

Covid State of Play: Vaccines and Variants

February 17, 2021

>> Well hello everybody. I'm Jonathan Zittrain and along with my co-host, Dr. Margaret Bourdeaux, we're here for another session of COVID state of play, a fitful set of check-ins every so often since the pandemic began in earnest last march of 2020 to see where things stand, where we think they're going. Today as in past instances, to have a guest, an expert, to help walk us through some particular aspect of the crisis. Today that will be dr. Vanessa Kerry, who will be talking about vaccination strategies and equities worldwide. A very sad landmark that we passed, our research coordinator will marks pointed out that since our last show, a month and three days ago, it looks like there have been about 100,000 additional deaths due to COVID in the united states. And it's a clip that is still quite rapid and that too often goes unremarked. If remarked, just feels like a new normal perhaps. So maybe that's one way to start by asking you, margaret, if we were to have that word to invoke the state of play, which in prior instances among us and our guests they have pretty much always been negative and have ranged from devastating to horrible, et cetera, et cetera, now with a vaccine here and with the parameters perhaps at least known, if no less pessimistic, what would you say? How would you characterize the state of play right now?

>> Right. I think last time the word I chose or the metaphor I chose was race. A race against time, between team human and team COVID. And i, you know, kind of talked about it in that way because then and now, it seems like we are in a race where COVID is trying -- that COVID is trying to win and team human is also trying to win. I think since then I refined it a tiny bit to say chase. Team human is trying to catch up with team COVID. Team COVID is clearly ahead, as the -- you know, as the death rate and the infection rate, you know, continues to be deeply upsetting. But you're right, there is a sense of, well, a sense of this is what, the 11th month that we have been meeting. And so, you know, there is that sense of like, oh, well, it's not a sprint. It's not wrapping up soon. But, you know, I think that overall if you wanted to just pick this particular moment, you know, since we talked last, this particular week, I would say team human has had a good week in that, you know, vaccine distribution, at least in this country, has increased by about 20%. I guess they announced -- the biden administration announced even last night that they were able to increase by 20% the amount of vaccine they're going to be able to give to states. And they are also, another positive development in that regard, is that they're able to give states a heads up for the next three weeks how much supply that they can count on. And that sort of reliability and consistency issue has really been one that is behind the scenes, really plagued the u.s. Response. Because you plan very differently, right, if you know what you're going to have a week from now. You're not going to keep in reserve or horde vaccine if you're sure that you're going to get more in the future. So that's great. Overall cases worldwide are down 10% this week. Most of that coming from the united states and europe. And it's been actually a little bit of a puzzle as to why that is. Some are like, well, the vaccines, yes, we have vaccinated at least 10% of our population getting one dose. Maybe it's the sort of holidays surge of cases that are starting to level off. I would say here in massachusetts we're

back -- we are much -- our cases are much lower, but now they're still consistent with a number of cases that we were recording at our peak in april, which is sort of an interesting comparison.

>> while you're talking, I'm just going to project real quick something from science magazine. John cohen shared a chart that in turn other researchers produced, trying to model with and without vaccines and with and without protection behavior. If we did not have the vaccine, thanks to the variant, the b-117, you'd see the slope of the curve going down and then up again. Here if we can really speed the vaccine rollout, you can see how much of an impact that has. And if we don't keep the other public health strategies going, including masking, even with a fast vaccine rollout, you can see the effect on the prevalence of the vaccine. Anyway, I thought I would share that while you were talking about this.

>> Perfect. I think it goes exactly well with the race or with the chase because that's right. But what I would say is it's a little of a mystery why our cases are going down so dramatically. I was saying, and a lot of people think it's holidays, vaccines. It's kind of interesting to me that there's no one thing that we can really point to why it's going down. My favorite hypothesis is that maybe leadership really does matter. You know, maybe that the one thing that has changed is we have a new administration, which is saying, hey, this is important, you should definitely wear masks, you should definitely take this seriously. I was really reminded about the hardest thing, maybe I've said this to you before. The hardest thing I've ever had to learn in my medical training was when to either declare an emergency or acknowledge an emergency was happening. Even in a hospital setting, there's a huge desire to pretend like everything is fine. And I always think about this case where I was at a really fancy dinner party and my husband was getting an award. It was really great event and I was just there smiling lovingly at my husband, I was just drinking wine, having this great time and right in the middle of the proceedings another guest of honor just keeled over in the middle of the dinner. It just took a very long time for anybody to declare that there was something wrong. The speakers had to stop speaking and people had to gather around this individual. You know, there's just a huge inertia. You know I keep up with the scene in georgia schools, there's just the sense, okay, nobody else is taking it seriously, should I take it seriously? So I think some of the drop is people finally have permission to take this seriously, to wear a mask, not feel foolish, not feel like they're going to pay a social penalty of, oh, you're so silly for being concerned, you're chicken little, is why I think we made a little progress. So that's team human. But team COVID, the variants are very concerning. These variants where COVID is changing, like all viruses do. All viruses change over time. The more opportunity they have to replicate, the more opportunity they have to change so much, so that a vaccine might not be able to recognize that your immune system, even after vaccination, might not be able to recognize the variant. And so that has added this really different dynamic. Before we just kind of thought, well, you know, we'll eventually get the vaccine and that will be done, just distribute it. Okay, it will be challenging and messy to distribute but we'll distribute it and we'll be done. But the idea there will be variants that outmutate the vaccine is a profoundly big development in a couple of different ways. One it means that this crisis could go on for a long time. It means that we have to get really serious about two things. One, vaccination, and two, as your wonderful slide there showed, the other public health strategies that are not based on the vaccine. And here is where

I think team COVID just has this huge advantage. The public health strategy, the non-vaccine strategy that we've talked about over and over again, the three-legged stool, the masks plus contact tracing and environmental modifications and ventilation, is still is too cumbersome. It's too cumbersome to implement because we haven't positioned ourselves really to implement it well, or it's too ham-handed. I mean this idea that we're going to stay socially distanced for years is just so hard. I mean we're just seeing the penalties we're paying, right? I don't know, how have you been?

>> First in reaction to what you've been saying, it's interesting to have still as an open question what's accounting for the drop in reported cases right now. And you would think that the answer to that question, your hypothesis was interesting that it's a leadership thing in the United States, just a perception of leadership thing, but really getting a solid answer to that question might help us know if the drop is temporary or permanent, what factors to lean in on. It's just so interesting to see even after all this time we have so many unanswered questions. I think that probably cuts to a theme that you've invoked before of just broken or never developed public health surveillance or intelligence system so that we actually can answer questions like these pretty promptly. The other thing it calls to mind is the prospect that if what so many people appear to be saying was a near miraculous effort by the scientists and companies and public authorities involved to achieve a vaccine and to test it as quickly as it could be tested so that it could be credibly rolled out with confidence, that if that just hadn't happened, if it had taken as long as Anthony Fauci thought it might take at the beginning, we'd really be up the creek right now, wouldn't we? Because even with very strong three-legged stool interventions, the increased transmissibility of the variants might mean we'd be within transmission value of above 1. So it's quite something we're getting narrowly a boost to turbo charge our chase vehicle to catch up to the vaccine. What you were invoking was the possibility that we'd have to do booster shots and such is kind of like, all right, you've got to stop at the pit stop every so often as you try to overtake team COVID.

>> Yeah. I'm glad you're running with that metaphor, that's fantastic. Yeah, you know, I still am a believer that we could -- that the public health -- the nonvaccine public health strategy is actually workable and doable if we had put as much effort into it as we did into developing the vaccine. I don't think there's anything actually conceptually difficult about it. And what I mean by that is things like rolling out screening testing, let's say, at every work site or, you know, before you go on an airplane you spit in a cup and do a strip and see whether you are positive. If you are, you receive immediate supports for being in -- for being in quarantine or isolation. You know, I think those things are all possible. I think we just -- when I say we didn't position ourselves, it was a matter of will. Why did you need will or political will to do it? Because you had to cobble together different systems that were complicated. I think I've talked to you before about the construction company, construction effort to roll out work site testing on construction sites. And we had to line up five different partners, the lab, the transport, who's going to take the sample, the employer had to be involved and there needed to be a medical partner. So getting all of those systems aligned and processes in place is what takes a little bit of effort. It's not -- it's not -- you know, you don't have to be a genius to do it, you just have to work with others in the public sector and that is a real challenge. But anyway, I am not -- I think

we still need to double down and get better and I'm never going to give up on that, on the public health strategy. I think we have not done that to date but I'm hopeful.

>> Let's talk a little bit more just about the vaccine situation. For a member of the public who's eager to get vaccinated, wants to avoid COVID and is keeping an eye on the various complicated tiers and subtiers and such, which might be worth talking about as an allocation question, should they care one bit whether once their number comes up which of the categories or labels of vaccine they take, knowing that they might have different efficacies estimated so far?

>> So my answer to that is not at all, they should not be concerned at all. Just get what is available because the efficacy of a single vaccine, the major driver of the efficacy of the shot that goes in your arm is how many other people have gotten a shot in their arm. So that's the real value. It's the common good that is the value to you personally.

>> And dare I ask, is that true without yet having a bead on so-called sterilization immunity, how much the vaccine prevents onward transmission versus coming down with symptoms and troubles if you should be infected?

>> You think there are two things that really are unclear in this debate. The first as you mentioned is the transmission issue where they say, okay, you know we know these vaccines protect you from severe and even mild disease, but could you possibly be a carrier even if you've had the vaccine. I'm going to go out on a limb here and just say I really feel like that has been overblown. It's a limb because I don't have good data to support why I'm going to say that. But most vaccines don't work like that. You're not a carrier of measles if you get the measles vaccine. That's just an unusual thing for a vaccine to not at least significantly cut down on transmission. It might not be perfect. I also just think as a public messaging thing, that's terrible. We need people to go get the vaccine. The more vaccine we have, the less virus we'll have circulating. To be told, well, you should get the vaccine but there's no personal benefit to you if you get it. You still can't get to see grandma, you still can't have a birthday party, you still can't hug people. Oh, I was reading somewhere they said but don't worry, you know now catch up on all the medical stuff you've been deferring. You can go get a colonoscopy now if you get the vaccine. This is not a winning argument. And so I just think that that is -- it is a possibility. I think scientists need to take it seriously. Public health people need to take it seriously. The general public, go get the vaccine. Do wear a mask because it's helpful to everybody if you're wearing a mask in public, especially in indoor spaces or crowded spaces where you can't distance a little bit. I really think that people deserve to have some hope.

>> Among the many things you were sharing was the fact that while the efficacy rates may be quite different, those are pegged to whether somebody comes down with COVID symptoms. And even the ones that may not be as efficacious there appear to be quite good and preventing hospitalizations and death, which is, of course, what makes this different from a cold or, you know, despite its death rate even the flu, which might mean then that a -- one of the vaccines that is not as well regarded from a pure efficacy percentage standpoint might still be quite

helpful for one's purposes to know you can go see grandma and neither you nor she will die as a result of that. I do wonder, I guess we don't quite know yet whether long COVID is a function of mild COVID but indefinitely or if that is lumped in with severe hospitalization, et cetera, kind of thing. Will these vaccines -- is it too early to tell if they help with long COVID?

>> Yeah, it's really interesting you asked me that because I friend just called me up and said I don't know if I want to get this Johnson & Johnson vaccine if it becomes available because what if I get a COVID and it's long COVID. Some people who have long COVID, meaning persistent symptoms in terms of fatigue and respiratory issues for months after the original infection, whether you can get long COVID after a mild course originally of COVID. So then the question is if you get a vaccine and then you get a mild case, will you then go on to get long COVID. You know, I really think that -- I don't have an answer. I'm not sure anyone does yet. I think it is being studied. But what I would say is you can just hear in my description -- in the description of what would have to happen, you know, you're talking about one risk multiplied to another small risk multiplied to another small risk. So the risk that you're going to get mild COVID after you get a vaccine and the risk that you're going to go on to develop long COVID is, I think, many ifs. So I feel like at this point the message needs to be pretty simple. Yes, there's all these complexities, there's all this nuance, but hey, let's just go get vaccinated. Let's do it and find out. And I do think that a lot of this will be much more manageable if we're dealing with much smaller caseloads. So if we're just dealing with outbreaks here and there, we'll have some time to be able to figure this out. But right now the name of the game is just to drive down rates as much as we can.

>> Now, is there anything we should know about the state of fda approvals? Right now in the united states it looks like the only games in town happen to be the so-called mrna vaccines from the two vaccine companies. Is that right? Or has fda approved any others?

>> Yeah, I think that they are on the verge of approving the johnson & johnson vaccine, and I think that would be the third in the united states. The european union and britain also have been a little bit faster down the track at approving some others. And, you know, this gives me an opportunity to pivot a little bit more to the thing that I'm really starting to think a lot about that is sparked in part because of this emergence of variants, you know, it's had some profound implications. One of the profound implications that the emergence of variants has is that it really connects all of us to what is happening in the rest of the world with respect to vaccination in a way that it didn't before.

>> We can't be safe until everyone is safe.

>> And that used to be kind of like an aspirational statement, I feel like. Like there is no --

>> An injustice anywhere is an injustice everywhere.

>> Right, right, so that used to kind of be a -- yeah, but here we're talking at the level of cellular biology, this is in fact a truth. Which is if we have a big pool of COVID virus that is circulating

and replicating in a far-flung corner of the world, it may be that string of COVID will outmutate the efficacy of our vaccines. That means all the money and time and effort that we put into vaccinating all of ourselves in this country might be undone by the emergence of a variant in another done. So all of a sudden we have to think very differently about our relationship to other people on the planet. It's really, really -- it's very tangible, right? And you talked about different vaccines being approved by the fda in this country versus around the world. So all of a sudden it's not just how efficacious is pfizer and moderna and johnson & johnson and if I could get it. We also have to think how efficacious is the sputnik vaccine the russians developed. How ification is the chinese -- there's several vaccines they have developed. Cuba is testing its own produced vaccine. So all of those vaccines are really important for us to understand their profile, how efficacious they are, and be able to distribute them around the world rapidly. You may have seen this issue with the AstraZeneca vaccine, another big-time vaccine, a lot of press. Well, it shows that it's only 10% efficacious against the COVID strains that are circulating on the african continent. And in europe they have started pulling back in some countries that use the AstraZeneca vaccine on health workers. So these are major, major implications. We are now really in, I think, a very, very different place as a human species because of this type of problem than we were, you know, even last year. I think we are being driven toward a very different type of relationship with one another that is going to require a global cooperation and governance approach that we still really have to think through.

>> Well, it's fortunate that there's such a high level of trust in our national governmental institutions around the world and in institutions generally. I speak somewhat facetiously. But that's a challenge to which to rise and that's maybe a great opportunity to introduce our guest today, who's been devoting so many efforts exactly to tackling this challenge. So I know know, margaret, if you want to introduce dr. Kerry, hello.

>> That's right. I am just so excited to have my friend, vanessa, join us, dr. Kerry. So dr. Kerry and I have worked a long time together as close colleagues. Just to give you a proper introduction of vanessa, so vanessa kerry is associate professor at harvard medical school. She's an attending physician at mass general hospital in the intensive care unit. And she also founded an ngo called seed that is devoted to building the health workforce capacities of different health workforces around the world. And she's also faculty chair of the program and global public policy at harvard medical school with me. And so she is really been out in front in helping think through and articulate the challenges with this issue of how do we come together as a global community to develop and distribute global public goods like a vaccine. So she's been sort of deep into those issues. I just want to welcome you on and have you tell us a little bit about your journey.

>> Well, thank you for letting me join you. I should add to the bio, I'm a mom of two with kids who are home, so prepare yourselves for whatever bombs start to come in during this talk. But it's a pleasure to join everybody today and to be able to talk about some of these issues. I've been very privileged to work with margaret at the global public policy at harvard medical school. That program was really founded based on the concept that as we deal with health, we have to engage in the public policy space, because as much as we may be implementers, as

much as we may be thinking about ways technology can augment our access to health, our ability to deliver health, at the end of the day if we don't have policies that are actually supportive, invest and uphold and cherish health as first and foremost and our ability to not just survive but to thrive, we are always going to be swimming upstream. I think COVID has demonstrated that for us in more ways than we ever expected. There's been growing data over time that have absolutely shown that health actually impacts economic growth both on a microeconomic level for household where you lose your main bread winner to a disease. There's drops in income, drops in access to housing or people have to move, loss of running water, children less likely to go to school in those houses where you lose that main bread winner. On a macroeconomic level, we know that countries that have invested meaningfully in health have seen growth in their gdp and equally countries that have had devastating health challenges may not have those decreased life expectancies, see a decline in gdp and those countries that have invested specifically in health, like vietnam, they made very explicit investments in health in the '90s and early 2000s that led to masses economic growth and boom. And that exists -- governance is better in countries that have dlef delivery of health services, we've seen less corruption and more increased stability. So the fundamental is just that health is truly fundamental to kind of all of the things that we strive for in the world and COVID has shown that. So the institution for health metrics actually noted that we have lost 25 years of development progress in 25 weeks in COVID which speaks to the disruption and devastation that this epidemic has created. So even though seed global health, we partner with governments to train the needed health care workforce for those governments. It's not sexy to train doctors, nurses and midwives. I think it is. A lot of other people are like, no, no, no, no, I would much rather invest in technology and create scale really fast and bridge countries and that seems like a much more easy thing to do with much more tangible outcomes. But the truth is that if we don't make these investments in people in a health care workforce, we're not able to deliver health care, we're not able to see ebola when we have a health outbreak or deliver vaccines.

>> Vanessa, can I just ask real quick, when you say we've lost 25 years worth of progress, tell me -- tell us a little more about the shape of that. What is it that we have lost by example?

>> So we've lost our ability to deliver vaccinations, to reach hard-to-reach communities. There has been major disruptions in that.

>> Because of what?

>> Sorry?

>> Because of lockdowns in part?

>> Lockdowns, the reallocation of resources from some of these core delivery and primary care towards responding to the pandemic. And so we actually know that there's more morbidity or there's more suffering and death in a decade after a conflict or epidemic than there is usually during the pandemic itself because of that long tail of disruption of services and the need to

rebuild it. The ebola epidemic in 2014 also showed us this, that actually there was more death from the loss of essential services than there was from ebola itself. A lot of -- in fact measles has been modeled there will be more deaths from measles from the disruption of vaccination than there will be from ebola itself in 2014. So the effects aren't always immediate. A lot of them are, but many are actually a long tail over time. But it takes a long time to build that back.

>> And

>>That's something that we've -- you know, it's so funny, we would say that over and over again, you, vanessa, and i. It's so funny. It was such

>> Hard message to get across. It was like

>>it's not Ebola that kills you, it's these other things that kill you down the line, the loss of health services and safe birth, economic being driven into poverty, all of these consequences. I think it's now very obvious to most of probably the people listening that that is the case. It's our lived experience now. We haven't gone to the doctor, we haven't gone to take care -- we haven't been able to have a job. There's a huge eviction crisis, housing crisis. All of these things start to pile on top of one another and I think the temptation is, and it's always the temptation to be avoided. The temptation is like, well, then let's ignore the health crisis and try to deal with the knock-on consequences. And of course that makes sense because you're just trying to, okay, I don't care about COVID, I want to stay in a house, I want to go to work. And so it's trying to make sure that we -- you know, we have to obviously take care of the health crisis before we can stop the -- stop the bleeding, if you will, the knock-on consequences but that's often a hard thing to do for some reason.

>> No, I think it's absolutely true. I think that the reality is that since the beginning of the pandemic health security is national security, individual and human security, right? Our ability to go to school, our ability to go back to work, our ability to grow our economy, all of these things are related to our ability to stop COVID. And that's our urgent medical thing in this moment. And so I think the reality is that people have to realize too, and this brings me to the whole vaccine discussion that I think is so critically important, right? I think for Americans we're sitting there just counting the moment until we get our vaccine. There's 205 million Americans out of 330 that are eligible to get a COVID vaccine. And we will get a vaccine in this country. But what we have to think about is that our safety and well-being just to be enlightened, you know, sort of self-interest, if you will, is related to the entire world's ability to be vaccinated and to shut down transmission. We live in a very global world now. So even if you do not have a passport in this country, even if you do not leave your city, your state, you are still very vulnerable to what is happening elsewhere in the world and we have seen that. If you look at the way COVID hit the united states, there were two different genome types of COVID. One on the west coast and one on the east coast. One came in from europe primarily and one came in from china primarily. But the point is COVID arrived here either way from somewhere else. We're now seeing the variants of COVID from brazil, from the one originated in south africa, the one that originated in the uk and now we have one that is homegrown in california. These

variants are forming, but they're moving around the world. Our ability to cut off the transmission of these new versions is going to be if we get everybody vaccinated in the world because it just -- we don't shut down movement at this point. It's unrealistic to think that you can build a wall and you will be safe.

>> And just to distill your point about enlightened self-interest, you're saying if there is a temporal hoarding of vaccine in only certain countries, generally the wealthy ones, the ones that have made the deals to stock it and get it, there will be enough incubation and evolution of the virus in places that don't have those deals and then international travel will mean those new variants will come back and the vaccine will not be protective, even within the wealthy countries where the people have gotten it.

>> Very succinct and exactly the point, I think, just to give that example. There are three sort of live vaccines going out in the world right now. There's Pfizer, Moderna and AstraZeneca. J & J is about -- it's now been getting approvals to be able to roll out, but there's three primary vaccines. Moderna and Pfizer vaccines have been purchased almost entirely by the United States and six other countries all in western Europe and/or Canada. Canada has bought enough to vaccinate its own population anywhere from five to nine times over. The US enough to vaccinate our population three times over. This is the vaccine that we have kind of pre-purchased and are holding onto.

>> By three times over, just to be clear October arithmetic, is that three shots or three --

>> No, no, you can go get three full shot sets of vaccine if you needed to. And so the reality of that is, that's not available for other places around the world. So AstraZeneca, and we can talk about the mechanism AstraZeneca came through in a moment. But the third sort of live vaccine that was developed in partnership with Oxford and AstraZeneca became what is known as the world's hope. That was the only vaccine left over for other countries to access that was far along in the pipeline. So the AstraZeneca vaccine is now being mass produced and delivered to countries around the world, but they started to roll it out in South Africa, where there's a new variant that has shown it's incredibly contagious and the AstraZeneca rollout in South Africa has shown the vaccine only works 10% of the time. That means that if you vaccinate 10 people with the AstraZeneca vaccine, nine out of those ten people will still get COVID even though they are vaccinated with the AstraZeneca vaccine. So South Africa shut down its delivery of AstraZeneca vaccine because it was not a good use of its resources to give a vaccine that is not able to manage the variant that is in the country. The problem is then we are going to see that variant in the United States. We already have. And so if that is more contagious and we are not able to -- you know, we are going to be vulnerable. Even if we get ourselves totally vaccinated, there is the very real scientific possibility that there will be a variant out there that escapes the

vaccination, that is able to mutate and all vaccines are no longer work against it and that could create the fourth wave. Although I would argue we have never emerged out of first wave.

>> Maybe a little question and then a bridge. The little question is just what data do we have and how reliable is it on the Russian and Chinese initiated vaccine programs and how their vaccines are doing and Cuba is in the mix as well. So curious if you have a lead on that. And then the bridge is to talk COVAX, which is harkening back to Margaret's observations about a way to have a global approach to vaccinations to avoid these problems that you've been describing.

>> so I think these are great questions. The Russian vaccine, I haven't actually had a chance to look in full force on all the data, but the overarching, and Margaret, you may want to weigh in a little bit on this too. But my understanding is it's 92% effective. It's a two-dose regimen about 92% effective. Meaning if you would vaccinate 100 people, 92% would go on to be protected against COVID. It is very temperature stable, so it can be stored in normal temperature. Everyone has given a critique of Pfizer that it has to be incredibly, incredibly cold. And it's actually medium priced compared to the other vaccines, so the sense is that it's probably pretty effective. The Chinese vaccine I think in the studies that have come out have had variable efficacy. I don't think we have a good sense of where that efficacy is on the Chinese vaccine in full and I've seen data come from where it's been rolled out in different countries come back with different results. It's very difficult to know how much of that is related to population, to various discrepancies in the trials. Margaret, do you want to say something?

>> no, no.

>> so I think the Chinese remains a little bit more -- a little less understood and a little bit less known in terms of its efficacy. The one, though, that is getting a lot of attention is the one coming out of India because the Serum Institute of India has done a terrific job of producing a vaccine that has been homegrown in India. They actually have unbelievable manufacturing capacity because one of the things that also is going to come up in here is the ability of those vaccines that we do have available to make them available quickly. And so the ability to manufacture things rapidly is going to be very important when we do have an effective vaccine. And the one in India has proven to be effective. They have been able to mass produce it very quickly. They have actually been willing to license it to others to vaccinate. They have been actually providing vaccines for neighboring countries. So Bangladesh, which is traditionally a very vulnerable, extremely dense country, so high risk for having very bad COVID outcome already has access to the vaccine because of India. So one of the challenges isn't just about producing new vaccines in other countries, we have effective vaccines. We have vaccines that work, we are just not allowing them to be manufactured rapidly enough to make them available to people. Instead we're waiting for other vaccines to come online, which you need all

of them, right? We can't just say let's wait for the chinese to come online, we have three very effective vaccines and a fourth that's coming up. We should be producing those rapidly and thinking a lot about trade agreements and access to licensing and ip. That's going to be critical to our ability to deliver vaccines in a timely fashion. And I think the next question is about COVAX. I think that was a big purpose of COVAX was to take the research and development industry of pharmaceutical companies and to create a system of collaboration and bring people together to solve a common problem by creating kind of a unified global market for those pharmaceutical companies to be able to respond to. And so COVAX is the vaccine arm of the act accelerator which is a multi entity effort by the u.n., w.h.o., sepi and others to make vaccines, pharmaceuticals and tests available. And COVAX is specifically the vaccine arm. And what they did is they created a consortium of countries that could pay and those that couldn't pay to basically crowd fund money to support the research and development of vaccines for all the companies and folks that sort of agreed to come into COVAX. They created money for research and development, which is usually one of the big barriers is that pharmaceutical companies don't want to lose money in research and development because it's about a billion dollars to do that. They also created a guaranteed market, which said we will buy doses. If you have an online vaccine that you produce, we are going to guarantee you the ability to manufacture, we'll give you money for manufacturing and give you money to buy the doses. So they basically derisked the entire vaccine process. What they also did was create a common market. Because if you think about it, sweden doesn't have a huge market share in terms of its population. But if you combine sweden with japan, with most of europe, all the countries in africa, europe, asia and south america, suddenly you have five, six, seven billion people of the world who need a vaccine and you're guaranteeing the market. That's why COVAX was so innovative and extraordinary.

>> So to get into the nuts and bolts of this, it's interesting to call it a market because it's a pretty high-stakes negotiation on behalf of a billion people to say what the per unit cost of the vaccine will be. Can you give us a little texture of how that works? How if you're the pharmaceutical executive, how do you set the price? And if you are -- how do you say what you're willing to pay?

>> This is a terrific question and I'm not sure if I can answer all of it because a lot of it is not necessarily -- I think there's been huge amounts of back and forth and a lot of it has been under various levels of secrecy and negotiation. But the idea was really so COVAX brought together 190 countries that bought in. About 50-50 of the countries that could pay and the countries that can't pay. And I think that what they effectively did was they kind of -- there's some bargaining power of COVAX saying, look, we're guaranteeing you market, giving you money for r & d and you've got to work with us about what the pricing of your vaccine is going to be. I don't know the specifics of sort of how it ended up breaking down to what the per capita price was. And it's worth noting that pfizer didn't join COVAX until about a month ago. It's worth noting that moderna never joined COVAX, so there are some countries -- I mean there are some pharmaceutical companies that said we're going to do this our own way. And I'll talk a little bit

about why they made some of those choices. There were other companies that said, yeah, we're going to do this I think because we either need the money. In the case of AstraZeneca, they're not traditionally one of the biggest vaccine makers. So the biggest vaccine makers in the world have been Sanofi, Merck and Pfizer. So there was the option to go into the US System. So under trump the u.s. Said we're not going to buy into COVAX. We're going to do our own thing. We're going to incentivize companies in the u.s. Through operation warp speed and some other companies to be able to -- they basically became a competing mechanism to COVAX. Did the same thing derisk but took control from a u.s. Government standpoint. Pfizer is interesting because they didn't take federal funds. Pfizer actually said we're going to stay in our own little lane because this is -- I think they took an approach of it's too dangerous to take federal funds for a variety of reasons. I think they also felt like it was too dangerous to join COVAX initially. So they said we have the ability to do this on our own. We're going to go forth, develop our vaccine on our own with our partner, biontech and this will come out when we have a successful vaccine, we'll get paid for it and it will work out.

>> A really interesting analogy to the campaign finance system in the u.s. And whether you buy into public financing of your election in exchange for caps on what you spend or if you just say, eh, I'll opt out. If you are the stronger, more experienced, better supported candidate.

>> I think it's a very good analogy. Pfizer, interestingly, though, did reserve some of its vaccine for developing and non-u.s. Countries. They wouldn't sell their entire package to the u.s., although they have sold a lot and they are slated to make 15 billion off the vaccine. So I think there's -- it's complicated. But a company like AstraZeneca that felt like they had a handle on this new technology but wasn't a major manufacturing giant, there's a huge advantage to go into COVAX to be guaranteed some of that r & d money, guaranteed a market and guaranteed the ability to produce a vaccine. That was part of the incentive for them to join COVAX and to be a part of it. The way it works, though, is that COVAX has to crowd source the funding to basically fund the vaccine delivery and distribution. They were very successful in 2020 to raise the \$2 billion they needed to kickstart it, but they need \$4.6 billion now to manufacture and deliver the vaccine at only 20% of the world's population for 2021. That's the goal. Is to get 20% of every country vaccinated, which should be enough to cover the most vulnerable, those that overwhelm the health system, and to be disruptive enough to transmission patterns. Margaret, I agree that the change in leadership made a big difference in the numbers we're seeing but we have had enough people infected that it's a little bit harder to transmit at this point than it used to be when everybody was entirely vulnerable. That's not a reason to not wear a mask. Everybody needs to wear two masks and socially distance in this moment, but it's simply to say that I think we're a little bit farther along, unfortunately, towards that herd immunity with a great cost of life, a great cost of opportunity and economic growth and with a really important realization that those that are most vulnerable going into this epidemic, the ones that are, you know, either socially or economically disadvantaged, people of color, you know, those are the folks that are going to be -- that remain paying the highest price of this epidemic and will for years if we don't figure out how to fix it.

>> The other interesting -- fantastic and I'm glad you fielded some of those questions, Vanessa, because I'm just starting to parse them. One of the interesting things about COVAX was that essentially it was offered up or sold as an insurance policy. So they basically knew that countries, you know, like the United States would go and try to cut their own bilateral deals with various pharmaceuticals. But doing that was a big -- was placing a big bet, right, that the pharmaceutical company that you invested in or we invested in, Pfizer, was going to produce a workable vaccine. And so they said, okay, what we will do is our R & D will invest in a whole portfolio of potential vaccines and will then, if you pay into it, you'll have access to the ones that end up being successful. It was I felt like it was a really creative and thoughtful idea about how to make this global governance structure work. Go ahead and pay in, we'll be this insurance policy, we'll bet on all the horses for you so that you at least have some access. I think that the variant issue is really throwing a wrench into everyone's plans here because it's not just like, oh, let's get along, it's nice to have some global cooperation, you know, and have a little insurance policy for us in case our stuff doesn't work. It's like, oh, my goodness, we might not -- it just means the bets that you placed might be much more risky than, you know, any one country envisioned. But I think it's those types of things. I think COVAX I hope will become a household name in the United States because I think those are the terms in which we are going to have to be thinking as a country, just like most -- most households knew the phrase the Marshall Plan after World War II. They knew what that was. It was to reconstruct Europe. COVAX is an idea. I think it's gotten off to a slow start potentially, but I think that's the kind of -- those are the terms that people will need to start thinking in as citizens.

>> And does COVAX -- it's so far been described as a way of unifying and making more consistent the production and market clearing pricing and funding of provision of vaccinations around the world. Presuming supply still remains limited and, therefore, there's going to be a question of who gets what, because it's not like there's going to be a bidding war. The whole point was to negotiate a price. Everybody is paying the same price but there isn't enough of it to go around and a raised price isn't going to happen to figure out who gets it. Does COVAX then make the decision about where that next batch of fresh vaccine is going to go?

>> It's a very complex algorithm. Basically they're fairly vague on how that algorithm comes out, but effectively the idea -- there is. There's a distribution model that gets created as the doses come online who gets access to it. Part of it has to do with where it's getting manufactured and who is closest, but it's supposed to be equitable distribution. I think the thing to remember is that we really have only just come to the point where we're distributing the vaccine through the COVAX mechanism of AstraZeneca. And to Margaret's point, there is a complete wrench now in this plan because an entire continent needs a different vaccine than they had been slated for. So originally as the doses were rolling off the manufacturing press, there was you're going to get 1 million doses, then you're going to get 2 million and based on population it was an algorithm based on population, based on how many people were infected, based on

vulnerability and a whole host of things that allocated how much of that vaccine you got. As it was produced, you would be given your first million doses and then you get the second million as it came off the manufacturing press. With the variant that has been shown to basically be resistant to the vaccine that is available, it's very complicated because the assumption again is that the variant that originated in South Africa is probably the predominant strain now over at least south central and eastern Africa. And probably the whole continent. And so that means that there's 50 more countries that are not necessarily going to want to use AstraZeneca. And that's a problem. That said, I think there -- countries are still bringing it out and are planning to deliver it because I think there's still an approach that that might be better than nothing. Pfizer is now trying to increase its manufacturing capacity for non-u.s. Doses and I think the question becomes how to we access others that have been going to neighboring countries. The vaccine is in stage 3 trials but has data anywhere from 50% to 91% effective, depending on which country you're in and which study you're looking at. So I think this is a constant scramble. Any information I gave to you today would not be accurate tomorrow or next week. So --

>> As we start to bring this in for a landing, is there any low-hanging fruit left that hasn't been seized? For example, and this is inspired by Hannah's question in the q & a. Might there be pharmaceutical companies whose vaccines didn't pan out but have a ton of manufacturing capacity for which there could be some way to have them licensed and then produce the vaccine that had been created by their rivals? Is that happening?

>> That's happening. That's actually already happening where there's been licensing agreements that have been given to -- I'm now going to blank on it. But I believe that -- I want to say I don't think it's Merck. I can't remember which one, Margaret, you may remember. But there have been licensing agreements where the big three that kind of failed are either bringing in boosters to make vaccines more efficacious and they're being licensed to do that, which I think is what Merck is doing, and then I forget which one has just been licensed to produce like 200 million vaccines in partnership with AstraZeneca.

>> Yeah. I'm not sure. I guess I would say I saw Hannah's question and thought it was nicely put. I think there are two things to say. One is that that's right, the licensing thing is really a big deal now and there has been some degree of sharing of -- permission of licensing to produce in other places, but there's also been some complaints filed with the world trade organization around whether countries should be allowed to produce vaccine, you know, as a generic essentially in their own countries and that's going to be adjudicated, I think, in march, number one. But the larger point that I thought was pointed out by the council on foreign relations, which I think is really relevant, one year into this pandemic and to date, you know, there has not been a convening of world leaders on how to figure this out. You know, I think -- I am very interested in ideas about -- I think leaving this up exclusively to the world health organization, which I totally respect and love, wonderful. But like we need to go big here. You know, this needs to be the center of gravity for our global diplomacy community. I mean this is really

complicated stuff how this is going to happen, and we need to get together, just like if we were fighting world war ii. We wouldn't sit back and be like, oh, let's have this all depend on a contract agreement between this company and this -- no. This is something we all have to sort of get into on a high level here. So that's where I think that that would be the thing that we should look for is a convening of world leaders to really map out a global strategy that's not just leaving things like COVAX, which is awesome, but it's just gone beyond their -- you know, the problem is so great that it needs a much greater degree of attention.

>> And I might add all health problems do. I mean health is central to almost all diplomatic negotiations. Sanctions have huge health ramifications. There's -- you know, when we think about trade agreements and the things that we give up. So I would argue that health plays a role in diplomacy at every level, even beyond the vaccine.

>> Well, we surely do need convenings that match the gravity of the problem, not just this problem but as you say, vanessa, the larger persistent range of problems where health is not just between a doctor and a patient but is truly an interdependent and community thing. I'm so grateful for this gathering that we had. As another snapshot in time. I'm aware of your point that anything said here might not be true two weeks from now. It's still quite a dynamic situation, and I hope we'll have a chance to keep checking in as we go. But, vanessa, thank you so much for spending time with us, for sharing what's going on. I put in the link to seed's global health site in the chat room. Feel free to put anything else in that's of use for attendees. I want to thank chris small for offering logistical help. Will Marks and Sophia Carter for their research help and advice and Lydia Rosenberg and Reuben Langerin for making the broadcast itself happen. So thanks again so much and, Margaret, always a pleasure even if it means topic is a grim one talking this stuff through and trying to puzzle it out.

>> thanks so much, Jonathan. It is always a pleasure. I feel like I have my arms around it a little bit more after talking with you all at these sessions. So thank you.

>> Very good.

>> Thank you.