AMERICAN PUBLIC HEALTH ASSOCIATION

and

THE NATIONAL ACADEMY OF MEDICINE

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RESPONDING TO COVID-19: A SCIENCE-BASED APPROACH

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WEBINAR #20: COVID-19 CONVERSATIONS:
A TALE OF TWO PANDEMICS: COVID-19 AND GLOBAL VACCINE EQUITY

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WEDNESDAY
JUNE 23, 2021

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The webinar convened at 5:00 p.m. Eastern Daylight Time, Dr. Helene Gayle, Moderator, presiding.

PRESENT

WILLIAM FOEGE, Rollins School of Public Health, Emory University
HELENE GAYLE, The Chicago Community Trust
BEATRIZ GRINSZTEJN, Evandro Chagas National Institute Chagas - Fiocruz
GAGANDEEP "CHERRY" KANG, Christian Medical College, Vellore
SALIM ABDOOL KARIM, Centre for the AIDS Programme of Research in South Africa (CAPRISA), Columbia University

ALSO PRESENT

GEORGES BENJAMIN, Executive Director, American Public Health Association

SUSAN POLAN, Associate Executive Director for Public Affairs, American Public Health Association

C-O-N-T-E-N-T-S

P-R-O-C-E-E-D-I-N-G-S

5:01 p.m.

DR. POLAN: The conversation today is going to focus on A Tale of Two Pandemics: COVID-19 and Global Vaccine Equity. And it's brought to you by the American Public Health Association and the National Academy of Medicine.

Today's webinar has been approved for 1.5 continuing education credits for CHES, CME, CNE and CPH. Please note that the speakers have not disclosed any conflict of interest concerns. If you want the continuing education credit, you should have registered with your first and last name. Everybody who wants credit must have their own registration and watch today's event in its entirety.

All the participants today will receive an email within a few days from cpd@convex.com with information on claiming credits. All online evaluations must be submitted by July 28, 2021 to receive continuing education credit.

If you have questions or topics you would like us to address today or on future webinars,

please enter them in the Q&A box or email us at apha.org. We will not be recognizing people who raise their hand so please use the Q&A box, if you have any technical difficulties during the webinar as well.

Please pay attention to the chat box for announcements about how to troubleshoot.

The webinar will be recorded and available on covid19conversations.org in the next couple of days. More information on the series of recordings of past webinars are also available at that link.

With that, it is my pleasure to turn it over to Dr. Benjamin.

DR. BENJAMIN: Dr. Polan, thank you very much. And, you know, I just want to thank everyone for being here today. I think this is a very important conversation. And to get us started, I want to introduce my good friend and colleague, Dr. Helene Gayle.

Dr. Gayle is the President and CEO of Chicago Community Trust, which is one of the nation's oldest and largest community foundations.

She is an expert on global development, humanitarian and health issues and privacy work for the Center for Disease Control and Prevention focusing mainly on HIV and AIDS.

She is also the co-chair of the Committee on Equitable Allocation of Vaccines for the Novel Coronavirus of the National Academy of Sciences Engineering and Medicine, a report that was released back in 2020 that produced the framework for equitable allocation of COVID-19 vaccine in the United States.

Dr. Gayle, over to you.

DR. GAYLE: Thank you so much, Dr. Benjamin and thank you for convening this along with the National Academy of Medicine. I think this is going to be a really important discussion.

And, you know, we have all had many discussions about COVID-19 and in many ways those discussions have sometimes been on parallel tracks. And so this is an opportunity to actually talk about the whole pandemic in a global way.

We all know that this is one of the most extensive humanitarian and economic catastrophes of our modern time. Here in the United States where

I am, you know, we have surpassed 600,000 total deaths, but we also know that the case rates and hospitalizations are declining thanks to the access to vaccine.

And while the vaccine uptake has slowed in the last few weeks, we have done incredibly well in terms of, you know, particularly our adult population where vaccine uptake has been brisk and access to vaccine has really improved.

So, you know, we have nearly 80 percent of people over 65 years of age fully vaccinated, 65 percent of people 18 years and older have received at least one vaccination. But that's in stark contrast to the rest of the world, and we'll hear more about vaccine accessibility and vaccine rates in the rest of the world.

While, you know, I think, and I have spent a lot of my time over the last year focusing on the disparities between communities of color who have been disproportionately impacted by the COVID pandemic overall, we know that here in the United States relative to the rest of the world, we have made substantial progress.

We also recognize that, you know, in a global pandemic, while we may be doing better here in the United States and starting to see our cases come down, if we talk about a global pandemic, none of us are safe unless all of us are safe.

So we know, and we will hear more about the different variants that are circulating around the globe, how that's impacting us here in the United States but more importantly how is that rolling out around the rest of the world?

From a selfish perspective, we know that, you know, we are not going to be able to protect our population unless the rest of the world is protected. But from a broader perspective and from where I think it really counts the most is that the United States has always been a leader when it comes to work on global pandemics.

And so, you know, we have to think beyond just how the vaccine effort is rolling out here in the United States and really think about what is going on in the rest of the world and how do we continue to play the kind of role that is critical given the resources we have here.

You know, on one hand, this administration, the Biden administration, has stepped up and is in contrast to the previous administration. On the other hand, we recognize that nobody is doing enough when we think about the disparity in vaccine access around the rest of the world.

So I will not go on about these issues just to say that I think this is an incredibly important discussion and I think one where we need to think about how are we making sure that the whole world and the whole globe has the kind of access that is necessary so that we really can do what we need to do to stem this twin epidemic that is a public health crisis but also an economic crisis?

So without further ado, I want to introduce our excellent speakers, our four excellent speakers that we have.

First we will have Dr. Salim Abdool Karim, who is the Director of the Center for the AIDS Program Research in South Africa, who I've had the pleasure over many decades to work with. He's also the Vice Chancellor of the University of KwaZulu-Natal in

Durban, South Africa and Adjunct Professor of Medicine at the Weill Medical College of Cornell University. He's also a Professor of Global Health in the Department of Epidemiology at the Mailman School of Public Health at Columbia University, a member of the National Academy, widely recognized for his work in HIV as well as other global pandemics.

Second, Dr. Beatriz Grinsztejn, who is an infectious disease physician and researcher at the Evandro Chagas National Institute of Infectious Diseases, the Oswaldo Cruz Foundation of Rio de Janeiro, Brazil. She is the director of the STD/AIDS Clinical Research Laboratory and principal investigator of the Fiocruz HIV Prevention and Therapeutic Clinic Trials Unit and has been working on HIV/AIDS patient care and research and prevention treatment for the last three decades.

I think you will see a theme that many of us started and did a lot of our public health research in HIV, another global pandemic, and on learning lessons from that as well.

Third, we have Dr. Gagandeep Kang, who is an infectious disease researcher at the Christian

Medical College in Vellore, India and an adjunct professor at Tufts University School of Medicine. Dr. Kang is known for her interdisciplinary research in studying transmission development and prevention of enteric diseases in children in India as well as building national surveillance networks for rotavirus, typhoid and supporting and conducting clinical trials of vaccines.

I would just also want to say thank you particularly to Dr. Karim and Dr. Kang, who are doing this at incredible hours on their time. And so it's early hours in the morning for both of them. So thank you for being with us.

And finally, last but not least, Dr. Bill Foege, internationally renowned physician, epidemiologist, who was one of the co-leads of the smallpox eradication campaign, former director of CDC, founder of the Task Force for Global Health and Executive Director of the Carter Center. He is now a presidential distinguished professor of International Health at the Rollins School of Public Health, Emory University. And I was so pleased to be his co-chair on the panel that Dr. Benjamin

mentioned on the equitable allocation of the COVID vaccine that we co-chaired last summer.

So as you can see, an incredibly distinguished panel. And I will turn it over to Dr. Abdool Karim.

DR. KARIM: Thank you very much, Dr. Gayle. I'm just trying to -- the host has started my video.

DR. GAYLE: Yes. I see that the slides may not be in the order that I thought. Do we want to change the order of speakers or change the order of slides?

DR. POLAN: Change the order of speakers, please.

DR. GAYLE: Okay. Sorry about that. Dr. Grinsztejn, we will turn it over to you first.

DR. GRINSZTEJN: Great. Thank you very much. Good morning, good afternoon and good evening, depending on where you are.

Thank you very much to the organizers for the invitation to present today. It's a great honor, a truly great honor to participate in this webinar.

Next one. I will provide a brief overview of the COVID-19 pandemic in Latin America with some highlights from Brazil.

I will then address some of the public health challenges and conclude with some opportunities at national and international levels.

Next one, please. COVID-19 evolved into an unmatched global public health emergency, and Latin America has been severely affected by the rapid spread of this disease.

The first cases in the region were reported in Brazil and Mexico in February 2020. Despite representing only 8.4 of the world's population, Latin America accounts for 20 percent global cases and 22 percent of COVID-19 related deaths worldwide. To date more than 36 million cases and over 1.2 million deaths have been reported in this region.

The response to COVID-19 in Latin America has been hampered be inadequately resourced health systems, widespread health and socioeconomic inequalities and the weak state capacity to mount a comprehensive health, social and economic response

to the pandemic.

Next one, please. This graphic provides a picture of the current situation of the COVID-19 pandemic in selected Latin American countries.

On the left, we observed a decrease in some countries such as Argentina. Nevertheless, other countries such as Brazil and Peru have alarmingly high increasing rates of new cases.

Of the 10 countries around the world with the highest daily death rates per capita, seven are now in South America. Together South American's death rate per capita is eight times the world's rate.

Peru, which represents less than 8 percent of the South American population accounts for 6.5 percent of the cases but represents almost 20 percent of the deaths reported in the region.

Brazil leads the South American region with its COVID-19 cases and deaths, accounting for almost 60 percent of the cases and more than half of the COVID-19 related deaths.

On the right, the graphic shows a disproportionate number of new deaths in Brazil

with over half a million COVID-19 deaths in total.

Next one, please. Brazil is the largest and most populus country in the region but socioeconomically it's one of the most unequal. Currently, the country has the third number of confirmed COVID-19 cases globally and ranks second worldwide in the number of COVID-19 related deaths.

Despite representing only 2.7 percent of the world population, Brazil accounts for 10 percent of all COVID-19 cases and 30 percent of all COVID-19 related deaths globally.

Next one, please. As Brazil is still grappling with the COVID-19 pandemic, epidemiological data shows a significant increase in hospitalizations and deaths of young adults due to COVID-19 with a substantial change in the demographic characteristics of hospitalized, severe and fatal cases.

In these graphs, the red lines represent numbers gathered in mid-June 2021 compared to the blue lines, collected in early January 2021. There is a left shift on the epidemiological curves in both graphs representing a decrease in the median

age of hospitalized cases and deaths.

On the left, the median age of people hospitalized by mid-June was below 60 years and this downtrend each week. As such, more than half of the hospitalized cases occurred in people aged less than 60. On the right, the median age of people who died has decreased in 13 years since the beginning of this year and is approaching 60 years by now.

Next one. As the pandemic evolved, several variants of SARS-CoV-2 emerged across the regions. Of the four variants of concern described so far, Alpha and Gamma were described in most Latin American countries.

Gamma first emerged around early November 2020 in the northern region of Brazil, the Amazon, and rapidly spread throughout the country and regionally.

Through the integration of genomic and mortality data, researchers have estimated that Gamma may be up to two times more transmissible and more likely to evade protective immunity elicited by previous infection with non-Gamma lineages.

Nevertheless, no data yet support that

this variant is related to worse clinical outcomes.

Despite substantial advances, the implementation of genomic surveillance remains a challenge for most developing countries where access to whole genome sequencing is limited.

The broad SAR-CoV-2 lineage diversity circulating in Latin America will exacerbate the impact of the pandemic in the region and even compromise the success of vaccination strategies.

However, the limited number of available genomes for the region compared with others prevents a clear view of the overall genetic landscape reaffirming the need to strengthen genomic based surveillance systems.

Next one, please. The advent of COVID-19 vaccines brought the possibility of ending the tragedy caused by this pandemic.

In this map, you can see the proportion of the population fully vaccinated against COVID-19 in each of the depicted countries. Latin American countries are struggling to get their citizens vaccinated and vaccine rollout in the region has been slow.

Next one. This graphic shows the distribution of COVID-19 vaccines for manufacture in selected Latin American countries. A primary concern is that a large proportion of those fully vaccinated received low efficacy vaccines such as CoronaVac, which has a 50 percent or lower efficacy.

Thus, the combination of a slow vaccination pace and the extensive use of a suboptimal vaccine may promote the surge of new variants and prolong the high burden of the epidemic in the region while other nations are already celebrating a semblance of normalcy.

Next, please. Besides the catastrophic health situation, the increasing poverty projected by the economical nation for Latin America and the Caribbean for 2020 signifies a 13 year setback for the region, reinforcing the importance of countercyclical public social spending and social policies aimed at moderating the effects of the crisis on real economies and curbing the rise in unemployment and poverty. Currently, Latin America risks facing a new loss record as it did 40 years go.

In Brazil, the economic crisis, which had already impacted the social achievements obtained until 2013, increased its negative momentum in 2020 with the COVID-19 pandemic.

COVID-19 had an early precedent impact on Brazil's labor market, resulting in almost 13 million job losses between December 19 and August 2020. This reduction in employment disproportionality affected informal workers, women and younger workers.

The graph on the right depicts the more than 40 million Brazilian families in extreme poverty as of October 2020.

This represents almost 40 million people with the per capita income of less than $16 U.S. dollars per month.

Next one. Even in the best of times, the Public Health Systems within Latin America are fragile. However, the COVID-19 pandemic taxed these symptoms beyond their limits. And COVID testing capabilities, late diagnosis, medication shortages, oxygen shortages and bad shortages made an already challenging job for health care workers nearly

impossible.

Another challenge is the impact of the COVID-19 pandemic on science. In Brazil, the COVID-19 pandemic is accelerating brain drain, consequently affecting Brazil's intergenerational development plan and educational future.

Before the pandemic, the government's relationship with universities and the scientific community was already in turmoil. The education and science sectors had suffered more than most and public universities have seen up to 80 percent of their budgets frozen.

The relationship between the Brazilian government and science has worsened during the pandemic. As a result, the country is at risk of possibly losing a generation of Brazilians who could contribute to the national scientific, educational and economical development in the long-term.

Therefore, this brain drain can have lasting effects, crippling Brazilian scientific research in the short-term and promoting an intergenerational gap in education.

Next one, please. Over 1.2 million Latin Americans have died of COVID-19, and Brazil recently reached the green milestone of half a million COVID-19 related deaths. Unfortunately, we cannot predict when and how this tragedy will end.

The challenges to achieving a high rate of effective vaccinations throughout the region mean that there is still a significant risk for the continuous emergence and dissemination of new variants.

As the more SARS-CoV-2 circulates, the more opportunities it has to evolve. If the vaccine rollout doesn't rapidly scale-up, this disease will continue to be fueled.

Latin America urgently needs mass vaccination to stop this. Additional scientific collaborations and funding for research are urgently and critically needed to improve care, treatment and prevention efforts against COVID-19 and prepare for future pandemics.

Together we can use our country and regional level data from this pandemic to make strides in the study of global health.

As best stated by Jonathan Mann, health care right is a human right. This statement has never rung as true as it does now. The COVID-19 pandemic has similar parallels to the AIDS pandemic we have fought for 40 years. the most vulnerable populations that struggle from poverty and social inequalities are the ones that suffer the most in both diseases.

As stewards of public health, together we must learn from these experiences and continue to bridge the gaps in our health care systems to ensure human rights for all.

Next one. Thanks very much for your attention.

DR. GAYLE: Thank you very much. Really great reflections. And I think it, you know, speaks not only to the Latin American region but the issue of global disparities both between as well as among countries.

So I see that the next person in the line-up is Dr. Kang. So Dr. Kang, thank you very much, and I will turn it over to you.

DR. KANG: Thank you very much, Dr.

Gayle. So I'm going to be talking to you about what it's like in India with a special focus on vaccines. And sometimes to just start talking about India is a humongous challenge because the numbers seem sometimes beyond comprehension.

India has 1.37 billion people so over one-sixth of the world's population. We have currently had about 30 million cases of SARS-CoV-2 infections, and we've had 392,000 deaths. And most of those cases, 20 million of them, have occurred in 2021 and the bulk of the deaths have also been this year.

Actually, when we started in January 2021, there was a sense of huge optimism in the country because we have two vaccines that had been approved by our regulators.

The numbers of cases we were seeing were less than 10,000 a day. We had been through the first wave. We hadn't reached 100,000 cases a day.

And that peak was in September. So we had almost three months of declining cases despite the fact that we had gone through the winter, we have a lot of festivals in winter. We had opened

society up. We hadn't had too bad a time of it. A blip in Delhi, but the rest of the country looked like it was doing all right.

So India was making vaccines. We started our vaccination program on the 16th of January. And during that time, we had vaccines that were available first for health care workers, as with all other prioritized populations. But we were also able to export some vaccines under the commitments that Serium Institute of India, which is the largest vaccine manufacturer in the world by number of doses, they had promised 200 million doses to COVAX and were able to send some of these doses out to Africa.

In addition to that, the India government purchased doses and distributed them to a number of our neighboring countries and some further afield, some of them as gifts to those countries. Totally, we sent out about 63 million doses of vaccines.

Now when we think about vaccine manufacture and how many people we need to give vaccines to, our adult population is 950 million. So if we are to immunize all adults above 18 then

we need about 2 billion doses of vaccine.

In pre-COVID times, India made about 3 billion doses of vaccines, out of which 1 billion were used in India and about 2 billion of those doses were exported, mostly to countries in Africa and to organizations like PAHO for routine immunization programs aimed at children.

Now India has Serium Institute, which is a very large manufacturer and a lot of people know about, but we also have a number of other vaccine companies that make hundreds of millions of doses of vaccines. And some of these companies have been around for more than 50 years.

We also have some newcomers, so the rotavirus vaccines that are now prequalified are made by Serium Institute as well as a company called Bharat Biotech.

Serium and Bharat were responsible for the first two vaccines in India. Serium was making the AstraZeneca vaccine, which is known as Covishield in India and Bharat Biotech went down a tried and trusted route to make an inactivated vaccine for which it used an adjuvant that was

originally designed at the University of Kansas that has now been indigenized by the Indian Institute of Chemical Technology.

These two vaccines were given restrictive use approval in January and brought into the program in January.

Since then we've have the introduction of one other new vaccine, which is the vaccine made by Gamaleya, which is also an adenovirus vectored vaccine like the AstraZeneca vaccine, which is known as Sputnik V, which is widely used in many countries around the world.

It's currently being evaluated by WHO and the AstraZeneca vaccine already has emergency use listed.

About 90 percent of the vaccine used in India so far is the Covishield or AstraZeneca vaccine, and about 10 percent of the vaccine is COVAXIN, which is the inactivated vaccine.

So far India's vaccination program has almost reached, tomorrow in fact, or today it will reach 300 million doses of vaccine. Of this 245 million are first doses and 52 million are second

doses. This means that less than 18 percent of our population has received the first dose and less than 4 percent of our population has received both doses of vaccine.

In India, our routine immunization program covers 27 million children born every year and about 30 million pregnant women. Usually, we have about 27,000 points at which immunization is given.

For COVID-19, we have added another 39,000 immunization points, of which about 38,000 are with the government and about 1,300 are private facilities.

When we started out, we were following the priorities that had been set for the rest of the world, health care workers, essential workers and then doing an age descending strategy.

However, unlike many other countries, we rolled out straight-up very, very quickly. So by the 1st of February, essential workers, 1st of March 60 year olds and above 45 with comorbidities, 1st of April above 45 and 1st of May all adults.

What happened was we managed to reach

a peak of immunization of about 4 million doses a day. And then as soon as we opened up to the entire population, it crashed to about 1-1/2 million doses a day.

We also had some significant policy missteps because in April the central government, which had been procuring all vaccines until then decided to have a policy where it would take 50 percent of all the vaccines produced in the country and provide them for the free immunization of all people above 45 and would allow for states to buy 25 percent of what was produced.

And states had to use that for the 18 to 45 age group and were given the freedom to not provide that for free but to charge people for it. And then the private sector was told that they could have access to 25 percent of the doses, and the vaccine companies could decide the price of that.

It was a pretty tumultuous time for us for the six weeks that all of this was in operation. But on the 21st of January, fortunately we've gone back to a system where the central government is

now procuring 75 percent of doses and distributing them to states for free immunizations in all government sectors. But in between, we had a very difficult time of it.

In addition to this because this is a humongous vaccination program, it was important to set up systems that would allow for people to register for vaccination and to track those who had received vaccines for the first and the second dose.

The government decided to use what had been developed previously as a truly outstanding electronic vaccine information network into an app for registration, which is called the CoWIN app. Unfortunately, in a country which has 22 official languages, this app was only available in English initially and only available on smartphones where smartphone penetration is less than 50 percent of the population.

This has created a digital divide. The pricing of vaccines has created an economic divide, and we had the rather unsalutary reports of people who were from urban areas and were savvy enough

to figure out what was going on to actually registering themselves for vaccination in rural areas.

So driving into rural areas, getting their doses of vaccine and then returning to the city whereas the rural residents did not even know that there was a vaccination program going on.

Some of these glitches are inevitable. Some of them, I guess, we could have planned much better for. And certainly with what happened on the 21st, which is we managed to reach a high of 8.5 million doses of vaccine being given out gives me hope that when we have sufficient supply, we will be able to vaccinate our population.

It's estimated that if we could keep up a pace of somewhere between 8 and 10 million doses a day, we could be looking at having our entire population vaccinated by the end of this year or the beginning of next year.

The problem, of course, is going to be supply. The government has made a very optimistic prediction that we will have 2.1 billion doses of vaccine available between August and December.

I think a more realistic estimate is about 1.4 billion doses, which given what we've used already is close enough to the 2 billion that we are likely to need.

In addition to the issues of vaccine not being available for India, one of the things that I worry about is the promises that India and Indian vaccine manufacturers had made to supply vaccines to the rest of the world.

COVAX had made commitments, particularly to the Serium Institute of India for both the AstraZeneca product as well as for the Novavax product that is currently being manufactured in India. And we have not, after the initial supply, been able to export any of these vaccines.

The need, of course, is urgent within our country. We continue to have well over 50,000 cases a day, having reached a peak of over 400,000 cases a day. But it is for a global community, a huge hurdle that there are many people in South Africa that have been unable to get their second doses of vaccine because we were not able to supply vaccines from India.

The pandemic has led to a lot of economic

difficulties. I'm not going to talk about those. We've had other challenges as well. We've had changing policies on timing of doses on the populations that needed to be addressed, the issues of procurement and distribution.

But I think the one thing that even from low and middle income countries like ours that we cannot ignore is vaccine hesitancy and what is happening because of social media.

The messages that are spreading in our communities are many of the same messages that you see in the U.S. We have many of the communications that come out of seemingly credible scientists in the U.S. being circulated on WhatsApp and on sites that as soon as YouTube takes them down, they appear on other sites and are dubbed into many languages and are being very, very widely distributed.

So issues of fertility, issues of vaccines being potentially dangerous or vaccine escape, all kinds of conspiracy theories are as widespread in rural India as they are in other parts of the world.

I think this is something that we need

to be paying attention to. We are a global community. And we need to be looking at both global and local solutions so that we can address the inequity that we are seeing today.

So I will stop there and thank you very much for your attention.

DR. GAYLE: Thank you very much. And I think it was both informative about what is going on in India, but also the role that India plays on the global stage, which I think is also very important. And I know some of that may dovetail with some of the things that Dr. Abdool Karim will talk to us about.

So I will turn it over to Dr. Abdool Karim to present a picture of South Africa, but more broadly about what's going on on the African continent.

DR. KARIM: Thank you very much, Dr. Gayle. It's a great pleasure to be with all of you here.

It's late my time. But, it's around 5:00 p.m. your time. A great opportunity for me to just share with you, some of the situations that

we're dealing with in relation to COVID-19 and vaccine inequity in South Africa.

So, if we look at the situation in Africa as it stands right now, there are just over five million cumulative cases to date, and about 136 reported deaths.

There are some challenges with these numbers because of the difficulties in obtaining kits and affording kits in some of the countries.

And the reporting is sometimes suboptimal. But, it gives you some impression of the scale of the epidemic.

About 96 percent of the countries have already been through their second wave. And right now, about one out of four countries on the continent, are in the midst of their third wave, including South Africa.

And about two-thirds of the countries that have had a third wave in Africa, the third wave was more severe then what we've seen in our first and second waves.

And indeed, today the New York Times carried an article about the COVID surge in Africa,

raising fears about scenes like what we saw in India.

So, overall the epidemic in South Africa at this stage, is a pretty sobering one as the cases continue to rise, with many countries in Africa going into their third wave. Next slide, please.

If we look at the vaccination situation, vaccine coverage in Africa has been a particularly difficult challenge.

If you look at the map, on the lefthand side, you can see how the lowest vaccine coverage rates in the entire world, are on the African continent.

Indeed, when we look at the number of vaccines available in the world, there are roughly about 22 vaccines available for every 100 people.

If we just look at Africa, it's only about 2.4 vaccines available for every 100 people. So, there's about a tenfold difference in vaccine access in relation to Africa.

And in the midst of this challenge of course, the most countries in Africa have depended on COVAX. And COVAX in turn depended on the Serum Institute of India supplying the COVAX.

And so, with India making its decision not to export its vaccines, the situation became critical.

In fact, in several countries in Africa, they have not been able to administer the second doses of the AstraZeneca or Covishield vaccine, because there are no supplies available.

In the midst of all of that, of course, we have other countries in the world that are vaccinating already low risk individuals, adolescents in particular.

So, in my view, it's unconscionable that we have a situation where some countries are vaccinating lower risk individuals, while most countries in Africa haven't even yet completed vaccinating their higher risk healthcare workers.

Next slide, please.

And if we look at that situation, why is it that Africa suffers this vaccine inequity?

I will outline three reasons.

The first, is that we lack local manufacture of vaccines. Indeed, as we look at the situation overall, not just COVID-19, but all

vaccines, it's only about 1 percent of all the continent's vaccines, are actually made in Africa.

Ninety-nine percent of all our vaccines for EPI and for children, are imported. Predominantly from India.

And we have at this stage, no COVID-19 vaccines that are actually being manufactured in Africa. So, that means all COVID-19 vaccines in Africa have to be imported.

And Africa has depended on COVAX. And has, as a result, had to join the back of the queue.

And this slow availability of vaccines through COVAX has impacted enormously on vaccine availability and inequity in Africa. Next slide, please.

The second reason is that there's a lack of the timely access to doses. So, even though some countries, for example, South Africa, have secured enough doses, and have contracts in place for those doses, they're just not able to secure them in a timely manner.

Because companies are supplying vaccines to other countries first, and they -- it's

only a small trickle that's coming into Afri -- into South Africa at this point.

So, when you look at the situation of vaccine coverage, and I've just taken the latest data available from our world in data, and listed the ten countries that have the highest vaccination coverage, with Canada leading at 66.4 percent.

As we know in many of these countries, for example, including Canada, Canada has secured about ten doses of vaccine for every one of its citizens.

And so, there's a huge excess of doses allocated to Canada. And that's leading to shortages and slow supply in many parts of Africa.

If we look at the highest vaccination rates in Africa, and I've only taken countries with population over five million, Morocco leads in Africa. And that is predominantly because of their access to Chinese vaccines, predominantly Sinovac vaccines.

South Africa at this point has just vaccinated about 3 1/2 percent of its population. Clearly, a situation that is begs -- begs some

kind of solution.

In the midst of all of that, we just saw recently how the U.S. vaccine surpluses are growing by the day.

And it's very heartening to hear from the G7 how the plans are in place now to make excess doses available from countries that have these excesses, to poorer countries, including Africa.

And I can only hope that that's going to be done quickly, so that we can try and get ahead of the wave of the second -- of infections occurring as we go through much of the third wave in Africa. Next slide.

And the third reason that we're suffering vaccine inequity, is that the variants that are spreading within Africa, have made our vaccine choices particularly difficult.

Now, I'll just use the example of South Africa, and focus on the beta variant. The variant that was previously referred to as the 501YV2, or sometimes referred to as the B1351.

The beta variant has three critical mutations that enables it to escape some level of

immunity.

So, if you look at trials that were done, and there were four of the eight vaccines that are in wide use, four of them were tested in South Africa during our second wave when the beta variant was spreading.

So, if we compare the efficacy of vaccines in other countries without the beta variant and in South Africa, we get some impression of the challenges we face.

So the AstraZeneca, which has shown to be 70 percent effective in the U.K., was less then 10 percent -- well, was about 10 percent effective in South Africa only against the beta variant.

And so that raises quite significant challenges for us. That vaccines that would otherwise be highly efficacious, are not so in our setting as far as the clinical data are available suggests.

The Novavax vaccine similarly, was 89 to 90 percent efficacious in the U.K. and the U.S., but only 43 percent effective in South Africa.

Fortunately, we do have some options.

And the Johnson and Johnson vaccine, which is 72 percent effective in the U.S., was 64 percent effective in South Africa.

And this was a large trial. And so we were able to assess both efficacy against mild disease and severe disease.

And finally, the Pfizer vaccine in the original trial included South Africa, none of the 400 individuals that received the Pfizer vaccine, were infected either in our first or second wave, despite several infections of the beta variant in the control group.

So, we know we have some vaccine, but not others that are effective against our variant.

And that's really important because, you know, there's a tendency to look at all vaccines are the same. All vaccines are equal.

They're simply not so when you take into consideration the variants. Next slide, please.

And that manifests itself in various ways. And I, just for illustration, thought I'd show you one country in Africa, the Seychelles, it's an island off the east coast.

It has a population of 98 thousand people. And they have achieved very high vaccine coverage.

They have about 75 thousand adults over the age of 18. And about 70 thousand have been vaccinated. So, we have very high vaccine coverage in that setting.

And the vaccines they used were the AstraZeneca vaccine, the Sinopharm vaccine, and just a few doses of the Sputnik V vaccine.

And what we are seeing in the situation in the Seychelles, is really quite frightening.

If you look at the daily rate of infections per million population, you get some idea of the scale of the epidemic in the Seychelles.

Compared to the U.S. epidemic, which is seen in the red line at the bottom, or the Indian epidemic that you see in green line in the bottom.

So, you compare to the, you know, the horrific images we had of India, and now you look at the situation in Seychelles, which is much worse. The difference of course, is scale, because Seychelles is a small country.

And so, even small numbers of infections,

right now they have about 120 cases on average per day. One hundred twenty cases in a population of 100 thousand, is pretty high.

And their big challenge is that the beta variant is the dominant variant. And they've also got introduction of the delta variant now as well.

So, the variants are creating a whole new dynamic about vaccine choice and vaccine use in Africa. Next slide, please.

And so if we look at the main challenges, and how we can try and overcome them, there have been several efforts led by the African CDC to try and overcome these challenges.

And one of the really heartening issues that now we've been making good progress on, is the Partnership for African Vaccine Manufacturing.

And just two days ago, the WHO, together with the French government and the South African government, announced a manufacturing hub for mRNA vaccines. Now, that will be initiated in South Africa.

So, there's a huge initiative to now boost vaccine manufacturing capacity. But, this

will take time.

It won't solve our problem today. But, at least it will solve our problem in the next two or three years when these production lines are operating.

The second is the African Vaccine Acquisition Tasking, AVATT, that is trying to secure doses.

And the challenges that even if they secure doses on paper, they're not actually getting those doses, because companies are first supplying elsewhere.

And so, it's very important that we, you know, look at global solidarity to try and address this challenge.

The third is, I think we really need to say no to vaccine diplomacy. These kinds of piecemeal efforts to assist poor countries, really driven by political imperatives, rather then, you know, public health proper planning.

And that for me really one of the additional issues. We really should be looking at vaccines being sent to COVAX. And through COVAX,

being distributed in an equitable way without a political agenda.

And we really need to get COVAX back on track. Because COVAX is really not achieving its primary goal of sending vaccine doses to countries that are poor.

And so I want to just make the point that the low vaccination coverage we're seeing in Africa is not merely an African problem.

Because we know that when you have low vaccine coverage, and you have high transmission, that leads to new variants. And those variants become a global problem.

And so low vaccination coverage in Africa requires a global solution. Next slide, please.

And I wanted to just highlight that we learned in the course of the HIV epidemic, the importance of global solidarity.

And I want to quote here from the UNAIDs document about how the AIDS movement demonstrates that the shared vision, a shared responsibility, and through global solidarity, and the leadership of people living with HIV, effected communities,

and individual action, we can change the course of history.

And indeed, we have. Through PEPFAR, through the Global Fund, through Unitaid, wealthy countries have made available the funding in order for poor countries to put their HIV positive patients on treatment. And next slide, please.

And so, I'd like to indulge a few -- if you'll indulge me. I'd like to quote Pope Francis, from a recent editorial, and Op Ed that he published in the New York Times.

And so I quote, the pandemic has exposed the paradox that while we are more connected, we are also more divided. To come out of this crisis better, we have to recover the knowledge that as a people, we have a shared destination.

The pandemic has reminded us that no one is safe alone. What ties us to one another, is what we commonly call solidarity.

Solidarity is more then acts of generosity, important as they are, it is the core to embrace the reality that we are bound by the bonds of reciprocity.

That my actions influence the risk of everybody else. And everybody else's actions influence my risk.

And in the same way, everybody's actions is influencing everybody in Africa's access to vaccine. And so we need global solidarity to address that.

Thank you very much.

DR. GAYLE: Great. Thank you so much. I want to thank our three presenters for really present -- giving us a real picture of what's going on around the globe.

The importance of, as you ended your talk on, Salim, global solidarity, and why it's important for individual countries. But why it's important for all of us globally.

With that, I'm going to turn it over to Dr. Foege to give some overarching, you know, concluding comments.

And then we're going to move to question and answer. But, would love to hear your thoughts on this as we think about this from a board global perspective.

Dr. Foege?

DR. FOEGE: Thank you, Dr. Gayle. This historian Will Durant, always maintained that the world would not form a true coalition, unless they feared an alien invasion.

You have just heard three speakers who have told us that we are in the midst of an alien invasion.

We've had surrogates for an alien invasion in the past. And this has allowed us to look at partial coalitions.

Nuclear weapons provided tentative coalitions. Small talks allowed the USSR and the U.S. to work in a cooperative fashion, even during the cold war.

HIV, as we've just heard, pushed western pharmaceuticals into all parts of the world. Polio has brought together a wonderful coalition of governments, agencies, foundations, and service organizations.

We heard so often that no country would go too normal until the world goes back to normal. Therefore, it's not just a nice thing to suggest

that we develop an unprecedented global coalition. It's an imperative.

A G7 pledge, which we just heard about, of 870 million doses of vaccine, has received great praise.

I found it depressing, when you look at the number of doses actually needed in the world, and this small fraction being approved by the G7.

And then they go on to say only half of that will be provided in this calendar year. And it made me wonder, do they actually know that there's an emergency?

Several things give me hope. In the U.S., the same administration, the same people who ignored the lessons of infectious diseases that have developed ever since the germ theory was discovered, these same people were able to support the development of a vaccine.

So, they add to the lessons that we've learned in the past about infectious diseases, a very important lesson, the lessons are meaningless if no one adheres to them.

And Mark Twain once said, the person

who doesn't read, has no advantage over the person who can't read.

Well, the country who does not follow the lessons of infectious disease control, might just as well exist before the germ theory.

But, on the other hand, look at the vaccines that we're producing. These vaccines aren't just good, they're spectacular.

The most lethal virus that came forth in the last century, is no match for the science. And we heard some of the variations of the different vaccines.

But in general, this virus succumbs to the RNA vaccines, to the vaccine carrier vaccines, the protein vaccines.

So, how could the same people who blocked reasonable public health efforts, produce such a vaccine?

Well, it maybe as simple as the ease of the making of public health proclamations on the one hand, so that we had an ex-President who said, the virus will disappear, as if by magic.

And then Dr. Scott said, or Dr. Atlas

said, don't worry. Just let it go, because herd immunity will finally stop it.

So, on the one hand they said those things. On the other hand, they produced this vaccine. And how did they do that?

Well, it's easy to make public health proclamations. But not very many people think they can actually make a vaccine.

And so they were willing to put up money for vaccine producers in NIH, and then stay out of the way.

For many decades, we have had on average a new infectious disease problem every year. And the names will be familiar with most people, Lassa fever, Hemorrhagic diseases of different kinds like the Marburg virus, Ebola in 1976 and again in 2014, Monkeypox, Zika, Legionnaires disease, SARS COVID-19.

Each time, as we've approached this, we've ended up saying our public health infrastructure is inadequate, and we get more funds to meet the crisis.

And each time, we believe that this is

going to be a permanent improvement in the public health infrastructure.

And each time, as soon as the problem declines, the funding declines. I'm just naive enough to think that COVID-19 might be different.

For 40 years, our approach to global health really revolved around WHO, UNICEF, UNDP, the World Bank, the big institutions.

But, very quietly, hybrid models develop, still using those multilateral programs, but with something different, a passion for specific problems that harness the ability of those institutions without becoming a captive of those institutions.

Gavi we just heard about, is an excellent example. It has forced WHO and UNICEF to work together.

But it has also brought in corporations, and foundations, and governments, and groups of all kinds, to try to provide vaccine for children of the world.

The Metrazam (phonetic) Program doesn't answer to any of those institutions. And yet it

became so successful that the World Bank and WHO asked if they could join.

And we heard a lot PEPFAR, Folio (phonetic) Program, the list goes on, of hybrid organizations that use the institutions, but did not become captive to them.

And I can see a response to COVID that's driven by COVAX, which we just heard about, as the nidus for coordinating.

But using dozens, and then hundreds, and then thousands of organizations to bring vaccines to everyone.

In every country, if the health organizations, such as the National Academy of Medicine and the APHA, organized strong health coalitions, they could influence government, corporations, foundations, service organizations, to provide what's needed to COVAX to vaccinate the world as fast as possible.

Two weeks ago I suggested we should start the goal of vaccinating one billion people in 100 days. And then speed up. Make this the largest peacetime effort the world has ever seen.

We could muddle through this crisis and breath a sigh of relief. Or we can see an opportunity that never existed before.

In 1796, Edward Jenner vaccinated James Phipps. And this was the beginning of modern public health, because we now had a tool.

2021 could be the beginning of a global health future, where we organize the world to stop a pandemic and to prepare an infrastructure ready for the next pandemic.

Make the phrase, we the people, a global phrase. The beginning of a global health coalition that changes the vision of public health forever.

That says, we will use this tragedy to create a global triumph. That says, we will use this tragedy to fight against racism, gender inequities, poverty, illiteracy, and all of the social determinants that make life so unfair for so many.

I'm really pleased to see on the panel someone from Vellore Medical School. Because as many of you know, medical schools throughout the world started to admit men.

And only later, and only recently, have they admitted women. Vellore started as a medical school to admit only women, to care for women in India.

It's been a hard 15 months. But let's not promote the idea of going back to normal. No, it should be the opportunity for a take off to leverage a future not envisioned before. Better then normal. Organized to counter an alien invasion.

As Lincoln Steffens reminded us 100 years ago, the greatest book has not been written, the greatest song has not been sung, and the greatest poem is yet to come.

I can predict that the greatest plague has not yet been seen. But, we stand at the brink of the greatest global health effort ever envisioned. And we can make it happen.

Thank you.

DR. GAYLE: Thank you. As always, thank you for your inspiring words as well as the sense or urgency in the moment that we face at this time.

I'm going to start, and we've got a lot of questions in the cat. But, and I'm going to

try to summarize some of them.

And maybe take them in some buckets, because I know we don't have a lot of time. And maybe just start with one, a series of questions that people asked.

And I can't see the panelists, so I'm not sure what the view is. Let's see. Okay, now I do.

You know, several questions about hesitancy. You know, there's access, and whether there's enough supply for vaccines. And then there's, will people take them?

It would be interesting to hear from all the -- the three presenters who talked about the different regional approaches.

What is vaccine, how is vaccine hesitancy playing into this? You know, what are people's beliefs about the vaccine at an individual level?

But also at a country level? How is vaccine hesitancy affecting the overall response in different countries?

And maybe I'll start in reverse order. I'll start with Dr. Abdool Karim.

DR. KARIM: Yes, thank you very much. So, in Africa our challenge is, that we just don't have enough doses for all the people really queuing to get it.

So, the issue of vaccine hesitancy is not one that's impacting our programs right at this time.

But, there have been several studies that have looked at this. And there are three studies that were done across the continent.

And estimates of vaccine hesitancy ranged from around 10 percent to about 20 percent. In South Africa, for example, it was 12 percent.

And that particular group of 10 to 20 percent, are very strongly anti-vaccination. They, you know, their children are not vaccinated for example.

And they will not take a COVID-19 vaccine. In many instances, we regard that group as, you know, almost impossible to reach, or very difficult to reach.

We have another group of around 20 to 30 percent, who ware somewhat hesitant. And they

just don't have, you know, enough information.

They are concerned that the vaccines were approved too quickly. They're not sure about its safety.

And you know, some of them have like asthma, or have some disease, they're not sure whether they should take the vaccine. So, they are put hesitant.

But, the majority in countries in Africa, just in the region of around 70 to 80 percent in most countries, are really keen and want to get vaccinated.

So, our challenge is to deal with vaccine hesitancy down the line. And we've already -- there are already programs in the way to start doing that in several countries.

DR. GAYLE: And just, before I turn to some of the other regions, you know, there's both vaccine hesitancies at an individual level, but there's also country vaccine hesitancy.

And there's been, you know, some heterogeneity on the African continent around issues of trust, and you know, whether or not at a country

level.

Do you want -- anything you want to say about that as well?

DR. KARIM: Yeah. I wasn't going to get into that level of detail. But, you're absolutely right.

So, we've already been experiencing some of those challenges, for example, in Cote d'Ivoire. Vaccine doses, there are some challenges in terms of people having some questions about, you know, the vaccinators involved, the vaccines themselves.

And so, in the -- in a handful of countries, we have been experiencing some of these challenges.

A lot of it relates not necessarily to any anti-vaccine sentiment. But rather, concerns about, you know, where they were made.

Or how they were made. Or whether they have, you know, animal proteins in them. And all kinds of questions along those lines.

We've also had a separate challenge, for example, in Malawi, where there were concerns that the vaccines were expired.

And so, Malawi decided to not use the 17 thousand doses that they had that were close to expiring, you know, in order to deal with some of these concerns.

So, you're right, that there are a handful of countries that have these kinds of issues.

DR. GAYLE: Yeah. I just raise it, because that the, I think this whole issue of vaccine supply, trust in the global supply, also feed into that.

And I think, you know, some of building that trust is around how those of us who have vaccines, are actually, you know, working with countries to build that kind of trust.

So, maybe Dr. Grinsztejn, if you want to say a bit about vaccine hesitancy, and you know, and we all know it also feeds into different political structures, and ways in which our politicians have or have not rolled out this issue.

DR. GRINSZTEJN: Yes. So, thanks very much. So, despite in the past, 120 years ago, there was a vaccine war when mandatory vaccination against smallpox was -- was pursued in Brazil.

After that, the exigency for vaccination decreased significantly. And Brazil has actually an excellent vaccination program with a great infrastructure in place across the country.

For instance, as I mention it in the H1N1 epidemic, we had massive vaccination in record time.

Unfortunately, during the COVID-19 pandemic, there is a lot of in -- there is a lot of governmental action to increase this sentiment.

That is not the usual sentiment that Brazilians have -- Brazilians have related to vaccination.

So, there is a lot of fake news, anti-science, opinions being done everywhere. And actually, the President and the government have a concerted effort to increase these vaccine exigencies in the country.

So, you can -- you can see that a significant proportion of individuals didn't come for the second vaccine. So, unfortunately this is something that is in place.

DR. GAYLE: Dr. Kang, any comments from

India or the surrounding areas? Yeah.

DR. KANG: I think one of the things that's really important to recognize is that there hasn't been an adult immunization program in these areas for the past 40 years.

So, the focus has been on childhood immunization, and countering of the hesitancy that some groups had.

Particularly with regards to the polio vaccine and then after that with the measles, rubella, campaigns that we had. Much of that was addressed.

But, I think the biggest problem with the start of vaccination for SARS COVID-2, was really around the fact that there was insufficient communication even to healthcare workers.

I actually had people coming to me and saying, you know, we've worked so hard over the last nine months, why are they putting products that have been tested so quickly, or that are incompletely tested, into us? Haven't we faced enough danger already?

So, that of course, is not something that persisted once lots of people had been immunized.

But, the key issues that are continuing are the issues of these vaccines are dangerous. The thrombocytopenia and thrombosis syndrome that is being seen with the adenovirus vectored vaccines, is a real concern, but is highlighted.

Very frequently there are suspicions that this is a way of sterilizing populations. So, both for men and women, the issues of cross reactivity with placental proteins and/or decreasing sperm counts, both of those have now been countered.

But, there is a lot of this kind of misinformation that has been circulated. As well as some thing that Dr. Abdool Karim referred to, which is specific groups worrying about animal products.

Or whether that is the use of porcine trypsin, or particularly in India, the use of fetal calf serum, is of significant concern.

DR. GAYLE: So, several questions in the chat around manufacturing, patents, and are there ways in which we could think about the manufacturing?

And Dr. Abdool Karim, you mentioned it in your presentation, you know, where things are manufactured, does have a lot of impact on access, and who holds patents.

And are there ways that we could be more creative about manufacturing to increase equities?

So, I'd love to hear each of you, you know, Dr. Grinsztejn, maybe start with you. You know, to say a bit about this issue of where things are manufactured.

And is there an opportunity for us to think about manufacturing patents and other things differently as we look at what is obviously a global urgent crisis?

DR. GRINSZTEJN: Yes. Thank you. So, I believe this is a critical point for us to discuss.

So, our understanding is that if Brazil hasn't secured technology transfer agreements, we would be in the much worse situation that we are currently seeing in the country.

So, we have technology, tech transfer agreements with Sinovac for CoronaVac and also with AstraZeneca for fabrication and production in the

country.

So, we are already producing AZ vaccine at -- at beginning making at Fiocruz, and production is steadily increasing.

And also for CoronoVac, the production is steadily increasing. And these makes a lot of difference in related to availability of vaccines in the country.

For instance, we have, besides these vaccines, we have purchased some Pfizer vaccines. Unfortunately, the government refuses to purchase them earlier in 2020.

But finally now, Brazil is purchasing some Pfizer vaccines. Not much, of course, not far from enough.

But, there is some purchase of Pfizer vaccines. But of course, if we would depend on that, honestly, that would be a real mess.

Also, we are now starting to receive the first shipment of the Yongsan vaccine. But still very small amounts of vaccines.

So, I believe that this made a difference in availability. And although slow, the slow pace,

and the not excellent quality of vaccine, using CoronaVac, and already having the consequences of having this vaccine as a major one in our program.

Still it is, it made a big difference on what we could have achieved so far.

DR. GAYLE: All right. I cannot believe that the time has flown. And we are almost at the end of our time.

So, I'm going to ask each one of you to just give one minute on what you think that the world should do to achieve vaccine equity?

What is the biggest thing? I know you said it in your presentations, but you know, kind of bulletize the final remark.

What can the world do? What should we be doing if we're serious about global solidarity and vaccine equity?

And I'll start with you, Salim.

DR. KARIM: Sure. The World Health Organization anticipated this challenge of vaccine inequity. And working with Gavi and CEPI, set up COVAX as a mechanism to create vaccine equity.

And the way in which COVAX is intended

to distribute its vaccines, is that it's intended to cover at least 20 percent of the population in all countries before it goes above that threshold.

And so, the challenge has been in ensuring that COVAX has enough doses. So, what can be done to solve this problem, or at least address it in the short term?

It's to ensure that COVAX gets doses. And especially getting doses from countries that have excess doses.

Countries that are manufacturing doses that can redirect it towards COVAX. That for me is a critical issue.

In the long term, we've got to address the intellectual property issues. In the crisis that we're facing right now, we have to put people ahead of profits.

And so, Africa and India have joined hands in trying to get the TRIPS waiver. And the TRIPS waiver is a first step.

It's not going to be enough. But, it's just a first step towards ensuring and building local manufacture.

Which I think is really the long term solution, because we are going to see many more pandemics in the future.

DR. GAYLE: Well, we can talk a lot about TRIPS and the -- and agreements. But, thank you for that.

I will turn to Dr. Kang.

DR. KANG: Thank you, Dr. Gayle. So, I'm actually the chair of CEPI's equitable access committee.

And through this past year, the one thing that we have realized is that CEPI was intended to do early stage development of vaccines.

And think about equitable access from the start of the program.

DR. GAYLE: And just say what CEPI is, for people who don't know. Just --

DR. KANG: Right. The Coalition for Epidemic Preparedness Innovation. Salim just said it, so.

So, CEPI started with looking at the critical access even for vaccines that were in the early stage development. Thinking that this would

be something that would be transitioned through to later stages.

What we've realized is that you really need a longer line of sight then CEPI had originally. And that's certainly something we will look at in the future.

The other thing, completely echo what Salim just said about making sure that COVAX is functional. That COVAX gets the doses it needs.

It gets them early and can distribute them. Twenty percent of the world's population is not enough.

We need to have it way higher then that. To do that, we need to make sure that there is ramping up of doses.

And absolutely no wastage. No country should be stockpiling at this time when the rest of the world really needs vaccines.

DR. GAYLE: Dr. Grinsztejn, you talked a bit about the manufacturing. But, any additional thoughts about, you know, what would really bring equity?

DR. GRINSZTEJN: Yeah. I would echo

Salim and Cherry on their thoughts. And just wanted to add once more that we can't live with vaccine stock concentrated in countries that are already controlling their pandemic, their epidemic.

And this solidarity needs to be in place so that all of us become safe. It's not enough for countries to control their situation if all of us don't get the opportunity to do it together.

DR. GAYLE: Great. Thank you. And Bill, last word. Oh, you're on -- but you're mute, so we can't hear.

DR. FOEGE: Okay. We all four agree that COVAX is the way to go. We need one place in the world that can coordinate all of this. And that's the place.

Number two, on hesitancy, expect it. The first vaccination was given in 1796. The first anti-vaccination group developed in 1796.

It's just the way people are. And you have to find the people that they trust in order to change that.

And third, the producer should be rewarded. But, I can't believe that we don't have

lawyers good enough to figure out how to reward them and still protect them.

DR. GAYLE: Well, thank you. We could have gone on for a lot longer. Some of you need to go and get to sleep, because it's very late.

But, just want to thank again, the tremendous panel and the incredible presentations.

I learned a lot. I can -- always love hearing from people who have this kind of wisdom and experience.

We're all learning. This is evolving for all of us. But, I think the bottom line message is that, you know, global solidarity is critical here.

And you know, we in the -- who are in the west, cannot, as many people said, afford and keep access to ourselves when the rest of the world is suffering.

This is a global pandemic. We must think about global solidarity. I think all of you have really given beautiful messages that really highlight those issues.

So, thank you so much. Thanks to APHA

and National Academy of Medicine for what I think was a very informative discussion.

A hard discussion. Some hard realities that we're facing. But important messages from the world.

So, thank you very much.

(Whereupon, the above-entitled matter went off the record at 6:32 p.m.)