

# COVID-19 and forces shaping global public health: challenges for academic public health before the next pandemic

KP Chen Memorial Lecture, November 12, 2021

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This presentation is a review and discussion of some of the crucial lessons we are learning from the COVID-19 pandemic and its impact on global public health. How will we in the public health academic community contribute to addressing these challenges through our research, our teaching, and our engagement with policymakers and the public? Is it business as usual or do we “step up our game?” If the latter, what are our goals, and how should we reshape, re-frame and re-energize our three missions (research, education, community engagement) to achieve them? Importantly, what can we in academic public health do to connect ourselves better globally for coming public health challenges? (*Taiwan J Public Health*. 2022;**41**(3):235-248)

## INTRODUCTION

Dean Cheng, members of the faculty, staff, and students of the National Taiwan University College of Public Health, and ladies and gentlemen:

It is a great privilege to be invited to deliver the KP Chen lecture for 2021. I find myself in the company of some of the best in academic public health today such as Dean Michelle Williams who delivered the inaugural lecture in this series in 2017. I hope to live up to her example and that of others before me.

Professor Kong-Pei Chen, who was Director of the Institute of Public Health from 1955 to 1972, predecessor to the College, was of a generation that

played a critical role in building modern academic public health following the close of World War II. We are greatly honored at the University of Minnesota to number Professor Chen among our most illustrious alumni. He studied at our school, receiving his MPH degree in public health administration in 1952. His passion, commitment and education led him to begin building what has become one of the most accomplished academic public health institutions anywhere.

As we weigh into the topic I've chosen, I review some of what we all have experienced in the past 24 months; what we have learned about public health's successes and failures, and what global leaders think about the challenges that lie ahead before the next pandemic. Most importantly: *what should academic public health contribute on a globally that could be most constructive and effective in advance of the next pandemic?*

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## THE PUBLIC HEALTH EXPERIENCE SINCE 2019

The SARS-CoV-2 virus traveled the planet infecting nearly every nation between late December 2019 and September 2020. An astonishingly rapid spread in a mere nine months, it infected at least 35 million people, causing 1 million deaths. Twelve months later (October 1, 2021) global cases passed 234 million with more than 4.8 million deaths. Epidemiologists agree that these numbers are underestimates [1].

Public health experts had warned about such a contagious pandemic for decades [2,3]. Would the next “Big One” echo the *Great Influenza Pandemic of 1918*, or would it come from the equally concerning family of coronaviruses? Several scares came and went. In 1997, H5N1, an influenza virus, first appeared in humans. Then SARS in 2003. Another influenza virus in 2009 – a variation of H1N1, related to the 1918 virus. Then MERS in 2012, yet another coronavirus. Between 2014 and 2016, the Ebola outbreak in West Africa, with the highest mortality rate yet seen in this class of hemorrhagic fever viruses. And SARS-CoV-2, beginning 2019. Every one of them began in an animal reservoir.

Experts also warned that despite late 20<sup>th</sup> and early 21<sup>st</sup> century advances in science, health and technology, the planet was woefully unprepared for a pandemic of the scale of 1918. Why? Principally because of the lack of an interconnected global public health system, chronic underinvestment by most countries in national systems, and a lack of deployable capacity when systems are about to be overrun [4,5]. There are other challenges, too: politics, public health policy, trust in science and government, social media misinformation, and disinformation [6]. In many ways, the COVID-19 pandemic is a watershed for public

health worldwide. Public health experts, scientists, frontline practitioners, policymakers, and average citizens are asking what we need to do avoid the next “Big One” [7]. Meanwhile, forces are at work in many countries to hobble public health and even strangle its ability to function internationally.

In the first 12 months of 2020, we watched the world turn upside down with astonishing speed, following the first electronic whispers of an unknown respiratory syndrome. We all have memories of major events that we recall exactly where we were and what we were doing. In December 2019, our School was celebrating its 75<sup>th</sup> anniversary with about 350 guests at a banquet. The day of our celebration, it was learned in Wuhan that there was a sudden uptick in hospitalizations of the unknown respiratory syndrome that had first appeared in November. Dr. Michael Osterholm, our leading infectious disease epidemiologist and head of the Center for Infectious Disease Research and Policy (CIDRAP), took me aside and advised: “This virus appears highly infectious and could go global” [8]. He was righter than anyone knew at the time, though there was yet no name for it nor confirmation of its pathogenic origin. Few nations were prepared for the scale, scope, spread and speed of mutation of what was finally named SARS-CoV-2. It was relentless, as we have seen with each variant and especially with the Delta variant as of November 2021, that is increasing in many nations around the globe [Author’s note: Delta was subsequently surpassed by the Omicron variant first identified in South Africa on November 24, 2021].

But also astonishing were the scientific advances that had made possible the rapid development of Messenger RNA (mRNA) vaccines. According to accounts [8], a virologist in Wuhan first typed the sequence of the unknown virus in January 2020 and

recognized the coronavirus signature and similarity to SARS [9]. The sequence was shared and by February, the Coronavirus Study Group of the International Committee on Taxonomy of Viruses had named it: SARS-CoV-2. By March 17, a week after WHO declared a pandemic global emergency, the first human trials of a vaccine were beginning. By December, vaccines had been approved for emergency use. Mass vaccination for those 16 years of age and older began, and continues with new recommendations for children 5-15, and additional booster vaccinations for those over 60, and eligible due to compromised immune systems. Twelve months later (November 3, 2021), global cases passed 247 million with more than 5 million deaths (likely underestimates), yet more than 7 billion vaccine doses administered. Figure 1 drawn from the Johns Hopkins University COVID-19 Dashboard illustrates these estimates. The green line running through the figure shows the start of vaccine availability. Prior to that, the strategies available to us to slow the spread were containment and mitigation. And that is

where we see big differences across the world.

In the United States, for example, as in China, some European nations, Brazil and others, COVID-19 quickly overwhelmed containment strategies. This includes generally coercive, enforced isolation and quarantine, and “lockdowns” prohibiting travel in or out; with large scale testing and contact tracing, based on a “zero tolerance” model for viral transmission [10]. It worked for some nations initially, South Korea and New Zealand, for example.

Taiwan’s approach was successful but in the 2020 period avoided the lockdowns imposed by New Zealand. A Lancet article by Summers, Cheng, Lin and colleagues in November 2020 revealed why:

“Extensive public health infrastructure established in Taiwan pre-COVID-19 enabled a fast coordinated response, particularly in the domains of early screening, effective methods for isolation/quarantine, digital technologies for identifying potential cases and

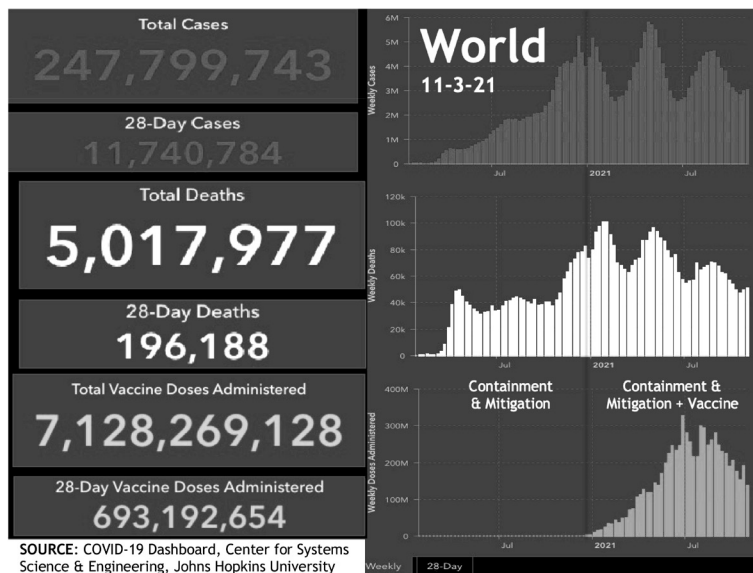


Figure 1 COVID-19 GLOBAL trends in cases, mortality, and vaccinations, 1-26-20 to 11-3-21

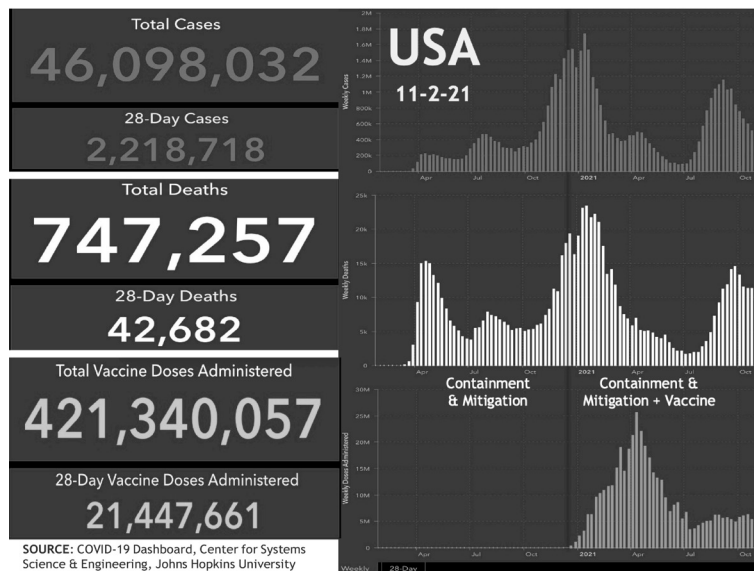


Figure 2 COVID-19 USA trends in cases, mortality, and vaccinations, 1-26-20 to 11-2-21

mass mask use. This timely and vigorous response allowed Taiwan to avoid the national lockdown used by New Zealand. Many of Taiwan’s pandemic control components could potentially be adopted by other jurisdictions” [11].

As the virus has mutated to infect more rapidly, Taiwan, too, had to adjust its strategies to avoid overwhelming its health care system. Continuing vigilance and adjusting mitigation strategies is especially important for moving this virus from pandemic to endemic.

Sadly, the USA remains the world leader in total cases, and total deaths. Population size and density differences as well as culture and governance are important factors. The US has the third largest population in the world, behind China and India. By most accounts, China has done well curtailing the virus but with continuing provincial outbreaks of the Delta variant and a strategy called the “Peoples’

War on COVID” [12]. Despite a substantially larger population, India too appears to be doing much better than the US. As of November 3, 2021, quite a few European countries are experiencing a fourth increase in cases with a recommendation for a new lockdown [13]. In the USA, some 20 states in the west and north are again seeing rising Delta variant cases (November 2021) that threaten to overwhelm hospitals and health systems. That includes in my home state Minnesota where we see a fifth spike in cases since the pandemic began. The main causes are unvaccinated adults, children who aren’t yet approved for vaccination, declining immunity among the vaccinated, and less adherence to mask wearing, and social distancing. There are inequities, too, in the US across different populations.

American Indian, Black, and Latino populations are at greater risk [14]. There are the global inequities of low-income nations that have yet to receive sufficient vaccines for their people, especially concentrated in Africa [15].

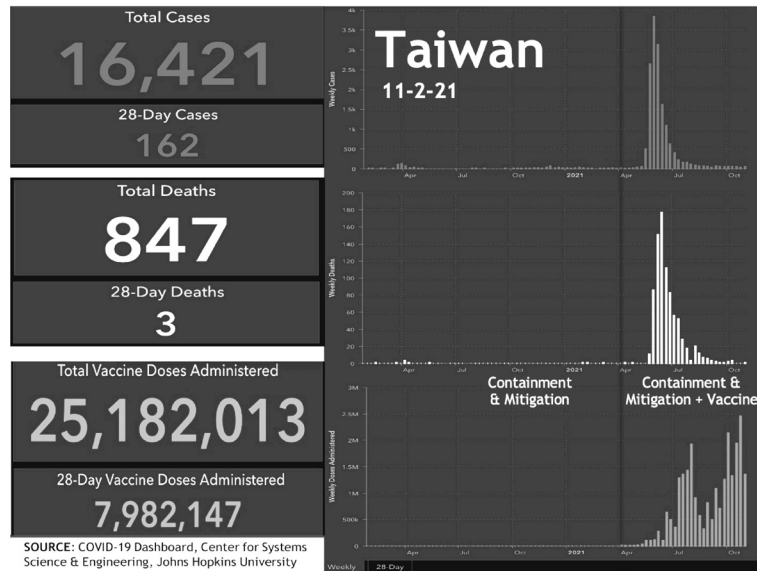


Figure 3 COVID-19 TAIWAN trends in cases, mortality, and vaccinations, 1-26-20 to 11-3-21

### QUESTIONS WANTING ANSWERS BEFORE THE NEXT PANDEMIC

Now, the world asks critical questions: What went wrong? Why were we unprepared? What was missing for effective global and local response? Safe, effective vaccine development was a success, but equitable distribution much less so. Containment and mitigation succeeded in some nations and failed in others. What must we change before the next pandemic? And finally, what should be our role in academic public health? Perhaps one positive coming out of this predictable disaster is that already global and local critiques are beginning in earnest based in part on the likelihood that the next pandemic will occur in much less than a century. As academic institutions of science, learning and public engagement, observation and critique is absolutely one of our important roles. One question to ponder is how do we better leverage this role on a global scale and scope?

In May 2020, the WHO 73<sup>rd</sup> Assembly passed a resolution establishing the *Independent*

*Panel for Pandemic Response and Preparedness* to begin answering the question: what went wrong, and what can the world do about it? Co-chaired by New Zealand Prime Minister Helen Clark, and former Liberia President, Ellen Johnson Sirleaf and with a diverse international membership, the panel issued its report a year later in May 2021. Here is a profound quote from early in the report’s findings: [16]

“This pandemic has shaken some of the standard assumptions that a country’s wealth will secure its health. Leadership and competence have counted more than cash in pandemic responses. Many of the best examples of decisive leadership have come from governments and communities in more resource-constrained settings. There is a clear opportunity to build a future beyond the pandemic that draws on the wellsprings of wisdom from every part of the world.” (p. 11).

Greater global collaboration, sharing, and decisive competent leadership development offers a context for creating a better future. Yet, the report acknowledged that the public record for this has not been positive. The *Global Health Security Initiative and Action Group* begun in 2001, had many members worldwide but few commitments to solutions. In 2016, the *Commission on a Global Risk Framework for the Future* noted that its proposed spending on preparedness of a few billion US dollars, was a mere fraction of what a truly global pandemic would cost the world [17].

## INFORMATION AND GOVERNANCE

As the pandemic began and the world struggled to control it, the Independent Panel identified an important context quite different from the 1918 influenza pandemic: two worlds operating at distinctively different speeds. The digital world of our century provided rivers of information from multiple sources within which analysts could read the signature of a potentially contagious respiratory pathogen: incidence reports, epidemic surveillance, social media, exchange networks. Yet the world of governance -- even with such a flow of information in plain sight - functions much more slowly leading to decisions and actions. As the panel observed, such processes often focus more on what shouldn't be done than what should be done. The virus functions at a far faster pace. As the panel noted: "We have failed in our collective capacity to come together in solidarity to create a protective web of human security."

It is tempting to think that autocratic nations compared to participatory democracies have an advantage facing down a pandemic, but the evidence is not supportive. All autocracies and democracies certainly are not the same. At this writing (November 2021), Russia is in

trouble as are Turkey, Brazil, and North Korea among those nations on the autocratic side. The People's Republic of China has done well with its heavily coercive approach that would be unacceptable culturally and politically in most other nations. The USA response initially was the worst, and the country experiences the fallout still. The UK and some European countries are not doing well, yet Taiwan, South Korea, Argentina, and France are among those doing well today.

However, one lesson that emerges from the COVID pandemic supersedes the strategies and of public health containment and mitigation: the virus rules.

A recent article appearing in the online journal *Frontiers of Public Health* by Sora Lee and Ryan Wong discusses South Korea's COVID-19 response in terms of "hybrids of governance modes." The authors averred: "It would be productive to think beyond the oversimplified understandings of governance modes and embrace flexible and different hybrids of governance modes to be more responsive, effective, efficient, and equitable" [18]. As the authors further explain, This is the lens of the "whole of society approach" engaging all sectors of a nation: public, private, civil society."

The point is important: neither autocracy nor democracy in themselves guarantee competent, decisive leadership, adequate public health funding, global collaboration, sharing of information or equitable investment in public health systems, capacity, training and distribution of workforces, or vaccines, and treatment drugs and technology. That requires a level of global cooperation, collaboration, and innovative thinking that we need to achieve for that future in which everyone thrives.

This is not a new insight. We have been discussing this for a couple of decades at least. Dr. Gro Harlem Brundtland, WHO Director

General from 1998-2003, summarized the need:

“Public health challenges are no longer just local, national or regional. They are global. They are no longer just within the domain of public health specialists. They are among the key challenges to our societies. They are political and cross-sectoral. They are intimately linked to environment and development. They are key to national, regional and global security” [19].

Whether globally or locally, we may say the approach is: we will all do better when we all do better. Admittedly, the real challenge is how we will achieve a level of global collaboration sufficient to bridge national self-interest, global rivalries and conflicts, and the inequities between rich and poor nations. Utopia is not the goal. Avoiding a public health pandemic dystopia may be all we can expect to achieve but definitely worth the effort.

Following up on the Independent Panel recommendations, the 74<sup>th</sup> World Health Assembly has planned a special session for November 29 through December 1. The topic is a “pandemic treaty” proposal binding on nations. This would address the challenge of a more coordinated global response to the next pandemic as well as the inequities that exist between rich and poorer nations in access to vaccines and treatment drugs [20]. For the first time, by the way, the US has indicated its support for temporary suspension of intellectual property rules to encourage wider production of vaccines and treatment drugs [21].

### **PUBLIC HEALTH FAILURES: WHO OR WHAT TO BLAME?**

As the global and local process of examining what has gone right and wrong

during COVID continues, questions have been raised about public health itself. Is it a victim of the pandemic? Is it the author of its own failures? The discussion is different across national contexts based on governance structures and national cultures. So, I will focus on what I observed in the United States - for two reasons: it's my home, and I am sad to see how such a poor response to the pandemic has left us with the largest burden of infections, disability, and death. I observe upfront that the answer to both questions in the USA is “Yes”: Public health is both a victim of COVID and responsible for many of its own failures. But there is much blame to go around. The discussion is beginning to focus on the most important question: Where does public health go from here?

The USA has an extremely decentralized, disconnected set of separate systems at the local, state, and federal levels that may or may not connect with each other effectively, let alone state and federal agencies (Figure 4). States have primary authority to address public health. Local public health is subject to different governance structures at the state and local level including county commissions, city commissions, and state boards and departments of health.

There were Federal agencies including the US Public Health Service that could have taken national leadership when COVID appeared in 2020 during the Trump administration but did not do so. No plan for containment or mitigation. This left states and local public health to fend for themselves with the Centers for Disease Control and Prevention (CDC) and the National Institutes of Health (NIH) offering guidance and recommendations, although Congress did provide funds [22]. By the time a national emergency was declared, containment was essentially not possible, and coordinated plans for mitigation did not exist

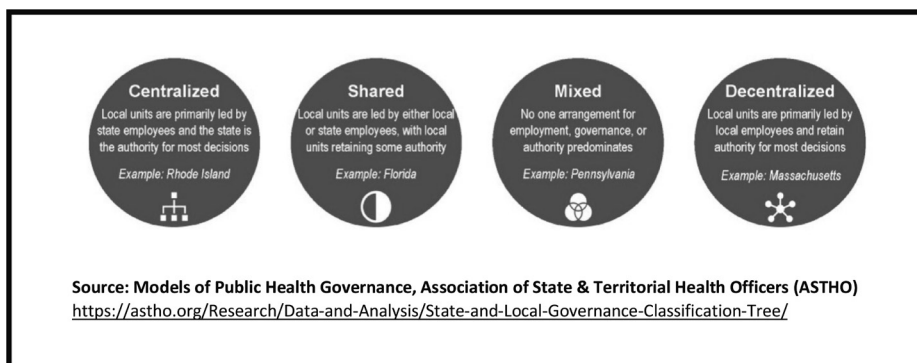


Figure 4 US Models of Public Health Governance at the State Level

except as hastily constructed by state and local responses. Governance at the national level failed, and the infections and death toll mounted rapidly. One clearly positive action the Trump administration accomplished in this period was mounting *Operation Warp Speed* leading to the manufacture of mRNA vaccines. Yet when they were ready for emergency use, the administration had no plan in place for public education and distribution. President Trump was obsessed with overturning a legal, legitimate election that voted him out of office, and so no plan was ever produced at the federal level. National leadership failed at a crucial point.

However, the disastrous public health US initial response to COVID was not of the Trump administration’s making alone. In a “postmortem” analysis of what went wrong, the *Lancet Commission on Public Health and Policy* had this to say about US history, politics and culture that created root causes:

“A four-decade long drift toward neoliberal policies bolstered corporate prerogatives, privatized government services, reinforced racism, and imposed public austerity. The rich got much richer while their taxes were halved. Workers’ earnings stagnated,

social programs shrank, prison populations greatly increased, and millions were priced out of health care even as government payments enriched medical investors. GDP grew but longevity lagged, a sign of profound social dysfunction” [23].

While US response failure was decades in the making, there is another dimension to explore: did public health author its own failures? This point of view was best expressed by science writer Ed Yong in the *Atlantic Monthly* magazine who wrote about *How Public Health Took Part in its Own Downfall* [24]. Yong’s article benefitted from many sources in academic public health and those in practice. The basic thesis is that US public health was very successful in the 20<sup>th</sup> Century at extending lifespan, reducing infant mortality, infectious disease, and rising success in other public health domains. A statistical analysis of contributing factors concluded that US lifespan from 1900 to 1999 increased by 30 years. About 25 years of the increase were due to public health measures in sanitation, hygiene, and disease control, while the remaining 5 years were attributed to improvements in medical care and treatment [25].



Some historians believe that US public health had become complacent, forgetting its early 20<sup>th</sup> Century advocacy roots that pushed change in social and working conditions that cause disease and poor health and short lives in the first place. As the Lancet Commission suggested, public health in the US may have bowed to the rightward political conditions that led to widespread state disinvestment in two major institutions beginning in the 1970s: public health and higher education. We've been suffering from that ever since, and the ongoing cycle of public health "Panic, Neglect, Repeat," as once described by former World Bank President Jim Yong Kim.

Most troubling of all? At least half of US states dominated by political conservatives are seeking legal changes to tie public health's hands from responding effectively to future public health challenges [26].

### **THE ROLE OF ACADEMIC PUBLIC HEALTH**

As we consider what academic public health can contribute to addressing the many challenges we face, public health and communication in the COVID era is an important starting point. I believe this bears also on what we as academic public health faculty must consider for the future.

In this pandemic, public health was blindsided and overwhelmed by a continuing flood of misinformation and disinformation about this virus and its prevention and treatment. Some have rightly called this an "infodemic." Much is about individuals sharing misinformation with friends and family. But much more is about extremely well-organized groups weaponizing social media with falsehoods and conspiracy theories. The purpose is to undermine trust in scientific evidence, public health, medicine, and public

policy, and to recruit social media users to do it for them by creating "echo chambers." For example, a very slick Hollywood-style documentary appeared on the web in May 2020 called *Plandemic*. It claimed that COVID was planned by "global elites" to control the world's population; vaccines were dangerous; masks activated the virus; and science and scientists were part of the conspiracy. It also pushed people toward extremist politics of the far right.

The documentary's authors anticipated that their work would be removed by some social media platforms, so to assure continued spread, they urged viewers to download the documentary and share it with their own networks. By the way, the Johns Hopkins SPH Center for Health Security estimates that each day, misinformation, and disinformation cost the US between \$50-300 million US dollars. The illness and deaths of real people are in those numbers. A superb study by Nazar & Pieters published in September 2020 studied this disinformation campaign [27]. It's an important work for public health because it also addresses techniques to counter disinformation. Where will public health professionals and scientists learn to counteract this if not among the subjects we teach in schools and colleges of public health? What else should we be contributing globally and locally with respect to our missions of research, learning and public engagement? Considering our experience of the past two years, what have we learned and how should it shape our missions, especially as the current pandemic becomes endemic?

Academic public health provides the main institutional network of scientists creating new knowledge, shaping that new knowledge into learning, teaching and professional public health practice and policy, and engaging with the people to make everyone's lives better. What is different about the work we do is the

idea of *ecology*: the relationships of organisms to each other in environments that provide conditions and forces shaping interactions. This is true of humans as much as it is true of viruses. What happens in front of our eyes today is the product of this complexity “upstream” that created conditions for what is happening now – for good or ill. Our public health forbears of the 19<sup>th</sup> and early 20<sup>th</sup> centuries knew this: living in poverty, racism, lack of safe housing, education, and opportunity to thrive - all combine to shape our relationships, and our health and wellbeing. Understanding this, Taiwan is one nation that over time has dramatically reduced deep poverty. In a larger global ecology, the actions of others far from us shape our future health and well-being. Climate change is an obvious example, as we are once again reminded by the *Glasgow COP26 Summit*. Global is local. Local is global. Most public health challenges are like an onion. There are many layers and each one is related to the others. It is One World, One Health. This a challenging framework for many people to understand. In the case of infectious disease (including what we have experienced since 2019), we are reminded that some 75 percent of newly emerging viruses affecting humans, originate in animal reservoirs. With climate change, the emergence and spread of new pathogens and the resurgence and spread of known pathogens are an enormous public health concern.

Because of the missions of academic public health, and the global and local ecology of the challenges we address, we must continue to build and strengthen our global system: *The Global Network for Academic Public Health*. This organization was established officially by 7 regional networks of schools of public health in May 2020, barely 60 days after COVID was declared a global pandemic [28]. Although in its infancy, it’s an important advance in shaping

the global public health agenda for research and education of next generation public health scientists and professionals, and for engaging with leaders and decision-makers about public health challenges. Its power potential is in synergizing our institutions and revitalizing our missions through global and translational thinking; true partnerships across sectors; interconnected systems of which academic public health is one; and informing leaders and decision-makers in shaping solutions.

Of course, academic public health became global more than a century ago. Yet the idea of synergizing is more recent -- enabled in part by the founding of the United Nations and the World Health Organization after World War II. Some schools were called on during and after the war to strengthen public health worldwide. My own school’s contributions during and after the war were studies of human starvation that helped create the protocols for rehabilitating concentration camp prisoners and other starving people back to health. In the early 1950s, our founding Dean Dr. Gaylord Anderson was asked by the US State Department to develop a school of public health in collaboration with South Korea following the armistice. Seoul National University’s School of Public Health was the result of that collaboration. But schools like ours come from a rich nation and there are many in much poorer that struggle. One of the challenges for the Global Network will be the challenge of equity in academic public health across the globe. How do we address capacity building in partnership without creating a “new colonialism” of rich nations?

A second point is about our education and training role in both public health science and practice. There are many groups for our teaching in addition to our students. One is continuing education of the professional and science workforce through the idea of “lifelong learning.” But there’s also “Just-In-Time-

Learning” in rapid response to sudden public health needs. There’s also the need to educate all the health professions and beyond them other professions, leaders, and decision-makers. We need national and local leaders who understand public health basics – evidence, risks, and decision options. The Global Network offers us an opportunity to share this worldwide in many different languages and cultural frameworks. Could we develop an “Everywhere/Anytime/Just-in-Time” cooperative learning platform with a global reach? I hope you are intrigued by the idea. There must be one or two billionaires out there with the funds to make it happen.

Such a global cooperative network might also be established with respect to public health data science and analytics. Several of our faculty worked with our state in modeling the spread COVID infections, in part to calculate the point at which the health care system would be overwhelmed. This is an emerging field in which large-scale global sharing, partnerships and collaborations would be of great help in response, containment, and mitigation in the future. There are content and competency domains that I believe are needed more than ever in public health: leadership, design thinking and analysis, and communication. Understanding and practicing good leadership is a must whether you are a professional or a scientist. Design thinking borrows from architecture and engineering with a process that encourages innovative thinking and solutions. We need that in public health – new approaches that we can research, test, prototype and refine.

Finally, academic public health must do a far better job of communicating with the people what public health is all about. So many do not understand how it works in science, evidence, practice, and systems. Science and scientists are no longer automatically granted the deference of expertise that they once enjoyed. Traditional media such as newspapers, magazines, radio,

and television also have lost much credibility, overwhelmed by the echo chambers of social media – and, as we discussed earlier, blindsided by well-organized purveyors of misinformation and disinformation. As we have seen, peoples’ lives are at stake. Building and restoring trust is a major issue for us in public health. As common wisdom has it: we live in an age when falsehood goes around the world three times before truth puts on its shoes.

Thank you for your attention, ladies, and gentlemen. I look forward to our discussion.

## REFERENCES

1. Albani V, Loria J, Massad E, Zubelli J. COVID-19 underreporting and its impact on vaccination strategies. *BMC Infect Dis* 2021;**21**:1111. doi:10.1186/s12879-021-06780-7.
2. Institute of Medicine (US) Committee on Emerging Microbial Threats to Health; Lederberg J, Shope RE, Oaks Jr S. *Emerging Infections: Microbial Threats to Health in the United States*. Washington, DC: National Academies Press (US), 1992.
3. Morse SS, Schluenderberg A. Emerging viruses: the evolution of viruses and viral diseases. *J Infect Dis* 1990;**162**:1-7. doi:10.1093/infdis/162.1.1.
4. The Independent Panel for Pandemic Preparedness and Response. COVID-19: make it the last pandemic. Available at: <https://theindependentpanel.org/mainreport/>. Accessed November 12, 2021.
5. DeSalvo K, Hughes B, Bassett M, et al. Public health Covid-19 impact assessment: lessons learned and compelling needs. *NAM Perspect* 2021;**2021**:10.31478/202104c. doi:10.31478/202104c.
6. Gruzd A, DeDomenico M, Sacco PL, Briand S. Studying the COVID-19 Infodemic at scale. *Big Data Soc* 2021;**8**:1-6. doi:10.1177/20539517211021115.
7. Mackenzie D. *COVID-19: The Pandemic That Never Should Have Happened and How to Stop the Next One*. New York, NY: Hachette Books, 2020.
8. Allam Z. The first 50 days of COVID-19: a detailed chronological timeline and extensive review of literature documenting the pandemic. In: Allam Z ed. *Surveying the Covid-19 Pandemic and its Implications*. Amsterdam, Netherlands: Elsevier, 2020. doi:10.1016/B978-0-12-824313-8.00001-2.

- [Published Online]
9. Centers for Disease Control and Prevention (CDC). David J. Sencer CDC Museum: in association with the Smithsonian Institution. Available at: <https://www.cdc.gov/museum/timeline/covid19.html#Early-2020>. Accessed November 12, 2021.
  10. Walensky RP, del Rio C. From mitigation to containment of the COVID-19 pandemic: putting the SARS-CoV-2 genie back in the bottle. *JAMA* 2020;**323**:1889-90. doi:10.1001/jama.2020.6572.
  11. Summers J, Cheng HY, Lin HH, et al. Potential lessons from the Taiwan and New Zealand health responses to the COVID-19 pandemic. *Lancet Reg Health West Pac* 2020;**4**:10044. doi:10.1016/j.lanwpc.2020.100044.
  12. Ho R. China's COVID-19 successes - credible at home, not so much abroad. Available at: <https://news.nus.edu.sg/chinas-covid-19-successes---credible-at-home-not-so-much-abroad/>. Accessed November 12, 2021.
  13. The Guardian. COVID LIVE: Germany reports record 50,000 new cases; Dutch experts recommend lockdown. Available at: <https://www.theguardian.com/world/live/2021/nov/11/coronavirus-news-live-europe-covid-deaths-rise-10-in-a-week-10-us-states-sue-over-vaccine-mandates>. Accessed November 12, 2021.
  14. Okonkwo NE, Aguwa UT, Jang M, et al. COVID-19 and the US response: accelerating health inequities. *BMJ Evid Based Med* 2021;**26**:176-9. doi:10.1136/bmjebm-2020-111426.
  15. Asundi A, O'Leary C, Bahadrelia N. Global COVID vaccine inequity: the scope, the impact, and the challenges. *Cell Host Microbe* 2021;**29**:1036-9. doi:10.1016/j.chom.2021.06.007.
  16. WHO. COVID-19: make it the last pandemic. Available at: [https://www.unaids.org/en/resources/presscentre/pressreleaseandstatementarchive/2021/may/20210512\\_independent-panel-pandemic-preparedness-response](https://www.unaids.org/en/resources/presscentre/pressreleaseandstatementarchive/2021/may/20210512_independent-panel-pandemic-preparedness-response). Accessed November 12, 2021.
  17. Commission on a Global Health Risk Framework for the Future, National Academy of Medicine, Secretariat. *The Neglected Dimension of Global Security: A Framework to Counter Infectious Disease Crises*. Washington, DC: The National Academies Press, 2016. doi:10.17226/21891.
  18. Lee S, Wong R. COVID-19 responses of South Korea as hybrids of governance modes. *Front Public Health* 2021;**9**:654945. doi:10.3389/fpubh.2021.654945.
  19. Bruntland GH. Public health challenges in a globalizing world. *Eur J Public Health* 2005;**15**:3-5. doi:10.1093/eurpub/cki134.
  20. WHO. World Health Assembly agrees to develop historic global accord on pandemic prevention. Available at: <https://middleeasthealth.com/news/world-health-news/world-health-assembly-agrees-to-develop-historic-global-accord-on-pandemic-prevention/>. Accessed November 12, 2021.
  21. Kaplan T, Stolberg SG, Robbins R. Taking 'Extraordinary Measures,' Biden backs suspending patents on vaccines. Available at: <https://www.nytimes.com/2021/05/05/us/politics/biden-covid-vaccine-patents.html>. Accessed November 12, 2021.
  22. Hazeltine W. How US public health failed you and me. Available at: <https://www.forbes.com/sites/williamhazeltine/2020/10/14/the-need-for-an-effective-national-public-health-service-how-us-public-health-failed-you-and-me/?sh=5e9fd47c1318>. Accessed November 12, 2021.
  23. Woolhandler S, Himmelstein DU, Ahmed S, et al. Public policy and health in the Trump era. *Lancet* 2021;**397**:705-53. doi:10.1016/S0140-6736(20)32545-9.
  24. Yong Ed. How public health took part in its own downfall. Available at: <https://www.theatlantic.com/health/archive/2021/10/how-public-health-took-part-its-own-downfall/620457/>. Accessed November 12, 2021.
  25. CDC. Ten great public health achievements – United States, 1900-1999. *MMWR Morb Mortal Wkly Rep* 1999;**2**:241-3.
  26. Edwards S. Pandemic response a cycle of 'panic and neglect,' says World Bank President. Available at: <https://www.devex.com/news/pandemic-response-a-cycle-of-panic-and-neglect-says-world-bank-president-89995>. Accessed November 12, 2021.
  27. Nazar S, Pieters T. Pandemic revisited: a product of planned disinformation amplifying the COVID-19 "infodemic". *Front Public Health* 2021;**9**:649930. doi:10.3389/fpubh.2021.649930.
  28. The Regional Associations forming the Global Network for Academic Public Health include: Alianza Latinoamericana de Salud Global (ALASAG); Asia-Pacific Academic Consortium for Public Health (APACPH); Association of Schools of Public Health in Africa (ASPHA); Association of Schools of Public Health in the European Region (ASPHER); Association of Schools and Programs of Public Health (ASPPH); Council of Academic Public Health Institutions Australasia (CAPHIA); and Southeast Asia Public Health Education Institutions Network (SEAPHEIN).