

Draft Scenario 1: America Endures – January 1, 2022

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We have learned that Covid is not going away soon. We are learning how to manage it as we have with other long-range problems like AIDS. It has sped the implementation of tele-everything and applications of artificial intelligence. The global “time-out” has given many the opportunity to re-think everything from the meaning of work to the purpose of education and priorities in life. What will evolve is too soon to say. But the international discussions for the Global New Deal may actually improve the prospects for humanity.

Meanwhile, the recession in the US looks like it may lead to depressions in many parts of the world. The political will to continue the financial support for business, unemployment, and state budgets has been irregular. As a result, public health and medical resources lurched back and forth as Covid continued to surge and re-emerge as the Northern Hemisphere entered the flu season for the second time during the pandemic this 2021/2022 season. Fires in the West, hurricanes in the East, and food shortages across America have stretched disaster personnel and resources beyond public appreciation. As a result, there are continuing gaps among emergency service delivery, donors, and the needs of first responders and other volunteers. This had led to increased social stress, slower recovery from disasters, and a breakdown in trust between citizens and their first and second line responders.

The persistence of the pandemic and periodic lockdowns have depressed much of the nation both psychologically and financially. Many desperate people have resorted to protests and riots across the country until the national recovery act was beginning to improve Covid coordination, economic recovery, and American morale. This made it possible to see the light at the end of the tunnel. America has endured through the dismal drumbeat of economic numbers and more than 400,000 deaths. The nation is now expected to emerge better prepared, with countless innovations to address future pandemics. Many heartwarming stories of local self-organizing groups helping their neighbors continue to fill the news.

Rough Choppy Waters more than Distinct Waves

It was unfortunate that governors and other leaders opened their economies too early during May and June of 2020. Restaurants, sporting events, and other public gathering managers did enforce physical distancing at first, but then overconfidence took hold. As a result, the virus continued to spread during the summer of 2020. The summer was supposed to be the low point of new cases, but incidence turned out to be higher than recorded for the spring. As a result, some mask-resisters and vaccine-deniers began to re-think their positions and have come around to become more responsible citizens. Nevertheless, the disinformation “infodemic” continues from US and overseas sources to amplify domestic ignorance.

It was very difficult to manage the pandemic since 40% of infected people had no obvious symptoms. Such healthy, asymptomatic people were unknowingly infecting others. Many schools, universities, and businesses that opened in the fall of 2020 without meeting the health benchmarks¹ had to close down and retreat to online learning and operations due to new surges of infections often from asymptomatic virus carriers.

The new administration and Congress initiated a series of national recovery acts with continued financial support that has reduced unemployment, increased business recovery, provided massive online training, and established the National Service Corps. It also re-established the pandemic unit at the National Security Council and established the Pandemic National Command in the Department of Homeland Security. These were supported by an improved early warning system at the CDC, plus the national pandemic online platform that included the national Covid registry, and dedicated infrastructure for clinical trials with trained professionals on call for speedy implementation. Additionally, the AI platform developed by the DoD Rapid Reaction Technology Office enables rapid agent-based modeling of unique situations like Covid (as well as biological warfare) for fast prevention and response actions. The national platform is helping to coordinate national, state, and local resources for testing, contact tracing, isolation, treatment, and equipment. It also includes a system for deployment of volunteer personnel. Hence, this time the impact of the new surges of outbreaks of the disease should be under better control than observed during the past two years. As a result, America faces the New Year with more confidence.

Vaccinations

Pinning all our hopes on a vaccine that would stop the pandemic was unwise. The many approaches to developing a vaccine were helpful to create a portfolio of vaccines (different ones for different demographics), but, on average, they were only 55% effective and required a second injection. Since only 55% of the public has been vaccinated so far, we have not reached herd immunity, which requires approximately 70% of the public to be immune. As several vaccine candidates approached approval there was considerable confusion and misinformation about which vaccine was best for different demographic groups. Decisions about passing on one vaccine to wait for another brought tension to many because of the uncertainty of if—and when—the new vaccine would be approved, how long immunity would last, and its distribution strategy.

Since one third of Americans said they would not take the vaccine, DHHS and others paid PR firms that created memes like “Get vaccinated to Make America Great Again” and “Vaccination saves the Nation” that had some impact over the summer and fall of 2021, and reduced the anti-vaccination mindset down to about 20%. Others created online platforms to identify and counter misleading and malicious information such as meme of a little girl who developed a neurological disorder. As it became clear that sometimes there were lasting effects of the virus on the lungs, heart, and other organs—even for mild cases—more anti-vaccine views began to change. Most school districts and employers required a vaccination. Public contact firms like airlines,

supermarkets and fast food chains saw this as a competitive advantage. The Supreme Court will be ruling on whether states that required vaccinations can ban people from states that do not require vaccinations from entering their states. Stock prices of driverless trucking companies have skyrocketed.

Operation Warp Speed's gamble—that funded the manufacture of vaccines in large quantities and filled vials for shipping without even knowing whether their vaccines were effective or would be approved—paid off. As vaccines by Johnson & Johnson, AstraZeneca, Merck, Moderna, Pfizer, and Novavax were approved, distribution was achieved with unprecedented speed. However, the need to scale manufacturing caused supply delays in critical components for the vaccines, delaying deployment. To address the shortage of vials, the global nonprofit Coalition for Epidemic Preparedness Innovations (CEPI) bought 100 million vials from the Italian manufacturer Stevanto. Each vial can hold 20 doses, enough for 2 billion injections. The international target of 5.6 billion people vaccinated twice to manage the pandemic required the production and use of 11 billion individual doses. The EC purchased enough doses for its 446 million citizens and to donate some to lower and middle income countries. Gavi² with WHO is also contributing to the 92 low- and middle-income countries. The US government purchased and distributed over 600 million doses.³ Some US insurance companies gave discounts on premium payments for those that got vaccinated.

However, prior to all this progress, the US public was in serious limbo; premature hype about how fast a vaccine would end the pandemic, led some to despair and others to become increasingly angry as periodic lockdowns occurred as a result of Covid flare-ups. Some people much further down the vaccine priorities list became impatient, having been told that it might be nearly a year before they would be getting the vaccination. As a result, they became desperate and were easily seduced by the online lure of counterfeit vaccines. They thought they were immune, but many ended up showing Covid symptoms. This reinforced anti-vaccine hysteria. Nevertheless, most accepted the priority list for getting the vaccines as: 1) hospital staff and related employees; 2) the elderly; 3) frontline essential employees such as food delivery supply chain workers (from farm to consumer), utilities employees (water, gas, electricity), garbage, police, fire fighters, and postal workers; 4) public schoolteachers; 5) others at risk; and 6) commercial delivery personnel.

Although the mass vaccine campaigns in the US and around the world began in earnest in the spring of 2021, it was not until a new self-administered vaccine was approved in July, 2021, that we could see the light at the end of the pandemic tunnel. The self-vaccination by a Band-Aid-like patch with 100-400 tiny dissolving needles made everything easier and faster. Decentralized international production has made issues of distribution less contentious. This is increasing the global vaccinated population. Hence, the planet is on course to achieve the international vaccination target of 5.6 billion vaccinated twice assuming the second return of the virus from Latin America, Africa, and South Asia does not mutate enough in 2022 to make the vaccines less effective.

Treatments

Hospitals struggled with combinations of convalescent serum of antibodies, remdesivir, and related drugs to shorten patients' hospital stays. Laboratory-created monoclonal antibodies proved very effective against Ebola and are now proving very effective for early treatment and prevention of Covid, but are expensive to produce. The heroic efforts of the American Red Cross volunteers who convinced people who had tested positive for antibodies to give blood, helped to hold the line against further devastation. The FDA-pre-approval of a blood test for compassionate use did help find people with potential immunity; however, reliability was in question and not all treatments succeeded. The massive production of monoclonal antibodies, remdesivir, dexamethasone, and other steroid drugs, and convalescent plasma not only reduced the death rates, they also reduced the ethical, racial, and international tensions that developed when these treatments were in short supply.

However, these treatments are less effective for patients who were infected by some viruses returning from Latin America, Africa, and Southern Asia during fall of 2021. These viruses had mutated enough that modified treatments are being explored. Fortunately, the overall situation was such that enough people returned to work sooner preventing what could have been a continuing recession leading into a depression.

Improvements in heating, ventilation and air conditioning (HVAC) systems with ionization systems helped to reassure the public that returning to work was reasonably safe in those buildings that had upgraded their filtration systems. The installation of such high-efficiency filters in many schools across the nation, also encouraged parents to let their children return to classrooms. This national HVAC upgrade is expected to help improve American health in general.

SARS-CoV-2 Virus Testing

The virus testing requirement became enormous! Some universities with in-person classes now require students to be tested twice a week. With 36 weeks per academic year, a university with 10,000 students would require 720,000 tests per year. This was clearly impossible using the nasal swabs with results available in 3-5 days and with shortage of testing kits becoming critical; and even with National Guard in some states helping to pack test kits, it was not enough. Pooling tests has increased the number of people tested and lowered cost (e.g., all students in an elementary school class put their saliva in one test; if positive, all students are sent home for quarantine; if negative, all stay in school), but this was still not enough.

The airlines got many passengers back by using the BinaxNOW test because it took 15 minutes and required no equipment to read the results. But what really saved the day, were the quick saliva tests with a thin strip of paper.⁴ They gave accurate results and became publicly available for a \$1/test paper strip in June 2021. These tests are now used by millions at home and have enabled restaurants to expand services and many returned to pre-Covid seating with improved HVAC ionization filtering. The effects of false negatives and positives were controlled with repeated testing. This was good

enough to show the spread or retreat of the disease and where contact tracking was needed. Since 40% of all those infected show no symptoms, but are contagious, it is wise to test as much of the general public as possible. Multiple mobile telephone apps associated with self-testing, gave financial incentives for sending the results to health officials and contact tracking systems.

Testing and proof of results has become a new way of life for many in America. People brushed their teeth in the morning and spit on the test slip and repeated the same in the evening. It just became a daily routine. From airlines to visiting the Smithsonian Institution, or Disneyland, testing and results are just as important as an entry ticket. Some protested and still do today, but most schools, theaters, museums, and baseball parks still require test results. This is beginning to turn around our long nightmare.

With so many virus carriers without obvious symptoms, and with the paper tests not always available, personal mobile phone apps were developed for retina imaging and smell tests to detect any changes that could mean one had become infected.⁵

Since many employers required periodic test results as a condition for returning to the workplace, those desperate for income and needed to return, resorted to counterfeit test results to get back to work. Both viral and antibody counterfeit results are available from online sources. It is estimated that 17% of test results presented to employers are counterfeit.

Post-Disease Antibody Testing

The presence of antibodies does not guarantee immunity. Of course, it is far better than not having antibodies, but some people with antibodies have contracted Covid again. Some of those who recovered from Covid, continued with a low-level infection that re-emerges later. The antibody testing became less necessary as the numbers of vaccinations increased.

FDA-approved blood tests were used to find as many people with potential immunity as possible. Use of plasma from such recovered persons did speed up the initial efforts, but reliability was in question. Antigen tests conducted at point of care did produce results in 15 minutes, but production of devices to read the results did not keep up with demand. The e25 is the fastest at home test, but it only caught 50% of positives and 90% of negatives. This did engender a sense of false security that caused people to be lax in personal protection such as handwashing, masking, and physical/social distancing.

Although some used self-administered tests purchased online as early as January 2021, the FDA-approved self-tests were not available until April 2021. The government still covers the cost of the tests for critical employees, and insurance covers the insured, but that leaves 20 million in the US who are uninsured or working for companies that do not cover the costs. This did tend to create some social division between those with

confirmed anti-bodies and those without, leading to a black market for test results. And the series of liability issues are still being litigated.

Contact Tracing

During the early spread of the pandemic, funding and capacity for real on-the-ground contact tracing was embarrassingly absent compared to East-Asia. The use of tracer apps, AI models, and community use of the apps was far more advanced compared to the United States, with some who resisted the invasion of their privacy.

Since this disease spread too fast for traditional contact tracing, mobile phone apps developed by Apple and Google were used after being successfully introduced in Japan and successfully convincing the public that temporary codes rather than names would be used and that the data was fully deleted after use. This increased contact tracking from less than 35% to over 50% of potentially infected people. Unfortunately, the percent of those who actually quarantined was probably closer to 10-15%, because contacts demanded testing before voluntarily quarantining and most of the tests were negative. The self-testing app automatically transmitted the test results to health officials and gave financial incentives and calls to patriotism for their use. It also monitored location to help manage quarantines as needed. Today the cumulative rate has increased since the number of new cases is lower and social acceptance of tracing has increased.

Although the contact tracing apps have made a major difference, about 99,000 contact tracking personnel were still needed for the United States. But only about 41,000 were reported available in 2020 (this number was likely under reported since nine states did not report, and some states did not count county and local staff). The difference was made up by thousands of local, state and national voluntary groups, State National Guards, returned Peace Corps Volunteers, local health center staff, and some U.S. Army health personnel. American Red Cross volunteers were so desperately needed for blood drives, they could not be spared for contact tracing. About 10% of the time, when contact tracers visited those who were sick or in quarantine, they were asked to help out on other matters, like picking up food ordered online so that quarantine rules would not be broken, or helping people apply to Medicare and Medicaid.

The good advice from the National Academies of Science⁶ to improve contact tracing was widely circulated and is believed to have increased the public's cooperation. It advised public health officials to provide advanced notice, partner with trusted sponsors, offer relevant incentives, enhance interviewers' skills, develop messaging that appealed to the public's motivations, and accept partial information from interviewees.

Now that vaccines are available, the pressure for testing, contact tracing, and guaranteeing is less intense.

Hospital Malaise

After the official unemployment peaked at round 23 million (total jobless may have reached 45 million at one point), and GDP fell by a third in the second quarter of 2020, financial support for hospital resources were drained as the 2020-2021 flu season approached. During this first year there was not enough PPEs, beds, and good treatment options. Hospital staff were emotionally depressed and near despair surrounded by patients on ventilators, daily deaths, and temporary morgues. On top of all their other concerns, some hospital staff recognized they are contributing to a massive new form of ocean pollution with plastic gloves, face shields, masks, and gowns. There were probably more near breaking points than we will ever know. Hundreds if not thousands of hospitals were near collapse. Hospitals responded by pausing nonessential surgery, and paying for psychological counselling, childcare, temporary shelter, and sick leave for employees who tested positive (whether they contracted Covid on the job or elsewhere). Hospitals had the burden of managing two hospital systems: Covid and non-Covid. Ethics triage committees were used so individual clinicians didn't have the daily emotional burden of decisionmaking. DOD medical personal and support staff were deployed to overstretched hospitals.

The two flu seasons compounded the hospitals' problems, but not as badly as originally expected by the CDC, since the methods of Covid prevention likely also worked to reduce the number of flu infections. Nevertheless, hospital staff were stressed again during this second flu season of 2021 caring for the new surges of Covid cases. But this time legions of volunteer on-call psychologists made it possible for hospital staff to "keep on keeping on" and hospital staff were augmented by more medical students, retirees and other volunteers from among the unemployed. Increased use of robots and AI reduced contact with infected patients and the environment. Many of the 7,000 Peace Corps Volunteers evacuate from overseas back to the United States at the beginning of the pandemic have also been volunteering in many areas from hospital aides to contact tracing and blood drive support. The success of Florida's use of U.S. Army Reserve units assisting some local hospitals has led other states to do the same.

Treatments such as monoclonal antibodies, remdesivir, convalescent plasma, dexamethasone and other steroid drugs have lessened the hospital load. Hospitals improved their ICU management including how to integrate new doctors and nurses, made plans for emotional support in addition to the tele-psychologists. Hence, fewer hospitals were near collapse this time. Supplies of face shields, hand wipes, and non-surgical gowns poured into hospitals across the nation. Over 70,000 members of the Open Source Covid19 Medical Supplies Facebook group shared software for 3D printing of face shields, masks that can be sanitized between usage, ventilator designs, and other medical supplies. All this reduced production costs and delivery time since production was localized for many hospitals. These do-it-yourself volunteers also provide protective equipment usually at no cost for the general public as well. New software applications cut hospital paperwork time, improved accuracy and sped testing feedback, patient registration, and screening of transferred health care workers. Hospitals continued to require commercially produced, disposable PPEs but reduced demand and hoarding, combined with ramped up factory output, kept supply adequate and prices manageable.

The nation mourns the death of over 1000 hospital workers who died of Covid and countless events around the nation have given thanks and saluted the surviving staff as national heroes.

Lower Income Countries

The World Bank Group, regional banks, and the IMF have renegotiated loans for lower- and middle-income countries to free-up their ability to fight the pandemic. This was a combination of some loan forgiveness and suspension of debt service payments. And although the G-20 agreed to suspend some debt in lower income countries and provide over \$14 billion to help fight the pandemic, the virus still returned from Latin America, Africa, and South Asia to the US during the fall of 2020 and winter of 2021. This first Covid wave in the Southern Hemisphere surpassed most of the impacts of many regions in the Northern Hemisphere. Social distancing for those in the informal economy is very difficult and handwashing is not possible in the poorest areas where the majority of households do not have running water. Much of the developing world does not have face masks, sufficient healthcare capacity, and lives in densely populated areas. All this made large-scale outbreaks inevitable.

However, the second wave in these poorer regions in 2021 turned out to be even worse and was compounded by increased famine. Transmission to rural areas took more time than the initial spread through urban areas. The devastation of medical, health, and financial resources during the first wave left these regions exposed to the virus with inadequate defense. In addition to the depletion of their domestic financial resources, foreign aid was also depleted during the first wave. As the second wave approached hospital staff had been reduced by at least a third due to Covid deaths, exhaustion, resignations, emotional problems, and migration. As a result, the growth and mutation of SARS-CoV-2 in Latin America, Africa, and Southern Asia during the summers of 2020 and 2021, returned to America worse than previously expected. These two waves have led to new mutations in the virus and the need for new research to counter these changes in the New Year of 2022.

As DHHS in coordination with other government departments linked changes in the genetic sequence of the virus with patients' demographics and associated disease severity, treatments, complications, it was possible for NIH to determine which mutations should receive greater attention.

Lockdowns 2.0, Public Morale, Social Despair, and Resilience

The periodic Covid surges and re-lockdowns further depressed the economy and the public morale, and increased desperation for many with no money left to pay the bills, to move freely or to see their loved ones. This fueled massive but relatively quiet discontent and general malaise. With Congress lurching from one economic package to the next, uncertainly became the order of the day. The Covid infodemic and foreign infowarfare fanned the flames of anxiety for many. Mental health issues, spousal and child abuse, alcoholism, and other negative consequences in the home rose with each passing month. Massive numbers of tele-psychologists volunteers have helped to

reduce what might have been much worse. Public schools and universities that opened for in-person classes had to go back to online-only classes as new cases began to spread. Online educational services flourished but public morale was tired of juggling work and childcare.

As unemployment ground on month after month, the number of homeless increased from 500,000 before the pandemic to nearly a million today. Social protests and unrest flared up where vaccines and hospital therapy needs were not met. Burglaries have increased as people become desperate with no money in their pockets and little children to feed. Social movements among the homeless were both violent and peaceful triggering a new self-reliance movement. Small resilient communities have sprung up across the country to counter the growing paralysis, suicide, and loss of social cohesion. Although the socio-economic picture was grim, it triggered a broad range of new movements for a more positive future, through new financial investments, national service, and community high-tech hubs.

We are learning to synchronize intermittent lockdowns as was done in Europe during their first year of the pandemic. This required half as many lockdown periods while dramatically cutting community transmission in much of Europe. Since the US did not have such national coordination during the first year, lockdowns were sporadic. Since the political gridlock delayed another round of economic stimulus in the fall of 2020, the economy did not recover as some politicians promised and unemployment increased again. It wasn't until the spring of 2021 that the programs of the new administration began to cheer up America and blunted the economic decline. Even the Consumer Confidence Index increased from 82.5 in December 2020 to 87 by June 2021 and now is 91. The country was coming out of the malaise.

Economic Impacts

It was believed by too many that once the vaccines arrived, the economy would quickly recover, but the cascading problems in supply chains, sporadic lockdowns, and the realization that the vaccines were only 55% effective have made the recovery irregular. Some people are doing very well, while half of American's households⁷ are not. Consumer spending dropped 70% for the past two years for those making less than \$100,000 per year.

The economic problems that existed before the pandemic have not gone away and have grown worse as we enter the New Year of 2022: the concentration of wealth is increasing, income gaps are widening, employment-less economic growth continues, and artificial intelligence and other advanced technologies are creating more unemployment than international trade agreements. The great stock market correction added further fears among the more affluent.

Nevertheless, tele-everything and AI applications are accelerating around the world. Fortunately, central bankers in higher income countries usually stepped in to provide financial support for government budgets as needed to address both the economic and health impacts of Covid. Development Financial Institutions (DFIs) have also increased

their lending significantly to offset the consequences of Covid in lower-income countries. Governments that have the borrowing means also provided economic relief to citizens, many without being able to work from their homes would have otherwise starved. NGOs in middle- and higher-income countries connected farm surplus produce (due to low sales to restaurants, hotels, and schools) to food relief systems to feed those in more desperate situations. The US government also purchased produce and other foods for distribution by NGOs that eased both the fears of citizens and protect farmers and ranchers from financial ruin. But lower-income countries already dependent on the UN's World Food Program before the pandemic, are having increases in malnutrition and starvation even with the help of DFIs.

Federal, state, and municipal tax revenues fell dramatically across the US. Although the federal government can have deficient spending, states and cities cannot. Since they are constitutionally mandated to balance their budgets, massive cuts were made while trying to address the full range of pandemic impacts. Even state hospital staff and public health programs were cut. On top of all the other economic problems, there was a building anxiety about the sub-prime business loans that could cause another financial meltdown like the sub-prime housing loans in 2008. Questionable business start-up plans were accepted by banks and loans were made before the pandemic, many of which have become financial disasters. These so-called "zombie companies" were at least temporarily propped up by government financial intervention, especially from the Federal Reserve, and credit company innovations, flexibility, and patience. Congress agreed to preserve the stability of much of the financial system, but not the shareholders and senior employees. This proves the old adage that "a rolling loan gathers no loss" at least in the short run. But the long-term threat to financial stability of such sub-prime lending is still there and nobody is quite certain how this ticking time bomb will be defused safely.

Meanwhile, the Federal deficit has increased by \$10 trillion over the past two years. Although the GDP decreased about a third in the second quarter of 2020, it fell only -6% for the whole year. GDP recovered a bit in 2021 growing at 1.63% and many believe it could pass 4% in 2022. Hence, the US avoids a depression, even though much of the world does not. Over 700 million more people fell back into extreme poverty worldwide. Annualized inflation in October 2020 was just under 1%, grew to 1.3% in April 2021, and 2.1% in December 2021. Although inflation is low now, many quietly talk of the potential of massive inflation (which will erode the real value of federal debt) and stagflation as the \$10 trillion of deficit spending over the past two years will have its future impacts.

However, as we enter 2022, the data are beginning to show that the worst is behind us. Unemployment improved from 14% in October 2020, to 10% in April 2021 and 9% in December 2021. However, these gains were difficult to sustain as many small businesses closed permanently, many large corporations converted temporary furloughs into permanent job cuts and state and local governments were unable to reverse much of their legally mandated spending cuts. Many people have taken pay cuts to keep their jobs and some have resorted to job sharing and shorter hours.

The national recovery acts are reducing unemployment with investments into the aging infrastructure and massive online training to prevent short-term unemployment from becoming long-term. The new National Service Corps is beginning to take effect adding labor to infrastructure improvements, renewable energy, local delivery systems, AI applications, online business support systems, work-at-home entrepreneurialism, tele-education, tele-training, tele-medicine, and tele-everything. Conversations about universal basic income continue, as people consider future pandemics, financial crises, and technological unemployment.

Most of Google's 200,000 or so employees continue to work from home and Twitter has told staff they can stay home permanently. As the economy restructured for increased work-at-home (estimated to be 20%) and AI/robotics continued to replace repetitive human labor, fewer employees were needed per unit of production and services. Futurists had warned about this for years, but the pandemic sped decisionmaking in this direction. Tele-everything was becoming the aspirational norm as more people accepted on-line purchasing, online entertainment, and on-line education. New businesses accepted the online model. Creative solutions for unused office space included local community business start-ups, art studios, 3-D printing, computer support, and low income housing. America's innovative spirit continues.

International Collaboration

When the officially reported global number of people infected exceeded 250 million with 1.75 million dead,⁸ the G7 finally got more serious, realizing that the actual numbers were much worse. The US began to lead in creating the global strategy to address the global pandemic in cooperation with the G-7, G-20, and WHO. This helped to avoid bidding wars, hoarding, and aggravating long held resentments. The WHO global collective intelligence system provided detailed global/local situational analysis and action-feedback that served government, business, and the general public to be more effective in reducing Covid. It now keeps track of numerous Covid pandemic variables from most countries, and scientific research on the virus, human immunologic response, genetics, and mutations. It also is doing the same for medical products, manufacturing quality standards, and delivery. It has helped to refine the number of models to understand risks and hence inform readiness. In addition to quickly alerting national leaders on emerging policy issues, most important of all, it is making it clear to the general public what is working and what is not.⁹

One analysis showed that spending \$260 billion over ten years could substantially reduce the chances of another pandemic like Covid-19. If the global economic damage is about \$11.5 trillion, then the study claims that just 2% of that could prevent it happening again.¹⁰ It remains to be seen if the world community will act on this insight.

New Year's Day 2022

It has been an interesting couple of years since the pandemic began. The first time in history, the whole world has had a simultaneous "time out" which stopped business as usual, slowed the pace of life, and gave time for many to re-think... everything. A sense

of local community has returned and global solidarity may have increased. Granted, there are still those who are more convinced that building walls is wiser than building bridges of solidarity and stewardship, but they seem to have receded. International collaboration to address the next pandemic is understood today, as is the need for personal responsibility for wearing masks, safe distancing, handwashing, and using tracing apps. Even those with poor diets and little exercise have realized they are at extreme risk, if the pandemic persists. As a result, junk food sales have begun to fall, exercise clubs have grown, and both plant-based and cell-based meat are becoming more popular. Like the 1918 Spanish flu virus eventually faded into the seasonal H1N1 flu, so too the SARS-CoV-2 virus that causes Covid will fade into a less-fatal disease as we develop resistance, vaccines improve, and immunity spreads. Attention now turns to improving the American health insurance system moving the nation closer to universal coverage and military and public health planners draw lessons for addressing future biological warfare possibilities. America has endured. And the R_t value¹¹ is under 1 nearly everywhere.

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Some implications and takeaways:

- Don't pin all our hopes on a vaccine to get back to normal; we may not reach herd immunity for years.
- There will not be enough money for hospitals.
- ARC (American Red Cross) and other actors should collaborate with CDC, NIH, DHS, DHHS to re-create the pandemic unit at the National Security Council and create a national pandemic register with a collective intelligence system of what is working and what is not.
- ARC volunteers should make a major effort to get those who have tested positive for the antibodies to give blood to produce convalescent plasma.
- ARC should expand its activities with partners on food distribution.
- ARC should study how long the public will tolerate lockdowns and related restrictions and at what level.
- How to control counterfeit tests, vaccines, and treatments?

Some factors that might move the United States from scenario 1 to 2:

- we keep opening too fast
- immunity is not reliable – it fades, and the virus mutates
- massive increase in Africa, Latin America, and South Asia
- social trust breaks down

And factors that can move the United States from scenario 1 to 3 if

- we have reliable, fast, at-home tests
- good contact tracking and quarantine
- immunity is reliable – insignificant virus mutation
- FDA-approved treatment that is more effective and is mass produced this fall
- FDA-approved vaccine with efficacy over 65% is taken by 80% of the public

Shortages.... not ready between now and January 2022.

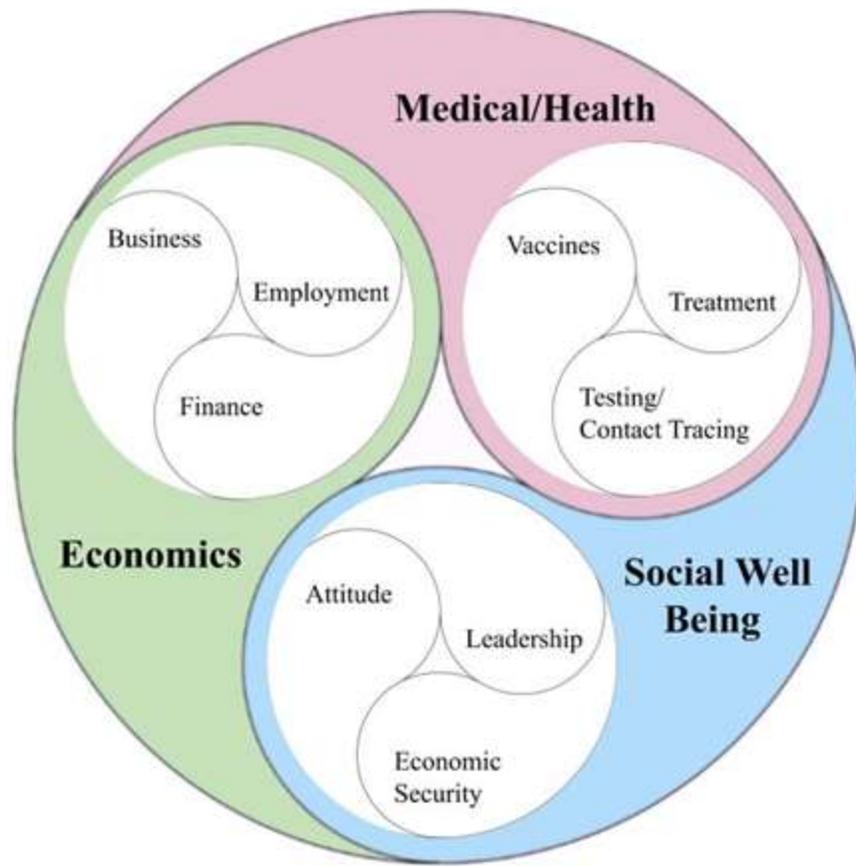
- Contact Tracing Personnel
- Food Supply
- Treatment/drugs Supply and IUC supplies in general
- PPE supply
- Medical glass when vaccine available and freezing units for delivery
- Financial resources
- China controls much of these with trade war in the background

Some thoughts for graphics, images:

Three Parts to the Pandemic Situation:

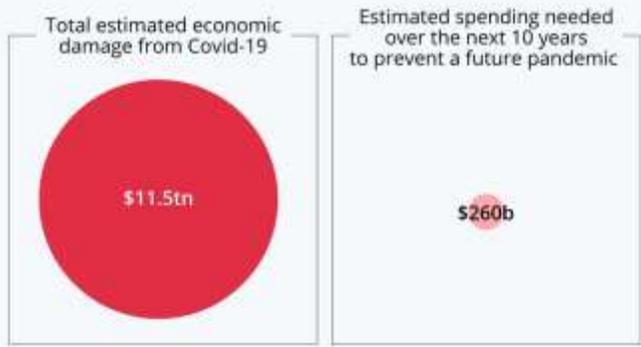
- ✓ Medical/Health: Vaccines, Treatments, Testing/contact tracing
- ✓ Economics: Employment, Business, Finance
- ✓ Social Well Being: Leadership, Economic Security, Attitude

Put each into a section of a 3 Ying Yang graphic



Cost of Preventing The Next Pandemic Just 2% Of Covid-19 Bill

Estimated cost of containing future pandemic compared to Covid-19's economic damage



Source: Dobson et al, Science 2020





1918 Spanish Flu

End Notes:

¹ New cases per 100,000 in the county should be below 100 for two consecutive weeks, schools should only open in a limited capacity when positivity rate in the county falls below 7%, and schools should only open if COVID-19-related hospital visits in the county fall under 10%.

² Gavi <https://www.gavi.org/news/media-room/100-million-covid-19-vaccine-doses-available-low-and-middle-income-countries-2021>

³ Azar: US funded COVID vaccines will be free or affordable
<https://www.thedenverchannel.com/news/national/coronavirus/azar-us-funded-covid-vaccines-will-be-free-or-affordable>

⁴ R. Meyer and A.C. Madrigal, The Plan That Could Give Us Our Lives Back, The Atlantic August 12, 2020
<https://www.theatlantic.com/health/archive/2020/08/how-to-test-every-american-for-covid-19-every-day/615217/>

⁵ A. Robison, National Academy of Engineering Answering the Call: Engineers Continue to Pitch New Ideas to Help Address COVID-19, NAE August 14, 2020

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¹¹ R or reproduction value is the average number of people an average person would infect. If it is over 1, the disease is spreading; if it is under 2, the disease spread is contracting.