An epidemiological perspective on whether there will be a third wave of COVID-19 in India

Speaker: Hello. Good morning and good evening for all the viewers who are joining us from North America and Asia. I'd like to welcome you to today's webinar, An epidemiological perspective on will there be a third week of COVID-19 right. This is the second year of the pandemic and though India's case numbers are falling, the aftermath of the second wave still lingers around as the country cautiously tries to return to normalcy. The question that is in everyone's mind is whether the new variants can lead to a new surge despite vaccinations, and how should the country adapt to these circumstances and mitigate a potential third wave?

We now know, almost eight months after the vaccines have been introduced that they do offer a real hope in getting back to pre-pandemic levels. But we still don't know a clear timeline. So today's webinar, which is organized by the Harvard T.H. Chan School of Public Health, India Research Center, Project SANCHAR and The Lakshmi Mittal and Family South Asia Institute, we aim to sort of decode where are we heading with vaccination, variants and the third wave in India and abroad.

Before we start off the panel, I want to hand over to professor “Vish” *Vishwanath* to introduce our guests and then we can kick off our discussions. Over to you, Vish.

Vishwanath: Good morning, good afternoon and good evening, depending on which part of the world you are in. My name is “Vish” Vishwanath, and I'm a member of the faculty here at Harvard T.H. Chan School of Public Health. I'm also the faculty director of the India Research Center of the Harvard T.H. Chan School of Public Health. It's my privilege and a delight to hold one more webinars in our continuing series of webinars.

When people talk about COVID-19, when people read about COVID-19, generally these days there are three kinds of reactions. There may be more. But one kind of reaction is a complete avoidance of information. What we call as information avoidance. They don't want to hear one more word about COVID-19.

They have had it. They're sick, they're tired and don't want anything to do with it. A second group of people are wondering how is it that the scientists always change their mind? Why is it that the guidance keeps changing? Why is it that the recommendations are evolving all the time and why can't people make up their mind?

And the third group of people are of course, people who are on this webinar, who are anxious, who are curious, who are wondering what happened. Both from an intellectual perspective, but also wondering what should they do for themselves, their families, their friends, their neighbors, and, and how do they keep up with this kind of information?

And I think all three types of reactions are reasonable, legitimate, and justified because of the nature of the pathogen. At every step, it has outsmarted us and we are seeing science in action as it is evolving and that is the challenge. And so Harvard T.H. Chan research center, what they

have been doing is bring the latest science and the work of scientists to translate it for public consumption and for public education. We know that this science is evolving every day. There are new publications that are more than 150,000 papers, for example, on this in the last 18 months or so.

And because of science is changing, the nature of recommendations, the nature of guidance is also changing rapidly. And our job as one of the significant important foresight of the Harvard Chan sector is the translation of science and to communicate that with the public. And trust me as somebody who has spent a lifetime studying science communication, and health communications and human behavior, I empathize with you and sympathize with you. When you hear the current understanding, what we would call the epistemic understanding of science and facts changing all the time. So fortunately, we work at an institution which has some of the foremost scholars in the world who are making significant seminal contributions to the evolution of the science.

And we have been privileged to bring them in to be a part of this conversation. And we are also lucky to have some great scientists from India who have been participating in the seminars who have been making some significant contributions. So today you have two of them. I have to introduce my colleague Dr. Bill (William) Hanage. I won't spend a lot of time going through it. Anybody who's on Twitter, who can go to the website and see Dr Hanage's work. He's one-off three or five, six epidemiologists from Harvard Chan who's working virtually 24/7. And when I say 24/7, they're working all the time.

They're doing basic science, contributing to the science at the same time. They're also doing, participating in webinars, being on social media, talking to reporters, taking this mission of education very seriously. Dr Hanage is a faculty member here, in the department of epidemiology and in the center for communicable disease dynamics.

I strongly urge you to look at their websites because he employs a mix of theoretical and lab work to research the evolution and the epidemiology of infectious diseases. It has been trained at Oxford and Imperial college of London. And we are so lucky to have you here. Bill, thank you for being with us today.

Dr William Hanage: Thanks Vish. That was a very kind introduction.

Vishwanath: Thank you. That is also very well deserved. I'm also delighted, finally we have been able to get Chandrakant Lahariya, who is a trained medical doctor, public policy expert, works in health systems, as well as trained in epidemiology, vaccinology, immunology and public health. He has a lot of experience in disease control and elimination through his work on polio elimination, grouping immunization, strengthening, as well as outbreak and epidemic investigations.

Dr Lahariya too has been very active, publicly communicating the science around this pathogen. So thank you, Dr. Laharia. We are very lucky to have you yet. Finally, we are so happy that we got you here. Thanks for joining us.

Dr Chandrakant Lahariya: Thank you very much.

Vishwanath: And last, I have to also say a kind word about my friend and colleague, Ms Divya Rajagopal. Anybody who has been following, Divya is a journalist, former reporter from economic times and anyone who has read her articles and I'm an avid reader. Was absolutely impressed by both the economic cycle, the social science angle, as well as the epidemiological angle in her reportage. Divya has taken her role as public education for some very seriously, and that's made tremendous contributions through her coverage.

And so we have been lucky to engage Divya on a variety of these webinars. We thought we may not be able to get Divya, but we are lucky to have you here. Thanks for leading the conversation. And before I give up my microphone, I do want to acknowledge the tremendous efforts made by the team who are behind the scenes at the Harvard Chan India Resource Center. They have been working again day and night on a variety of projects, including this one, organizing this. Usually we give thanks at the end, but I usually thank people at the beginning because at the end we are in a hurry.

So I want to thank them for the work that they have done and I also want to thank my advisory council for the India research center who have been encouraging us to hold this webinars and who have been giving us ideas including today's, to do this as a part of the mission of the center. So thank you everyone. And we look forward to an interesting conversation. Thank you.

Divya Rajagopal: Thank you so much for that really kind introduction professor Vish . And thank you for our panelists for joining us today. Let me quickly start off our discussion. I'll start with you, Dr. William. We've seen that within six months the number of global infections has risen from a hundred million to 200 million. And Delta has been one of the biggest driver of these infections. Where do you see… how bad is this Delta beast. And how do you think that public policy makers should be dealing with it.

Dr William Hanage: Wow. You do ask me the easy questions, don't you? So the first thing to state as a Delta is a truly, truly terribly, how can I get this right? It's a very difficult virus to deal with and that's putting it mildly. It is extremely transmissible. It appears to be more likely to land people in hospitals if they are infected, than the virus that went before. And of course the virus that went before was really no picnic. So we have a genuine challenge dealing with Delta and whatever might come next.

That, we'll talk about that later. For the moment, Delta is more than enough to be getting along with. When you're talking at a global level about how policy makers should be trying to prepare for it, or handle it. I think that it's important that folks recall that for start vaccines are… they remain very effective against the worst outcomes of Delta infection. That's really, really

important. So vaccines are a major public answer to this, but they won't work overnight, not the least because of the fact that we can't get them into people overnight. I can't click my fingers and, you know, important MRNs vaccine into the arms of everybody in the world, no matter how much that might be something we'd like to do.

So we have a challenge in preparing fidelity, but also not only vaccinated, but keeping our situation, keeping the situation relatively under control. Now, one of the things which I think is important to recognize is that Delta is not a magic virus.

It doesn't get from people to people via some sort of weird non-scientific method. It's via the route somebody might expect. And so we do have ways that we can stand in its way through what we call non-pharmaceutical interventions. I'm not going to say that they can completely control it, but I will say that they can substantially slow it down, such that we can get more people vaccinated.

Divya Rajagopal: Right. So vaccination remains one of the keys, especially in terms of dealing with Delta. Doctor Chandrakant, we've seen India's vaccination numbers though. In absolute terms, we keep talking about this huge numbers of vaccinations that we are doing, tt's commendable, of course. but still we just vaccinated 9% of our population.

And now with the Delta surge, how do you think we are going to deal with the third wave that's perhaps right at the doors. How do you think India should go about it?

Dr Chandrakant Laharia: I think what we need to remember that in India, the data has been there for second wave. And we know after the fourth nationwide CDOT survey conducted by Indian council of medical research, that around 67.6% of the population has already developed some form antibody, either due to vaccination or afternoon sun protection.

When do we know that only 9% of population has received both shots? But around 34% of population has received at least one shot. So that in some sense, it's really assuring because fourth a nationwide CDOT survey has a midpoint around 25th of June. Since then additional number of vaccine shots have been administered, putting the two together, what we know is that India has a fairly decent number of population, which has developed immunity or antibodies either after vaccination or after natural infection. So we can be fairly assured that we are in good condition. We also know that at the national level, we might, India might not have a very big subsequent wave because of the same reason, 67% antibodies and then vaccination going up.

We also know that the same variant is unlikely to cause a subsequent wave in the very quick succession. So for a few months, so to say, now India might be in good condition. There are projections that India might have a third wave and this, but the projections indicate and especially SUTRA consortium are the that realistic scenario that even in third wave, the number of dedicated might not go beyond 80,000 or so.

The worst case scenario is 150,000 dedication. So this is really assuring, but we cannot live with this assurance because what is unknown, that how long the immunity lasts and how it weaves out. I have been talking to some of the people who have been involved in the modeling and none of the modeling factor in how immunity wanes, because that becomes a really rolling approach that somebody who was vaccinated in February and March, how, what is happening to his or her immunity or antibody or protection so to say.

Factoring in the models makes models really unstable. And that makes it really difficult to project really well. That's one part winning up immunity, second party that nobody can project, predict what would happen to the emerging variants. So these variants and winning a mentee or two, really unknown or what we need to remember and what can we infer based upon all of this analysis is that if we can keep pace of vaccination really accelerated and higher, then even if there is a subsequent wave, the number of hospitalizations are likely to be low.

So hospitals are unlikely to be overwhelmed in subsequent wave. That can be said with a fairly reasonable assurance, except for the smaller towns where the health facilities are really weak. And if there's just wide susceptible population, there could be challenged, but national hospitals, we might not see, like that's kind of fairly, we never confident that kind of overwhelming… or for the health facility, but the number of cases I repeat the point. While India may have a smaller number of cases like 80,000; 100,000 comparison or 400,000 when the second wave hit.

But we cannot rule out the localized outbreak. Some states might have a high susceptible population. There could be outbreak in the district level. So we should stop looking at a micro level now, not the national third wave, but India should be paying attention on state level, subsequent wave and district level increase in the cases.

And that's what we should be paying attention.

Divya Rajagopal: Right. I think you sound pretty confident and it seems like a very optimistic picture that with 9% vaccination, we still think that we will not be over. And I hope that remains the case. Dr. Bill, I want to come to you on a little bit of breakdown on these different variants. Because there is a misconception, or still confusion among general public when we talk about the alpha, delta, beta and now, the gamma variants, how different are these to each other? And is there really, I mean, of course we know that they're highly infectious, they're highly transmissible, but when it comes to breaking it down, how different are these to each other?

Dr William Hanage: That's a great question. The first thing I want to say, just building about what you just said is that we should be prepared for future waves of infection, even in places where there's quite high immunity. Because if you just look at Florida and Texas at the moment, these are places which had a reasonable number of disease, a lot of vaccinations, and they're still having trouble.

So Delta is very serious regardless. But to come back to what you were saying, the virus has managed to come up with a remarkable number of different faces to show us in a comparatively

short period of time. The alpha variant is one which was notably more transmissible and perhaps a bit more dangerous than the original variant.

And then the interesting thing about it was that it was able to spread quite rapidly around the world. Now, one of the things which it did not have, which was quite interesting, was any notable ability to evade the immune system. So anybody who had been previously infected was well-protected. People who had been vaccinated well protected and so on.

The second two variants you mentioned beta and gamma were noticeable because of the fact that they seemed to have some ability to evade the immune system. And that made people very worried about it, because if they can evade the immune system, then that means we might be struggling with future surges of infection among people who have been previous infected.

What's noticeable about them, however, is that they didn't really take off in the way that might've been expected. Beta for instance, which was originally identified in South Africa and caused a very rapid surge that collapsed pretty much immediately once South Africa started putting in place interventions to stop transmission, simple interventions, masking, distancing, stuff like that.

It was not very good at transmitting, even if it was pretty good at evading immunity. Gamma seems to have a little bit of both, but again, hasn't moved on as far from its original somewhere in South America, as you might expect. Delta, on the other hand, Delta has the secret sauce. Delta's secret sauce is that it is able to replicate extremely quickly and along with that, there is some ability to evade immunity and we scientists are still talking about exactly how much of its properties is down to evading immunity and how much of it is something else. But one thing that we can say, and it's really becoming very clear is that it could replicate extremely quickly, to high levels so that people shed large quantities of virus and that makes it more transmissible. And it's being more transmissible, which is why it is such a challenge for the world because being more transmissible means that it can affect people before we can vaccinate them. And it being more transmissible means that more people need to be vaccinated in order to control it.

And so we have here, that's the reason why Delta is epidemiologically, such a challenge. And if you look around the world, you'll see that Delta has pretty much swept and out competed all other variants, wherever, it has been introduced. Now there are a few others sitting around at the moment and maybe we'll get to them later.

But at the moment, Delta is the thing that we need to be worrying about. Delta should be the focus of our attention, because it is quite… it is the most serious I frankly have faced so far with this.

Divya Rajagopal: Right. Uh, well absolutely. And I think obviously seeing studies coming from Israel and in other parts where we are seeing high number of infections coming in vaccinated people though these are still mild infections.

They're not, the hospitalization are still low, but of course these things have to be taken into account. Dr.Lahiri, I want to come to you about — I mean, I'm just going to hold you back on your confidence about how we will not be seeing a bigger surge as we saw in the second wave, because we have vaccination.

However, we are also seeing that… we're talking about schools that are getting reopened and India is one of the few countries that we have not vaccinated children yet because we don't have the vaccines for children. How safe is it to get to school with reasonably low level of vaccination or no vaccination for children. And with the background of Delta, do you still think that we are ready to open schools?

Chandrakant Laharia: I'm really happy. You asked that question. You want me to touch that question again? So what we need to remember one of the key difference in India and rest of the country that in India, Delta came first and then vaccination is happening later. In other countries, vaccination happened first and then Delta is there. So this is the key difference. What we need to remember that India had some of the state's largest states. So Madhya Pradesh, 79.6% of zero positivity after the nationwide survey, Bihar, Uttar Pradesh, Gujarat. These are the states that have around 75% or plus zero positivity.

We know that these numbers were small and that there could be a wide confidence interval. But what we need to remember is that if we compare those states, they definitely have a far higher zero positivity. And that is for June, since then two months have gone, vaccination has happened. We also need to remember another thing. There is some evidence or it's fairly reasonable evidence that natural infection followed by one shot, provides reasonably good immunity.

And that's what is happening in India because a large proportion of the population has been affected. So that's why I have been arguing. And that's why the rational for providing single shots is really more effective. In my opinion, with that high kind of zero positivity transmission is still going, if we can ramp up vaccination, even a single shot will provide reasonable protection.

And of course, one thing, as I said, Delta is unlikely to revisit or cause a severe, wave at least for few months. And if we can keep vaccination place, it will reduce hospitalization. I would say that only unknown age waning immunity, and second unknown is new variant. Nobody can predict. I also want to briefly reflect on one of the study which had been published in General Science on 20th of August. And professor Hanage had been put in that it's called a title… not a study, but a paper… which says the evolving threats and the evolutionary virologists in that study had logged… and have been asked various questions and what they had said, they have said three things.

One is that the virus had definitely changed a lot from the start, from the one being reported on 31st of December. And this ongoing second wave, or this one reported in 2021, Delta is very different. So we can very well call it a second pandemic, not the first pandemic. What they are

saying that though, this is highly transmissible, but this is not the height of the transmission for any virus so it can become more transmissible.

So that leaves the possibility that there could be more transmissible virus, but we are not there. And we don't know. The second thing they have said that this virus, if it, the evolution keep happening, in a decade would be completely different.

And third point, which they make that in the future, we might need a vaccine which has two different variant involved. So there is a future possibility that things might unfold. Disease might become endemic, but then I stopped there on that part.

Coming to the schools. I have been writing about this and the key thing to remember, and there's a global evidence to say that schools should be open because children are at the low risk of moderate to severe illness. And that fact, that particular fact alone is enough that school should be open and then anything else which comes over and above it to avoid like a possible vaccine, which can provide some protection it's add on, but not an additional requirement.

So I strongly believe, and there is a global evidence on that children are at low risk… no risk of infection. Risk is same, but the risk of moderate to severe illness and mortality is low. Like I have been reading one of the articles, there is not enough data available on those areas, but one of the New York times article has quoted that for every 1,500 deaths, which have happened in adults age group, the number of deaths in children is just one. So ratio of death in zero to 18 years and 18 years plus is one eight to 1500. So it is adults who are at the risk. Children are at completely no risk. And of course we know that all of the children and adult they'll develop this infection at the same day.

Final point is that we need to remember that currently licensed vaccines do not provide… stop the transmission. And then they reduce the more technical, moderate to severe illness and disease so that if the disease is so low in the children, then the benefit of vaccination comes down. And then this does not reduce transmission. So we should not be waiting for vaccination. All we need to do is improve ventilation and be prepared for other approaches, including mask of the children, mask in the children older than five years. Other than that, schools are safe. And of course it had to be dynamic process if cases rises, we need to modify.

Divya Rajagopal: Right. Dr. William, do you agree? Because I think school reopening has become not just a scientific issue, but also a political issue where there are two equally strong opposite sides, saying one why we shouldn't and why we should. I want to kind of ask you specifically from the Indian context though Dr. Laharia said that COVID impacting children are low in case of India, just the sheer size you make, even a 1% makes it a huge difference. Just want to check with you on what's your view on the school debate.

William Hanage: Well, you're absolutely right. That the decisions are not being made on a scientific basis. It is made on a political basis and it's super powered by the fact that people are very emotive, understandably about infections in children.

Now from the epidemiological perspective, Dr Laharia is absolutely correct to move directly to less risk as a result of infection. In fact, I would go further than that. I would separate out kids since the under tens and the over tens. The under tens are extremely low risk for a whole bunch of reasons, including the fact that they have less of the receptor that the virus uses, went to cells.

The older kids, there is a different space. They find distancing very difficult and they're capable of being infected like adults, but they're really unlikely to get serious disease. The role of them is not so much as a concern for them themselves. As in that potential to be able to introduce the virus to many different households.

Now, one mass gathering that we really do not know want to stop. Now the, exactly what was said at the end of Dr. Laharia's last comment is that what is important there is to be able to limit transmission within schools. And we know from at least the United States, I'm thinking about my own local school district, that with alpha, that proved to be possible with a combination of ventilation and masks and a bunch of extra ordinarily simple things like making sure kids can't they have that lunch outdoors.

No of actual cases of transmission that happened at schools over the last period, when there was substantial in-person schooling. And so with these things in mind, I think that it is possible. And a lot of these things are not particularly high tech, but they are able to reduce transmission to a point where it is, if not little, it's much more manageable and much less consequential for the overall community.

So yes, absolutely. I think that you can do these things. And I also think that the point that you made that, that there are these two camps is absolutely accurate. Unfortunately, the reality is somewhere in the middle. What we want to do is we want to be able to minimize the educational harm to children as a result of the pandemic, while also working to minimize the harm to public health that could result from uncontrolled transmission, wherever among children.

Divya Rajagopal: So do we open the school or not? Where are you in this?

William Hanage: I think it's impossible to answer that without having a specific local thing to do with current prevalence. But I think the goal should be to open them. The goal should be to open them and to keep them open and prioritizing schools, look at the word, prioritize. If you're prioritizing something, it means you're putting it ahead of something.

Right. So I do think school should be prioritized. I do think the goal should be to keep them open. I think the best way to keep them open is to keep a lid on the virus in the community in general.

Divya Rajagopal: Right! So our Q and a box is sort of buzzing. And before we start the audience questions, I just want to ask one quick question to you, Dr. William. Is that the whole

debate on breakthrough infections? This has become, it says, caused concern. Where people are talking about — Are vaccinated people driving the big breakthrough infections, or are vaccinated people getting infected in larger numbers and those who have been un-vaccinated? And of course, this is a music for the ears of a lot of the anti-vaxxers groups. How do we communicate this concept of breakthrough infections and make people realize that this is part of the entire process.

William Hanage: So the first thing to understand about breakthrough infections is that they were essentially expected from the vaccine trials. The vaccine trials showed that even though the vaccines, including AstraZeneca's are really effective against serious disease hospitalization, they are not able to completely reduce transmission to nil. So unfortunately the vaccines are not a light switch that you can flick and set off the pandemic. That's a situation. The other factor is that the more people who are vaccinated, the more cases you expect to see among vaccinated people. And it's not necessarily that the vaccines aren't working, it's just that there are a lot of people who have vaccinated in whom infections can occur. It's like the comment I make is that an awful lot of shoplifters are right-handed, but it doesn't mean that being right-handed has anything to do with being a shoplifter.

So what we are seeing here is a range of infections occurring in breakthrough disease. And Delta seems to be pretty good at causing breakthrough disease certainly better than what went before. But I want to be quite clear about what this means. The type of illness, which Delta causes in breakthroughs is not the same as the type of illness, Delta causes in people who are unvaccinated.

It is less severe. It is less likely. That's not to say it cannot be severe. It's just much more rare that it is severe. You are, and it's sometimes a better way to think about the way vaccines work is, how much it reduces your risk of being hospitalized. And if you are un-vaccinated, you are many times more likely to be hospitalized or indeed die as a result of infection than if you were vaccinated.

So breakthroughs are also a next step. Some of them are serious. And we tend to hear about those because they make headlines. But there's probably also a lot. In fact, we know that there's quite a few, it's just a harder to study, which are comparatively mild, and those are perhaps capable of transmission.

We're not sure exactly how much it is down to that, but they are also something which is not, which may be epidemiologically significant because they can transmit. This is one of the reasons why the centers for disease control in the United States has recommended even vaccinated people wear masks, but they are not likely to produce the same consequences for public health in terms of burden on health care.

So breakthroughs are real. Breakthroughs are serious. However, breakthroughs are much, much, much milder than the alternative of no vaccination. We have to bear in mind the counterfactual. The counterfactual is what would happen if you have a Delta wave in the

absence of vaccination. And I would point out that India of all places in the world has the misfortune to have had an actual experience of that.

Divya Rajagopal: Well thank you so much for that clarification. I think this is one question that has been coming even in our Q and a sessions, is that the right way to deal with the victim infection. I think now I'm going to start off with questions because there's so many of them. I'll come to you, Dr. Laharia first, because I'm going to give Dr. William rest to kind of take a breath. The first question is, do we have any information about the immune response on for the vaccinated? How long does the immune response last? Because we started vaccination sometime in Jan. Do we know that the vaccine still are effective with the emergence of Delta variant.. What's your view, have you come across any studies?

Chandrakant Laharia: I think there are plenty of studies which have outlined how immune response lasts after vaccination and of course, after natural infection. So let me talk about natural infection. There are studies which have shown that antibody levels stayed for like two to three months and then start declining.

And after four months there is a rapid decline of the entity. But there was a study published on 24th of May, which found that even at the end of 11 months though, antibody levels decline. But besides antibody, there is a cell based immunity which provides the long-term profits. So the person could be protected even in the Epson top in Peabody. The individual that stopped the natural infection is very similar for the individual who had been busted.

What we know after different vaccinations, the rate of decline, really, but we are hearing some recent studies with talks about vaccine, that level of antibody declines very quickly after four months. But as we know that the antibody is not the only level of protection and we can individual can be protected with cell based immunity and memory cells can last year long.

Currently there is the assumption that the Delta variant requiring higher quantity of neutralizing antibody. And that's the reason this is being argued for providing booster shot. Declining antibody is a given, but we do not really know. And since they didn't know correlate or protection, that how much quantity of antibodies should be present in the individual to provide protection.

So the booster shot is being recommendation. That's why some other people argue that decline in the antibodies should not be taken as only criteria to consider whether a person is protected or not protected. The final part is that antibody decline, that's a natural process with all the vaccines and image antibody develop after that.

But the decline in antibody results, we do not know, but we believe there is a broader understanding that at least nine months or so person is protected and as we will have more evidence, we will know. But the concluding part that shouldn't, that is not enough to conclude that individuals should be given.

Divya Rajagopal: We'll come to the booster dose debate also that's coming in, but I just want to… like I have a follow-up question on this spot about the vaccine effectiveness in the case of India. We knew that there is enough studies that's coming out on the MRNA vaccines, but we still don't know the, studies on Covishielf, shield and covaxin on a national level.

Most of the studies that we have seen in India have come from, institutions, medical institutions, and private institutions. Where do you see that again, that we to sort of improve the vaccine intake. We need to come up with this vaccine effectiveness study that is specific to the Indian context.

Well, there have been some, a few studies on vaccine effectiveness from India. Of course we have questions about the scientific design, which had been adopted for those studies and sample size. But there are studies and inputting one of the study, which had been done on 1.5 million army staff. And most of the studies have found that the effectiveness of these vaccines, again, moderate to severe illness and mortalities is sparely high.

We can be reasonably confident, but we also need to factor in that a large proportion of Indian population I'd received just one shot and to assess the effectiveness at the ground level. We need to design a bigger study where we need to include individual who has both one shot, and both shorts. We got to assess effectiveness votes short. I'm not very sure about the single short effectiveness, because there are many issues in their study design, but I agree. We need more study, right?

Divya Rajagopal: Staying with you Dr Laharia, there is another question related to Kerala? Why are cases rising in Kerala? We're seeing it in the entire Indian context. So that is one outlet. We need to remember that vaccines do not reduce the transmission. That's what I've been arguing about. But if we know, I don't think it's the 75% population being vaccinated, Some 55% of the population receiving single shot and 20% received both shot in Kerala. That is the numbers. But we need to remember a few things about Keral after nationwide survey who had lower serial prevalence bit means highest proportion of susceptible population.

Second, Kerala has a large number of a biggest proportion of 60 plus population, which is a high risk and third, Kerala has high burden of NCDs. In other settings, this would have resulted like high- NCDs, high old-age population and high transmission, very high number of deaths. But what is there, Kerala has lowest mortality rate and I would attribute it to high vaccination coverage.

Vaccination has reduced the deaths and case fertility while transmission is not reduced by the vaccine. That's why we have seen transmission because the last part transmission is high in Kerala because higher susceptible population. But we also know that the Delta variant arrived in Kerala a little later than the rest of the country because of the important containment measures. So I'm not concerned or worried about not high number of PFS. Why does he following part in the state and big public health interventions?

Divya Rajagopal: We have five minutes and I'm just going to rush through most of the questions that we have right now. Dr. William, this is the question on boosters. The Dr. Laharia has very clearly put his view on that. He doesn't advocate for boosters. What's your view on the booster dose, because in the West, this has already kind of been announced. Do you think we will need boosters at some point of time, perhaps six to eight months after doubly vaccinated.

William Hanage: So the question regarding boosters is a relatively complicated one. The first thing I want to say is that I am not in favor of the booster policy as of now by the United States. To make an argument for perhaps some people who are very highly at risk, to receive boosters, but in the United States, we're talking about making them available for anybody on the basis of the fact that antibodies are waning and it's suggested that protection is also waning.

The difficulty with the studies that have been done to date is that they end up being confounded, which is a statistical term, meaning that the first people who got the shots. Well, those who were most vulnerable to disease, the old or the otherwise, people with poor morbidities, otherwise in a firm.

And so what happens now is that when those people are confronting Delta, they are unsurprisingly not… they're more likely to suffer serious breakthrough disease with Delta. And so that produces a correlation between time to vaccination and severity of outcome. And you need to control that. It's very hard to see how that can be done. Some places have managed to, or have attempted to do that. Israel is among the most important. But we have to set against that evidence from the United Kingdom where, there was a very large Delta surge and where there were also relatively large numbers of people vaccinated. Essentially, in my view, the evidence is too complicated right now to put down my nickle on any particular plan for vaccinating or for boosters for all.

Although I do think that you can make an argument for those who have not mounted a good immune response. Well, you would ask why that is.In order to try and help them do so there's actually a reasonable amount of data that people, for instance, who are solid organ transplant recipients, that they Mount a better response after a booster.

And I think that in those cases it is potentially merited, but your question has something else buried within it, which is, are we going to need boosters? Because the virus evolves now. Yeah. I mean, I will point out here that I'm seeing the future and evolution is difficult, but you know, you'd have to be a complete socket against natural selection.

What we can expect is that the virus is going to be with us basically for indefinitely, for the foreseeable future. And as it is able to evolve and perhaps gain some weight with eight immunity. Boosters might become important in order to cover those viruses. However, we need to understand more about what the nature of disease is in people who have been immunized and indeed, and people who have been reinfected because there's reason to think, as we've been saying that it is much milder. And if it is much milder than the marginal benefit of producing these boosters ends up being reduced. But I don't want to speculate too much because I don't

want to, I don't want to be talking about a future, which has not yet happened only to suggest that we are ready.

Divya Rajagopal: Right. Well, as we stay on the question of boosters, there is also this whole debate about vaccine iniquity. One of the best talks about the boosters and having extra doses and shots. We have a other part of the world, the global south, where, absolutely no vaccination and the cases are rising. I mean, Indonesia is one example, low vaccination and high infection rates. I mean, this quote has become so common that Nobody's safe until everybody's safe.

How do we get there? Do we need much more global advocacy to, address the issue of vaccine iniquity. Dr. Laharia, I'll start with you first. And then, Dr. William.

Chandrakant Laharia: I think this is something that should have started a months ago, but unfortunately this is the situation that we are in. But the point is that we need to look at vaccine iniquity with two perspective. One is that we need to remember that in situations such as pandemic… now this is more evidence based than being argued at countries that again, getting affected that we need to show solidarity in global fight against disease.

And even with the experience from some of the countries which are suffering because of emergence of Delta variant we are not seeing that kind of solidarity. We know that a number of countries kept on like the kind of commitments which have been made to donate vaccine are far too small for the need. So the only way that the now left it at much of the rich countries have already vaccinated, but they have secured far more supply of vaccine to vaccinate their population three to five times. And I guess this is the time those countries should recommit their secured supply to other countries.

That's one. Secondly, we need to definitely delay the decision on the booster shot of the population and prioritize vaccination for all those countries where this is happening. I personally also think that once vaccine supply in India improves, surprisingly India will be one of the country, which will supply vaccine to the rest of the country.

So for best Covax mechanism, and I'm really waiting for that opportunity, but each of the countries need to do something and going for booster is not the right approach

Divya Rajagopal: Right. Oh, well, I hope India's political compulsions and political realities allows it to do that. But Dr. William, last word on vaccine iniquity before I hand it over to Mr Vishwanath for a wrap.

William Hanage: Yes. I'd like to echo what Dr. Laharia had just said. I mean, I would ask how many, considering the situation in the United States, I mean, how many boosters do you need to give to comparatively healthy 40 year olds in order to have the same benefit for public health of giving one single first shot to a person in Indonesia who is still waiting to receive. The public health benefits to the world is absolutely clear.

Giving single shots in places which are struggling with the virus are going to be much more helpful. Like I said, there is an argument perhaps for the most vulnerable, but in general, we need vaccine equity. We need to help. Not only our own communities, but the world. And that's basically what public health is about. There's a reason why we use the word public in there because it's about all of us.

Divya Rajagopal: Right. I think it couldn't be said much more clear. Well, we almost… completely out of time and Dr Vishwanath back to you for the wrap. And thank you.

Vishwanath: Thanks so much. I think we can keep this webinar going for at least two more hours and we still won't be done given the number of questions that are coming up. But this is not going to be the last conversation on this. This is a continuing conversation being hosted by our center. So we'll continue to do this. I do want to thank Dr. Hanage and Dr Laharia again for making the time. I know how busy you both are with the work and the research work as well as your public education work. So I appreciate you both showing up and answering these questions very patiently.

Also thank you, Divya, for continuing to moderate this session. I do want to thank my team at the Harvard Chan India Research Center for organizing this behind the scenes. And also I would be remissed, which I did not do. I am remiss that I did not mention that our co-host Lakshmi Mittal and Family South Asian institute, who are also co-hosting the webinars, have been working with us in doing this public education webinars.

So, I want to thank the team there at the Mittal Institute of South Asia who have been instrumental behind the scenes. Again, my thanks to everyone. We are recording these videos. These videos are available on our website, Harvard Chan, India Research Center website. They have 20 different webinars. If you didn't get a chance or if you wanted to follow up feel free to go to the website and watch the videos and circulate that information. We are continuing to create communications material based on these conversations and the material is available again on these websites. Feel free to go there and download this material. It's available in different languages — English, Hindi, Urdu and other languages. We will continue to hold these webinars. Please watch out for this space. Again, thank you everyone. Thanks so much.