Data scientist Dr. William Ku on the state of the COVID-19 pandemic

Benjamin Mateus
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Dr. William Ku is a retired scientist and physicist from Columbia University who has had decades of experience analyzing data. After the 1986 Challenger *explosion set his project studying quasars back several years, he was recruited by financial institutions to model complex financial instruments. Following his retirement, he turned to analyzing data in the healthcare sector. During the COVID-19 pandemic, using his analytic and modeling experience, he has teamed with epidemiologist Dr. Eric Feigl-Ding to document critical developments.*

Benjamin Mateus: Dr. Ku, thank you for taking time to speak with the *World Socialist Web Site*. I have been following your work closely and am always impressed by the clarity of your graphs and plots.

Perhaps a good place to start would be by explaining the work you are doing now with bringing awareness to the issues behind the COVID-19 pandemic. What is your background, and how did you become interested in tracking COVID? Perhaps you can also discuss your collaboration with Dr. Eric Feigl-Ding, who has given your excellent graphs and plots a wide audience.

William Ku: I have been trained as a scientist and researcher for more than 50 years. Initially, I analyzed and modeled many physical systems ranging from atoms to clusters of galaxies.

After the *Challenger* explosion, I left academia and spent 20 years analyzing and modeling complex financial instruments. Finally, when I retired and encountered more health issues, I turned my attention to trying to improve health care data analysis.

When SARS-CoV-2 emerged more than two years ago I figured that with so little known about a deadly virus I can use my talents to track, analyze and model the spread of this deadly disease. Dr. Feigl-Ding has been extremely helpful in guiding my analysis and making sure that our graphics help to educate the average citizen and fight the tremendous amount of misinformation on social media that has caused more people to suffer and die needlessly.

BM: In your look into the data at a granular level, what is the picture that emerges in the US? And can you give a graphical pictorial on this? Many have forgotten the early phases of this long drawn out pandemic. It would be good to recap.

WK: More than two years ago, I tried to see how exposure led to infection and then to hospitalization, ICU, and death in an effort to build a model to aid public health authorities to better forecast and allocate scarce health care resources, and individuals to better assess what their risks were from exposure to this deadly virus. Early data from many countries showed that age was the primary driver of mortality. Over a very wide spectrum from 8 to 80 years old every six years roughly doubled a person's risk of death. This was true two years ago and is still true now and can be seen in the data for lagged Case Fatality Rates (CFR, deaths per cases occurring three weeks before). Knowing this, nursing homes should have managed their vulnerable population better then.

Gender also played a strong role. Men of similar age were 60 percent more likely to die from COVID-19 than women. Finally, many other health (obesity, diabetes, cancer, etc.) and demographic (income, job, etc.) factors also affected how likely a person was to die from this disease. Each one of these factors can be fed into a computer model to calculate how infections progress from cases to hospitalizations to deaths.

In the early days, it was very difficult to convince the public to treat the exponential growth of cases seriously and people waited for death counts to soar before acting to mitigate the spread of the disease. But with variants such as the Omicron that can double every two days, waiting 3 weeks for deaths to occur and report and then act can allow the virus to grow 1,000-fold and get totally out of control.

BM: Can you review the data with regards to what states have done better or worse? Where do we see high rates of infections, hospitalizations, and deaths?

WK: On a state level, some states have done much better than other states in terms of keeping hospitalization and death counts lower. For a long time, Vermont was one of the best at keeping COVID-19 cases and deaths low (927 per million population) compared to other states like Mississippi (4,035 per million) and Arizona (3,837 per million). But no state has been immune, and even Vermont has seen a huge Omicron surge when it failed to boost its population fast enough last fall.

I have focused a lot of my attention on the biggest three states in the United States since they contain more than a quarter of the US population. California has done a much better job of protecting its citizens from COVID-19 than Florida and Texas, especially through the Delta and Omicron waves when vaccines have become widely available. Texas is an especially sad case since the median age of Texans (34 years old) is younger than that of Californians (35 years old), and fewer should have died. Most hospitalizations and deaths in Texas and Florida could have been prevented with better public health messaging and government management.

BM: What countries did well during the pandemic? And specifically on South Korea, why did they take their foot off the brakes? How are they faring?

WK: Some countries such as South Korea, Taiwan, Japan, Vietnam, Denmark, Australia, New Zealand, etc. were able to control the spread of the disease better initially. But no one has escaped the virus unscathed.

One of the first countries hit by the pandemic after China was South Korea. They were able to use classic pandemic control techniques like thorough testing, tracing and treating those infected in isolation facilities that allowed them to contain the spread of the disease for over 21 months.

Countries looked to South Korea for best practices. Then South Korea started to ease mitigation measures last October and allowed the Delta variant to spread and kill record numbers of Koreans. Worse, last month they essentially dropped all mitigation measures under political pressures. Omicron is milder than Delta but when cases soar to near 20 times higher than the Delta peak reached in mid-December, Omicron deaths are certain to set records. They should have vaccinated (86 percent) and boosted (55 percent) even more people, especially the young and elderly, before taking

their foot off the brake. South Korea is teaching the world a new lesson that if they cannot end mitigations safely, how can countries like the US that are less well vaccinated (65 percent) and boosted (44 percent) drop mitigations so prematurely?

BM: What countries have done poorly? You had recently looked at Russia, which has seen a massive death toll.

WK: Official COVID-19 deaths per capita are very high in major countries like Peru (0.62 percent), Brazil (0.30 percent), Poland (0.29 percent) and the US (0.29 percent), but we know they are undercounted for many countries. Pandemic death reporting has been very uneven from country to country. Different criteria are used to classify and report deaths attributable to COVID-19.

Most people now consider excess deaths above the average for the past roughly five years more reliable as a gauge of true mortality associated with hurricanes, earthquakes and pandemics even though it is less timely than officially reported death counts. Official death counts from COVID-19 are nearing 6 million, but scientists estimate that the real toll is more likely 2 to 4 times higher. Using excess death counts and extrapolating, Russia has lost 0.83 percent [almost 1 in every 100 people] of its population to COVID-19, and the US has lost 0.32 percent. These are huge humanitarian tolls.

BM: As a data scientist, you had tweeted about your frustrations behind the CDC's (US Centers for Disease Control and Prevention) slow and delayed publication of data. What does it mean not being able to have real-time data? In other words, why has the world politicized the pandemic instead of responding to it in a collaborative fashion?

WK: Slow, incomplete and haphazard reporting of pandemic data makes a difficult problem more difficult to understand and manage. The CDC should be able to do a much better job handling this than Third World countries that lack the training, resources and money to do so.

The CDC had been slow to release breakthrough data that they had collected from the states to the extent that the FDA booster approval process was delayed last summer costing thousands of Americans their lives. Their decision to allow different states to report cases sporadically and non-uniformly makes it difficult to sum up all the state data to form a complete, accurate and timely picture for the US.

As we had mentioned earlier when Omicron infections can double every 2 days, allowing some states to delay reporting for a week makes absolutely no sense. Further, when other agencies such as Health and Human Services can collect and report hospital deaths in a timelier fashion, there is no reason to cut that reporting channel until the CDC has fixed its own death reporting channels. All this extra work to "manage the message" ultimately does more harm than good—eroding public trust in America's scientists and government.

Moreover, scientists used to share information and resources across borders to speed up the advancement of science, and now it seems people only support their own narrow views. In many classic science fiction stories, the arrival of alien invaders causes humans to unite to defeat a common enemy. Now the arrival of SARS-CoV-2 has exposed more human divisions and allowed [this] alien invader to kill millions of humans.

BM: You have used social media to bring awareness to the need to vaccinate the population, highlighting the benefits these life-saving treatments offer. You have also noted that the benefits for these treatments wane over time and especially by the evolution of new mutations in the virus. Can you comment?

WK: Vaccines have been extremely effective in saving lives, and it has been extremely frustrating and puzzling because vaccine hesitancy continues to hold sway over large segments of the population.

Seeing the updated data for vaccinated folks (see Figure 1), people should be rushing to take up free vaccines offered by the government as they act like a "Fountain of Youth" for older immune systems. Someone 50-65 years old that is vaccinated fares as well as someone 30 years younger (18-29 years old) who is unvaccinated.

But vaccines are not perfect, and they do wane over time so "breakthrough" cases, hospitalizations and deaths do occur and should have been better tracked and studied by the CDC. Boosters should have rolled out earlier than last October, and now with Omicron they are more necessary than ever, but instead boosting has slowed significantly.

BM: The BA.2 subvariant—can you speak on it? And can you speak on it in the context of the dismantling of all trackers and opening of society? Will vaccines alone end this pandemic?

WK: The BA.2 variant appears to be around 30 percent more contagious than the original Omicron. In the United States it is still a minor player (around 4 percent) although spreading exponentially. According to the latest World Health Organization estimate, BA.2 constitutes about one-third of all SARS-CoV-2 variants globally. It is disheartening to see all the countries and states rushing to reduce or drop mitigation measures especially with approximately 3 percent of the world's population being unable to achieve full vaccine and booster protection due to poor immune systems or age. These more vulnerable parts of the population are now left to fend for themselves.

Moreover, new variants can always develop that are not milder. Dropping masking, reducing testing, eliminating tracing and ending isolation (classic pandemic tools) without applying objective benchmarks (in terms of hospitalizations, death rates or case fatality rates) sounds insane to me. Vaccines can end this pandemic in theory if enough people get vaccinated and boosted, and countries stay vigilant until reasonable benchmarks are met. Unfortunately, the world appears to be rushing for the exit and killing more people in the process.

BM: Dr. Ku, one last question. On Friday, February 25, the CDC changed its masking guidelines. But it wasn't so much that the masking guidelines were changed; it was how they determine risk.

Instead of using infection rates and positivity rates, they are heavily weighing hospitalizations and bed occupancy. Essentially, overnight, the US map has been transformed into a "low-risk" zone. We know most cases are asymptomatic. Also, from the time of infection to illness means a significant number of infections will occur before any triggers are hit.

However, even when hospitals were drowning in patients in January, the CDC did not really lift a finger to address the situations that were putting health care systems into extreme crisis. I cannot help but think that the CDC has accommodated to political pressures and is enacting the policy of "living with the virus" with the new guidelines. Can you comment?

WK: I agree with you and share your concerns.

I think adding hospital admits per day and total hospitalizations to the mix is okay in principle, although as you say these are less timely indicators than cases. The question is how all these factors should be weighed and used to assess risk levels by county. These important questions should not be left to bureaucrats, and the opinion of outside doctors and scientists should be considered to set more objective benchmarks.

For example, while hospital admits per day have fallen in general, pediatric hospital admits remain higher than they were before Omicron hit last December, but the CDC apparently doesn't care about this measure in dropping universal masking of students.

BM: Any final thoughts?

WK: I fervently hope that recent changes by the CDC and the UK Health Security Agency do not worsen a trend toward less timely, comprehensive and standardized data collection and dissemination. Viruses do not take weekends or holidays off. I hope the trend toward more lax testing, tracing and isolation standards set by these countries and others like South Korea are temporary and will not permanently discourage and damage the reputations of doctors, scientists and public health professionals who work every day to save the lives of others. If so,

the world could lose more lives to the next COVID-19 variant or virus.

BM: Dr. Ku, thank you for your time and responses. They have been very clarifying and appreciated.

WK: You are welcome. Take care.