemic has taken a disproportionate toll.

Even as people are vaccinated, researchers will follow them to make sure there aren’t any surprise reactions and to determine when a booster might be required.

“We don’t know how long protection is going to last,” said Inglesby, of Johns Hopkins. “We’re going to have to take the information as it comes and build the system as we go.”

Dec. 31: New Year's Eve in a very different Times Square

The pandemic has disrupted storied events, from the Olympics to the [Radio City Rockettes' Christmas Spectacular](#). Often, the cancellations include "for the first time since World War II."

While New Year's Eve plans in Times Square haven't yet been announced, it seems inevitable that the tradition will be far more restricted than even during the war. In 1942 and 1943, there was no ball drop "due to the wartime 'dimout' of lights," according to the Times Square District Management Association. Still, crowds massed those years for a midnight "minute of silence followed by chimes ringing out from sound trucks." Gathering like that could serve as a moment of camaraderie during a difficult time, but the pandemic is not like other historical crises. You wouldn't want to start 2021 with Covid-19.



January 2021: One year after cases exploded in China

A year after the coronavirus came to our attention, we'll likely still have basic questions about it, including from which animals it leapt to people. But with time, we could start getting a better understanding of one of Covid-19's biggest mysteries: how long immunity lasts.

There's not an exact answer. Some people, depending on how sick they get or something intrinsic to themselves, will be protected from reinfection longer than others. But when the bulk of people who recover from a first infection become susceptible again, it can change the dynamics of outbreaks.

Protection from the coronaviruses that cause colds is thought to generally last [about a year](#); immunity after SARS or MERS for a few years. If Covid-19 is like its cousins, come early next year, a wave of the pandemic's earliest patients might see their immunity start to wane. If, as seems likely, an effective vaccine won't be widely available, this could give the pandemic new fuel. It's hypothesized, though, that people who get a second case will typically have milder illnesses and maybe won't be as infectious.

There have been a [few cases of reinfection](#), but so far, these seem like outliers — scientific curiosities that gain headlines but that won't shift the pandemic's course. Overall, researchers are finding that most people generate a robust immune response to SARS-2, one that seems to persist for at least several months. [Maria Van Kerkhove](#), the World Health Organization's technical lead for Covid-19, described this as "a very positive sign."



Jan. 20: Masks or MAGA hats

Whichever is the adornment of choice on the National Mall for the president's inauguration could be a reflection of who won the election — and the future pandemic response.

Traditionally, the inauguration speech, as well as the first presidential address to Congress, acknowledges the challenges of the past, with a more

assured view of what is to come. In this case, imagine a triumphant President Trump heralding that his administration steered the country through the worst of the pandemic, and was rewarded with a second term. A resolute President Biden would argue that now was the time to tend to the country's wounds exposed by the pandemic, and to turn the moment into an opportunity for ambitious change.

There is some potential overlap between what Trump or Biden would call for in their terms, like manufacturing more medicines and PPE domestically. Either president would have to oversee the rollout of vaccines and try to mount an economic recovery. But Trump's pandemic strategy probably wouldn't change, and he doesn't seem likely to use the crisis to lead a new era of scientific discovery.

Biden has a [detailed pandemic plan](#) that he hopes can start to pull the country out of the Covid-19 depths. But he would likely use the first speeches of his presidency to set loftier goals for shoring up the country's pandemic preparedness.

Experts and advocates have a lot of thoughts about what they would like the administration to do.

More investments in science so we are more nimble for other emerging diseases. Appoint leaders who can begin to [restore the credibility](#) of the FDA and CDC among scientists and the public. Refurbish the national stockpile.

Local health departments will have their own requests. The agencies never saw their budgets bounce back after the Great Recession and [lost 55,000 positions](#) from 2008 to 2017. They came into the pandemic already struggling to keep up with water-quality and restaurant inspections, childhood immunizations, addiction, and HIV testing.

"We have to stop this approach where we fund the emergency only," said

Lori Tremmel Freeman, CEO of the National Association of County and City Health Officials.



Feb. 7: Are you ready for some (fanless?) football?

It's the most-watched TV event every year, but the question will be how many fans will be watching at the game itself.

When sports vanished at the outset of the pandemic, "it shook a lot of

people,” said Patrick Rishe, director of the sports business program at Washington University in St. Louis. “There’s this identity and connection people feel toward their favorite athletes and teams.”

So when the NBA, NHL, and MLB came back, it was a boon to fans — as well as the leagues’ finances. The leagues showed, with varying levels of success, that sports were possible in a pandemic. But those leagues did not allow spectators at games.

Football has taken a different tack, with a handful of collegiate and professional teams welcoming thousands of (allegedly) masked fans into stadiums in the fall.

A packed crowd at the Super Bowl would be an indication that the country had given up on trying to control the coronavirus, experts said; there’s just no way the virus will be so contained by early February. But experts say that allowing even some fans is a bad idea.

“Being a big NFL fan myself — I have Seahawks season tickets — there’s no way I would feel safe attending a game or having my loved ones attend a game,” said Angela Rasmussen, a virologist at Columbia University.

Teams limited capacity, required masks, and pointed out that, for the most part, the fans would be in outdoor stadiums. But those steps reduce — but don’t eliminate — the chance of transmission. Fans jostle past each other at concession stands and in bathrooms. And afterward, thousands of people scatter back to their hometowns.



March: One year after major U.S. outbreaks, will long-haulers have recovered?

The more time passes, the more we'll know about all that SARS-2 can do — and how long those effects last.

“From an intellectual perspective, I’m fascinated” by the complexity of the coronavirus, said infectious disease expert Judith Feinberg of West Virginia University. “But from a public health perspective, I’m terrified.”

Covid-19 quickly revealed itself to be much more than a respiratory infection. Kidney failure, heart damage, clogged blood vessels, and attacks on the nervous system have all resulted from the virus and the body’s attempts to fight it.

It’s also caused a constellation of problems for “long-haulers” — those who recover from their acute illness but then experience a range of symptoms for, in some cases, months. Headaches, fatigue, muscle aches, and a “brain fog” that affects attention and memory are common. They have good days and debilitating days. It’s [been a struggle](#) to get doctors to take their concerns seriously.

“Chronic symptoms after viral infections are not unheard of,” said Timothy Henrich, a viral immunologist at the University of California, San Francisco. “Although it certainly seems that with Covid-19, symptoms can be really persistent, more so than they would be for influenza or other upper respiratory infections.”

After a presumed case of Covid-19 in April, with symptoms including chest tightness and headaches, Lynlee Swartz, 32, dealt for months with brain fog and a fatigue that left her so exhausted her family had to care for her German shepherd, Pepper.

Her symptoms have started to improve, but the Indianapolis resident still gets tired. She’s accepted that she may not fully recover. “Yes, you have the two week respiratory infection, you have those people who are asymptomatic, and yes, you have those very, very severe cases,” she said.

“But we need to normalize that there’s an entire spectrum of outcomes, including long Covid.”

At Northwestern Memorial Hospital, researchers have started [a clinic](#) for patients experiencing neurological complications after Covid-19. Some patients had severe Covid-19, but not all. Some “are younger people, previously active and healthy, who had minor respiratory presentations with some fever that went away,” and then developed symptoms like dizziness and memory issues, said Igor Koralnik, an expert on the neurological effects of viral infections who is leading the clinic.

Several factors could be at play. SARS-2 infects cells through a doorway called the [ACE2 receptor](#), which is found in organs and blood vessels throughout the body. The infection itself could damage these tissues.

A major driver, experts think, is that the body’s inflammatory response that revved up during the infection never quieted down. For some people, it can take time to restore that to normal.

“We don’t have a full picture of this yet, and we do not understand the long-term effects for people with mild disease or even asymptomatic infections,” Van Kerkhove said.



March 19: Match Day illuminates how the pandemic has remodeled medicine

In 2020, Match Day — when graduating medical students find out at which hospital they've "matched" for their residencies — coincided with states and cities shutting down as the pandemic took off. The following month, Kelly leong, a student at Stony Brook's medical school in New York, graduated early and joined the health care workforce facing a wave of patients. She spent two months on the Covid floors at Stony Brook's hospital before starting her residency, taking care of intubated patients and having difficult conversations with their families.

"Those two months were life-changing," leong said.

leong's early departure from medical school was just one sign of how the pandemic has upended the fields of medicine and public health.

For clinicians, "Covid for many has actually increased the sense of meaning, and for some, the sense of being valued by their patients, their colleagues, by the organization at which they work," said Christine Sinsky, the American

Medical Association's vice president of professional satisfaction. "But on the other side of that are all the stresses that come from Covid — the fear of acquiring Covid yourself, or bringing it home to your family and friends." More than 1,150 U.S. health workers [have died](#) from Covid-19.

Perhaps the pandemic will be a galvanizing springboard for the public health workforce. All the attention on scientists — Fauci was even played by Brad Pitt on "Saturday Night Live" — could also inspire some future virologists and epidemiologists.

At the same time, scientific expertise has been under attack by the public and politicians. Those days when we rallied around health workers are long past.

It's created what infectious disease physician Krutika Kuppalli called a "trauma to the global workforce." In places that have had waves of Covid-19 patients, Kuppalli said, "where frontline workers have seen horrible things, we're going to have mental health problems."

The pandemic arrived when there was [already a shortage](#) of infectious-disease physicians. Even top fellowship programs have had trouble for years filling their spots, as young physicians towing boatloads of debt were drawn into more lucrative specialties like cardiology. "It's really quite alarming that we are having trouble recruiting people," said Feinberg, a spokeswoman for the Infectious Diseases Society of America. "Covid shows you can't run the world without us."

Freeman, the leader of the local health officials' group, is not sure that the pandemic will motivate people to join health departments. It was already considered a thankless job. And with the virus, some leaders have even received death threats.

"Maybe if we were able to handle it better, it could have been that inspiring type of event," Freeman said. "And that's really sad, isn't it?"

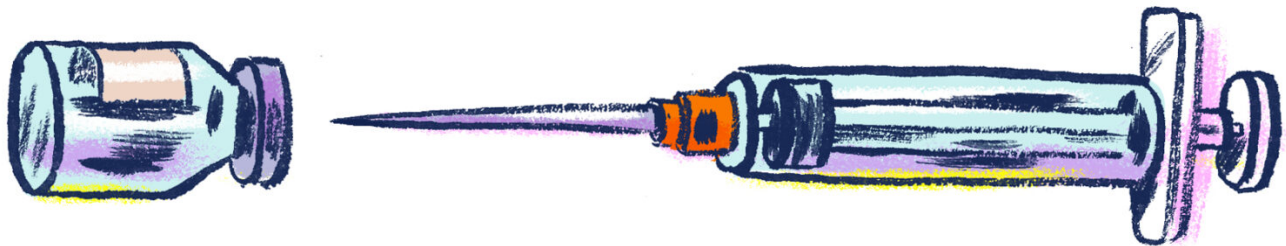
April 25: And the Oscar goes to ...

James Bond and Vin Diesel, who both know a thing or two about worldwide calamities, were clearly on to something.

The next installments of the 007 and “Fast & Furious” franchises were among the first movies in March to postpone their planned release dates, for months or even a year.

The pandemic has accelerated ongoing shifts in how people consume entertainment, putting a greater emphasis on at-home streaming services while providing a new threat to theaters, which were already increasingly dependent on blockbusters. So when the Oscars are given out — two months after the planned date — it likely won’t be the same awards show packed with celebrities.

Theaters were closed for months as a result of government rules. But even as they started to open again in most places at the end of the summer, studios weren’t rushing to release their films. For lots of people, sitting in an enclosed space with dozens of others for hours does not sound like the escapism we normally seek from cinema.



April: Vaccines, round 2

The vaccine reinforcements could arrive starting in the spring.

The first immunizations out of the gates into pivotal trials were from Moderna, AstraZeneca and the University of Oxford, and Pfizer and

BioNTech. But other candidates just months behind could play a crucial role in corralling the pandemic.

Of the shots that are authorized for use, some might work better in older people, who typically generate less robust immune responses to vaccines. The subzero temperatures at which some vaccines are stored might preclude their use in certain settings. The second group of immunizations might just be more effective than the pacesetters.

And there's the fact that the world just needs a whole bunch of doses.

"There are over 7 billion people in this world and not one single company can make 7 billion doses of vaccine," said Kawsar Talaat, a vaccine researcher at Johns Hopkins.

May: Celebrate good times, come on?

Canceled. Postponed. Virtual. That was what happened in 2020 to traditional rites of spring, like proms, graduations, and the beginning of wedding season.

For people planning events in 2021, it's like trying to stare into a crystal ball if someone swapped it out with a shaken snow globe. They can't tell if gatherings will be safe or if some people will have been vaccinated or if states will still have capacity limits.

Memorial Day has also traditionally kicked off summer movie season, which vanished in 2020 but normally accounts for about 40% of annual box office revenue. Movie theaters have tried to make do by showing classics like "Jaws" and "Jurassic Park," but the hope is that next summer will be full of the superheroes and sequels that normally attract theatergoers in droves.

"They're really just trying to get open and stay open," said Phil Contrino, the director of media and research at the National Association of Theatre Owners. "If no new movies are opening, they can't stay open."

June: We need Americans 'lining up to get the vaccine'

Finally, vaccines are widely available. Will Americans roll up their sleeves?

The way out of the pandemic is to achieve herd immunity through vaccination, a point that will be reached for SARS-2, experts estimate, [when some](#) 50% to 70% of the population is protected. Health officials have been planning for months how to connect with hard-to-reach groups and people who don't have regular access to care to ensure broad coverage. "We need to have people lining up to get the vaccine," said Columbia's El-Sadr.

Polls, however, indicate widespread, and growing, skepticism about how quickly a safe and effective vaccine can be made available. People of color, who have long histories of mistreatment by the medical field, are even more leery.

"The most effective vaccine in the world is useless if no one will accept it," Talaat said. "I think people will die because of a lack of faith in the system." She pointed to wavering CDC testing guidelines and the optics of political interference in FDA decisions as undermining the credibility of U.S. health agencies. Others say vaccine makers need to commit to being more transparent.

"You can't talk your way into trust," Talaat said. "You need to demonstrate that you're trustworthy, and that the process is trustworthy."



July: As office employees return, what will greet them downtown?

More than a year after companies en masse told office employees to work from home, more and more workers will come back.

There's been a lot of fretting over whether the pandemic is the death knell for some cities, and a lot of [that is exaggerated](#). Covid-19 may contribute to ongoing trends of people fleeing eye-poppingly expensive cities, but that's just a handful of metropolises.

Still, there will be effects. Skyscrapers could face high vacancy rates. Cities that are particularly reliant on tourism or that were already on shaky footing could have a harder time recovering and have to cut services. People still crave density, but as Amy Liu, the director of the Metropolitan Policy

Program at the Brookings Institution put it, the “geography of density” might change. Picture more commercial activity in the suburbs if people are working from home more often yet still want to hit happy hour.

The inverse of that is, “your downtowns are not going to look the same,” Liu said. “All those small businesses, the food establishments and shops that depend on daytime traffic, a lot of that demand could go away.” Black-, Latino-, and immigrant-owned businesses are at particular risk because their customers are more likely to have lost jobs and income.

When Bob Roberts, who runs McShane’s Irish Pub in the [Corktown neighborhood of Detroit](#), assesses the pandemic’s toll, he takes a mental walk up the street. “We have a bagel shop that went out of business, we have a personal training and fitness company that went out, we have a hair salon that went out,” he said.

With expanded outdoor dining and limited indoor capacity, most of the local restaurants have patched together a way to stay in business. But with winter coming and no sign that indoor capacity restrictions will be lifted, Roberts said, “it’s a really scary thought as to what might happen.”

The pandemic could also decimate a core feature of urban living: public transit. Agencies are projecting shortfalls in the billions of dollars, as ridership and sales tax crashed. They could have to cut routes and delay upgrades. All this will have a particular impact on low-income residents and people of color, who [make up the majority of transit passengers](#).

July 6: The U.S. withdraws from the WHO — maybe

Whether the U.S. goes through with its plan to leave the WHO depends on the election. A President Biden would reverse Trump’s decision to withdraw.

But if Trump wins reelection and pulls the U.S. out of the United Nations agency, effective July 6, 2021, it will have deep ramifications for the WHO’s

funding and programs, cooperation among scientists, and even [how prepared the U.S. will be](#) for flu seasons.

Beyond the U.S. decision, the WHO is in the middle of a review of its handling of the pandemic. The agency typically launches such assessments once a crisis ebbs, but the pressure on the agency — drummed up by the U.S. — has been so great that an independent panel [started meeting](#) in September, with a report due in 2021. Criticisms of the agency include that it was deferential to China in the early days of the pandemic, when more aggressive action could have stemmed outbreaks, but WHO observers say the crisis has underscored how policies set by member states keep it from taking a stronger hand in reprimanding countries.



July 23: The 2020, erm 2021, Olympics begin in Japan

Fans heading to the Olympics will need passports, luck if they want to snag tickets to see Simone Biles compete, and — perhaps? — proof of vaccination.

By summer, the hope is that millions upon millions of people will have received Covid-19 vaccines. But this embodiment of global kinship could come at a time when national interests are overriding distribution to all countries.

When vaccines make it to the market, the initial supply will be extremely limited relative to global demand. Wealthy countries have taken an us-first approach by trying to snap up millions of doses.

Advocates have argued that the world won't be safe and that global travel and economic patterns won't return until the virus is smothered everywhere. "Vaccine nationalism will prolong the pandemic, not shorten it," WHO Director-General Tedros Adhanom Ghebreyesus said in September.

Ultimately, the gulf in vaccine access could humble wealthy countries into helping others.

"Large parts of the world will not have been vaccinated by a year from now," Brown's Jha said at the STAT event in September. "And it will create substantial political and social tensions to see high-income countries starting to get back to normal when you see a lot of people in low and middle income countries continue to get infected and die from the disease."



August through December, and beyond: Living with SARS-2

Let's start with what won't happen to the coronavirus: It gets wiped off the earth. The only human disease ever eradicated was smallpox. SARS-2, it seems, has joined the ranks of endemic viruses.

But if vaccination coverage reaches all corners of the world, Covid-19 could become an uncommon disease, eventually a rare one. Pockets of people may remain vulnerable if they never build up immune memory to the virus — either through infections or vaccines — so serious cases may still occur. But for most people, even if they contract SARS-2, that immune memory should make each subsequent infection milder and milder — perhaps imperceptibly so.

So when will we reach that point?

So much depends on when vaccines are authorized and how quickly they can be deployed. But most experts say that even if a vaccine campaign gets rolling at the beginning of 2021, certain precautions like masks might be our future until at least 2022. "Normal" won't just arrive one day. We'll work our way toward it.

"We will have to, as societies around the world, learn to live with this infection," said Jeremy Farrar, the director of the Wellcome Trust. "Manage it. Reduce its impact through vaccination, treatment, and diagnostics as we do with other infections."

"This is with us for a very long time — with a vaccine or without a vaccine," he added.

That is not a message people will want to hear. But the important thing to remember, Fauci said, is that the crisis "will end." People need to remember that their choices matter to protecting themselves and others.

"When you realize it's not an infinite problem, you can feel better about just hanging in there a bit longer," Fauci said.

If the pandemic is not static, neither is SARS-2. So far, it doesn't seem mutations have dramatically changed the virus, but modifications in its RNA could alter how it infects, transmits, and sickens, and how effective vaccines are. "The evolutionary dynamics are still kind of inscrutable — we don't know what's going to go on there," said Sarah Cobey, an epidemiologist and evolutionary biologist at the University of Chicago.

SARS-2 was the third coronavirus to raise global alarms in less than 20 years. Despite that, "we were so poorly prepared for this it was ridiculous," said Stanley Perlman of the University of Iowa, one of [a handful of U.S. scientists](#) with a decades-long coronavirus focus.

Perlman suggested that researchers should set out to develop antiviral drugs that work against coronaviruses broadly. Fauci raised the possibility of a universal coronavirus vaccine. A SARS-CoV-3 or MERS-CoV-2 could appear at any point. "The thing about coronaviruses is that they really like crossing species," Perlman said.

The pandemic will have lasting impacts, on everything from people postponing having children to urban landscapes to [harms to global health](#). But "we will come through on the other side and we will go back to our lives," said Howard Markel, a historian of medicine at the University of Michigan. "There have been epidemics for millennia, and those who survive move on with their lives and they go on."

Perhaps by the holidays in December 2021, life will feel safe enough that memories of the anxiety and fear of spring 2020 start to blur. After all, Markel said, the typical final act of health emergencies is "global amnesia," when people forget the lessons of what they just lived through.

But surely the Covid-19 pandemic has been so monumental that things will change, right?

"I sure hope so," Markel said. "If this one doesn't do it, I don't know what

will. But my study of the past suggests to me that we may not, and we would do so at our own peril."

It's not just pandemic preparedness, of course. Covid-19 has been like a blacklight on U.S. society, revealing in glaring detail the faults that are built into its foundations. The real test will be whether that clear view drives change, or whether the country flips the light off once again.

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