

A Shot at Prevention – Bringing vaccines into AMR control

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Speakers: Dr. Wasif Khan; Dr. Abhilasha Karkey; Dr. Siphon Dlamini; Mr. Anand Balachandran

Moderator: Dr. Erta Kalanxhi

Erta Kalanxhi 00:03

Yes, I see so many people have already joined in. Hello everyone. Good morning, good afternoon. So nice to see all of you here. My name is Erta Kalanxhi, and I am a Research Fellow and Director of Partnerships at One Health Trust. It is my great pleasure to moderate this webinar today. So, thank you very much for joining. I know this is a very busy week for many events, but especially for the world AMR Awareness Week events. So, amongst all these other things that are happening, thank you very much for taking the time to join this very important discussion.

So, we will have a discussion on vaccines and how they can be integrated into AMR strategies. We will (also) talk about different topics related to Antimicrobial Resistance (AMR) and vaccines. We will make sure to leave a few minutes at the end of this hour for questions from you. So please take the time to enter questions in the Question and Answer box, and keep an eye on the chat box, because we'll be sharing links to some of the documents and keep an eye for the chat box, because we will be sharing links to some of the documents that we will be mentioning or discussing during the talk.

So, it has been a very big year for AMR. A lot of work has been going on towards the political declaration that was approved at the end of December. I would say a decade of work was dedicated to making sure that the second declaration had measurable targets and objectives for AMR. So, while some objectives were there, I believe that the declaration provides the base, an opportunity to develop additional targets and objectives that can be monitored, evaluated, and adopted in country-specific contexts.

So, it is my pleasure today to talk about prevention. Prevention is a very important aspect of the AMR story. There has been a lot of data accumulating quantifying the impact of preventive interventions, such as access to improved water, hygiene and sanitation, infection prevention, control, and last but not least, vaccines.

So earlier this spring, the Lancet series on AMR came out with a series of papers that talked about the AMR burden. At the same time, it really provided a highlight or overview of the impact that preventive

interventions can have on AMR. So, with regard to vaccines, improved access to current, existing vaccines, or routine pediatric vaccines, could avert 180,000 deaths per year, and this is without considering the impact of vaccines in development or those that can target different age groups. So, the data and the evidence are there. It has been increasing a lot in recent years.

The World Health Organization (WHO) has also done a lot of work to solidify the position that vaccines have in AMR mitigation. Their most recent report came out talking about the impact that vaccines can have on 40 different pathogens.

We will provide the links for these documents in the chat as well. However, the global perspective is promising, and it really outlines the importance of vaccination in not only reducing the infectious disease burden but also reducing the need for antibiotics or antimicrobials in general – two very important drivers for AMR.

At One Health Trust, we've been working a lot in coming up with some of this evidence, but also in initiating conversations between immunization and AMR departments, and we've been doing this through the Global Antibiotic Resistance Partnership (GARP), which is a network of experts in across countries in Africa and Asia, where we present and discuss evidence that connects vaccination with AMR mitigation, in an effort to improve the collaboration between these two groups, and sort of bring more country-specific or country relevant evidence that can help form Policy.

I am very happy to say that today we have we have experts who are also members of GARP groups from Bangladesh, Nepal, and South Africa. And we are also joined here by our dear WHO colleague Anand, with whom we work very closely in AMR national strategy evaluation projects.

We are very, very happy to be here and talk about vaccines in AMR strategies from a country-specific context because while the global perspective is really good and supportive of including vaccines in a more meaningful and impactful way in AMR strategies, there's still a long way to take these recommendations into policies that are relevant and can help inform decisions at the country level.

So, I will not take much longer. I am going to start our discussion today by inviting our first speaker, Dr. Wasif Khan who is a scientist at the International Centre for Diarrhoeal Disease Research, Bangladesh (ICDDR, B). Dr. Khan is going to talk about the impact of vaccines in Bangladesh and how they are integrated into the national policies in the country. So, Dr. Khan, thank you so much for joining us today. Over to you. I know you have a few slides that you are going to share with us. I will ask for those slides to come up.

Wasif Khan 06:57

Yes, thank you so much. Thank you. Dr. Erta, for very for the nice introduction to today's webinar and for giving me an opportunity to be a panelist. Can I have the next slide, please? So, before I talk about Bangladesh's infectious disease burden, just to give you a demography. If people have no idea about Bangladesh, it is a country of over 180 million population or almost half of the United States of America.

But by size, this is equal to the state of Wisconsin. So, it is a densely populated country where we have an extremely high burden of infectious diseases. On the left table, you can see the most common disease infection related to respiratory (diseases). Tuberculosis (TB) is the number one, followed by enteric infections, other infections, and neglected tropical diseases (NTD) for example malaria and Human Immuno Virus (HIV). The top pathogens that cause infectious disease include *Mycobacterium tuberculosis*, *Streptococcus pneumoniae*, Respiratory syncytial virus (RSV), *Salmonella typhimurium* and rotavirus and you know that all these bacteria and viruses have got vaccines. But other than *Streptococcus pneumoniae* in Bangladesh, no other vaccines have yet been incorporated into the national program.

On the right, the slide shows the Fleming Fund studies that are going on in different countries in Asia. This CAPTURE consortium, which started in 2016 for this report of 2022. So, they collected the pathogens from 34 labs and looked at the multi-drug resistance. The top one is *Escherichia coli*, followed by *Staphylococcus aureus*. And the alarming situation is that over 50 percent have multidrug resistance. So, it is definitely a big issue here. Can I have the next slide?

So, in Bangladesh, the immunization program was launched in 1979 with six vaccines, and by now, in 2024 we have 11 vaccines that are given free of cost by the government. The most recent was that was included last October 2023.

The next one, please. So, this National Immunization has definitely had a great impact. There are a number of achievements. If I highlight a few of those, from 2008 onwards, we have achieved the maternal and neonatal treatments eliminated, for which the state is still maintained, and the country has been polio-free since 2014 and Bangladesh has achieved control over the rubella virus and congenital rubella syndrome. There have been a lot of impacts also shown by adding this one of those. A few of those that have been highlighted below are reduced in the under-five deaths from 133 to 27 per 1000 live births, from 1993 to 2021. Measles incidence cases have reduced from about 15,000 to less than 1000 and the national introduction of pneumococcal conjugate vaccine (PCV) has really shown nearly about 50 percent reduction in the *S. pneumoniae* cases. Next slide, please.

So, this slide shows that, if we can add more vaccines to the immunization program, we can avert antimicrobial use, and misuse, and that can reduce AMR. For example, the PCV vaccine has already been introduced in children, but it has not been given to risk-populated adults. So, this could be considered, and then rotavirus and diverse types of conjugate vaccines are not introduced.

Although there have been several studies done in Bangladesh that have clearly shown to have a big impact in reducing misuse of antibiotics and AMR. And similarly, tuberculosis is a big issue as a routine post-exposure. TB vaccine can also reduce 50 percent efficacy against symptomatic disease and can have 22 percent of references in TB cases and 8.4 percent of references resistant TB deaths from Bangladesh, according to a report between 2020 to 2022. It is a prediction that it will be from 2022 to 2035. So definitely, vaccines have a big role. Next slide, please.

However, the major concern with the problem is that immunization has not yet been adequately included in the AMR strategy in the country. We know that the five objectives of the AMR global action plan National Action Plan of Bangladesh just is focusing on surveillance, infection prevention, control, and antimicrobial stewardship to make the antimicrobial contentment journey cost-effective, but they do not address much of the investment that includes medicine, diagnosis and primarily the vaccines, even in the recent national strategy plan of 2020 to 2025 they didn't mention anything on the vaccine use. So, this is an important lack, I would say, from the government's perspective. Next slide, please.

So, to mitigate AMR with vaccines, we need to expand the use of licensed vaccines to maximize their impact on AMR. For example, as I mentioned earlier, the production of rotavirus, typhoid, and TB vaccine.

One more concern for Bangladesh is not having much time. By 2029, the GAVI (the International Vaccine Alliance) support is going to transition out. So, the country must start to think about increasing domestic vaccine production in the future or export investment sources. As Dr. Erta at the beginning mentioned ensuring and maintaining the universal uptake of childhood vaccines. There has been a survey done from Bangladesh, which has shown that the full vaccination coverage by the age of 12 months is still around 80 percent whereas the sustainable development goal (SDG) is, it must be 95 percent. The missed communities have been constantly linked to stagnant vaccination coverage for the last decade, and there is a high percentage of invalid doses.

Next slide, please.

So, there is a lack of the object of existing guidelines and developing regulatory and policy mechanisms to extend approval and use of new vaccines. There is a lack of integration of cost-cutting activities between the national action plan and the National Immunization program, which needs to be done. One of the other important things Dr. Erta mentioned at her beginning — is that inadequate information, and lack of impact studies like health economics of AMR, and antimicrobial consumption (AMC) is very important, especially while we talk with the policy because they want to see the figures, the cost, how vaccines can reduce, not only but the total package of reducing the cost in the treatment and everything and adult immunization is just under discussion. Again, the budget is the main concern.

So, I do not think the government is thinking right now, and the major issue is about the same thing, the funding gap in Bangladesh and the other 1 million income can be sustained. Additional funding is needed. Unfortunately, in Bangladesh, the total budget of the yearly budget, 5 percent is given to the health sector. So, 70 percent of people must pay out of pocket. So, these are the major concerns to address this issue of AMR, so this was my last slide.

Erta Kalanxhi 14:38

Yeah, thank you, Dr. Khan. Thank you very much for that. I did notice that you provided some data, and you talked about the importance of the rotavirus vaccination, I bet you have been working a lot with that, but it was approved in 2018, and it is still waiting for introduction. Are you aware of how the

prioritization is taking place with regards to these vaccines, and why is the Coronavirus vaccine not introduced, given its impact that has been shown also globally?

Dr. Khan my question was on whether there was any indication as to why the rotavirus vaccine is not included yet.

Wasif Khan 14:50

Okay, sorry, I did not realize. So, one of the factors is budget, you know, because my feeling is – the government is getting existing vaccines from GAVI and other sources. Because for local production, there are (only) two pharmaceutical companies. They're making vaccines, but it's not adequate, and they are more concerned that if they add more vaccines, then obviously the cost will go up, and as the GAVI will be going out soon, they just want to make sure that the vaccines which are already being given can continue, and unless there's new pharmaceutical who can come up with, in the interest of developing vaccines locally.

So that is the biggest concern. I feel like the budgetary issues are the government's limited budget for the health sector. And as I said, the impact studies, we need to have more impact, economic impact studies that can convince the policymakers, as you mentioned at the beginning, yeah, that the investment is worth taking.

Erta Kalanxhi 17:18

Thank you very much, Dr. Khan. We will continue this discussion, and we have a lot of opportunities for additional questions, both from the panelists and from the audience later on, at the end of this hour, just checking out that we're doing well for time. Yes, thank you. So, I will move over to Dr. Abhilasha Karkey, who is a previous member of the GARP network in Nepal.

Dr. Karke is the Director at the Oxford University Clinical Research Unit in Nepal, and we are very happy to have her here today because she has some experience with both AMR and vaccines. She has been working in the field for a while. What we wanted to hear from you, Abhilasha is how AMR is included in vaccine studies. You have previously been working on a vaccine trial for a typhoid vaccine. Typhoid is an excellent example of how AMR develops, but also how it can be controlled by vaccination. So, I will be very happy to hear any comments that you have on this. Were there any AMR-related outcomes that were investigated in this trial?

Abhilasha Karkey 18:17

Yeah. So, unfortunately, no. So, not directly. I think at the initial point, everyone was just focused on efficacy, safety, etc. I think we did come to a point where we were sort of looking at the impact on the pathogen itself, like, you know, "Does the AMR patterns change?" However, I think one of the main problems in looking directly at outcomes is that these studies are long. I mean, for example, for typhoid we did the study. It is now in the National Immunization Program. But, you know, the immunogenicity studies do continue, so we do not know when they might need a booster shot, are booster shots needed? To know whether the incidence of typhoid goes down, so that, you know, the logic is, incidents

go down means you do not use antibiotics as much. I think that takes time. There is a long follow-up, and it is the same for the pathogen itself. It is a long follow-up that you must do.

Especially for typhoid, you know, there is this whole issue of gallbladder carriage. So,, you know, how many carriers are there? Is there any way that we can reduce them? Are they reduced with vaccines? So, it is quite complex, and I know there was a huge push to try and look for outcomes. And you know, that's continuing now. I mean, the vaccines are already on the immunization program, but looking for AMR-related outcomes, I think it is taking longer.

And I think the only reason is because it is so complex that you know you really need to break it down and look at one problem at a time, and then once you do that, you need a longer period of time, and that means more funding. So that just makes it quite complicated.

Erta Kalanxhi 20:15

If we were to kind of clarify, for those of us who maybe are not familiar with these studies, what time frames are we talking about? How long would this trial take? Has it? How long has it taken, or it has planned to take?

Abhilasha Karke 20:33

I mean, for example, (excuse me) the typhoid vaccine that we did. It is about looking at all the surveillance studies done before, then the whole typhoid, and then on the immunization program, we are talking about something like six, seven years.

So, we do have incidents of typhoid before the AMR patterns of strains, but now we need to look at the incidence after the AMR patterns after the carriage rates. So that is where we are now, and I think that is still another four to five years. So, whether you could have these four to five years within the first six to seven years, you could, but I think that there's no standardized protocol in countries like Nepal, and even microbiology labs are not exactly where you want them to be so, it just takes a lot of time and money, and I think funding is one of the main issues post the complexity.

Erta Kalanxhi 21:47

And what about, if I may call them low-hanging fruits, like measuring antibiotic use? Would that be a measure or an outcome that can be easier incorporated into the setting, in Nepal?

Abhilasha Karke 21:55

I mean, I think in countries like Nepal, that might be more difficult. So, we've tried to do that, you know, like, look at the use of antibiotics for what? But because you can get antibiotics just about everywhere. And you know, in a study that we did from 2017 to 2018, we had over 800 pharmacies in the Kathmandu Valley itself. That is not even in a whole country. So, I think it's very difficult to know where antibiotics go down, or the use of any antibiotics goes down or up. So, we focused on hospital pharmacies, but that does not give you the whole picture. So, I think you know, just trying to quantify how much prescription habits change has been, has been a challenge, to be honest.

Erta Kalanxhi 22:40

So, it is true that certain AMR outcomes may be feasible in various settings. That is for sure and is evident in what you are talking about right now. But if you were to be given it there is nothing you can do about the time, the time frame is there. But if there were no funding limitations, do you see any other barriers that would prevent having more real-world AMR data from vaccine studies?

Abhilasha Karke 23:22

I mean, I would not say barriers, but what I feel could be useful was if we could develop standardized protocols with AMR-related outcomes, for example, simple things like AMR strains, if hospitals could do surveillance or if there are surveillances that happen, but I think there aren't just robust enough surveillance systems. I mean, the pathogens are changing faster than our surveillance programs are. So, I am talking from the context of Nepal if the surveillance systems could be made more robust. I think that would give you a lot of information, even before vaccine trials came in, that could be very useful to look at AMR outcomes later on. So, you know, having standardized protocols and just strengthening microbiology labs, I think would also be a huge change that we could make. So, I would not call them barriers. I just think we need to come together more and think about it more in-depth. Yes, it is just a very complex problem. And we already are, but just more, talking more, trying to understand more, I think would be helpful.

Erta Kalanxhi 24:43

Thank you very much. The reason I asked you these questions is that I think you understand the landscape very well, and through the work that we have been doing in the past two years with GARP, one of the biggest questions that we have received, usually from country experts, is on the actual local data, like utilization of data that is already there, or, you know, acquiring new data. So, your insights into this are very important. From some of our experience, we have also noticed that sometimes the data is already there, but it is not easy to analyze, because, as you said, there is a lack of standardized methodology that is being applied in different settings. So, thanks a lot. We will come back to you later. I hope we get some good questions from the audience. I can already see some red buttons over here, so it means that the questions have come in. I do not have time to look at them right now, but for the speakers, for the panelists, make sure to check them and see if there is a question that you would like to answer later.

So, I am going to move on now to Dr. Sipho Dlamini from the University of Cape Town, I would like to talk to you a little bit about life course vaccination. So, we have been talking about vaccines a lot in the context of routine immunization for the pediatric population. There is also a lot of evidence on the impact that vaccines have short term for the control of outbreaks like cholera and typhoid. These are situations where antibiotic use is rampant. But what about thinking about the long term? Because, you know, traditionally, we think about vaccines for, you know, the first years of life, and now we understand the impact that that vaccination could have, also in vulnerable populations.

I am asking specifically because, in a recent paper that quantifies the burden the AMR AMR-associated deaths in the older age groups, it has increased a lot in the last 20 years.

Do you have any input on the role that vaccines could play here?

Sipho Dlamini 27:21

Yeah, no, thank you, and good morning and good afternoon to the people watching and listening. So yeah. So, the first thing is that life post-vaccination has certainly been identified by WHO as something that contributes to healthy living and or healthy aging. So, vaccines certainly play a key role in the different stages of one's life. So, it is not just about pediatric or Essential Programme on Immunization (EPI) programs, but about all the other stages of life where they play an important role. So, that is just the first thing to say.

I think the second thing to say is that the elderly population globally, is expected to double. I think currently, about 1 billion people are above the age of 60. The estimates are that by 2050 that will double to 2.1 billion people, and those people are going to be vulnerable to, and are currently vulnerable to vaccine-preventable diseases, and that is because a lot of proportion have at-risk conditions, so for example, diabetes and other conditions that may make them vulnerable. So there is data that suggests that vaccination is going to play a key role in protecting these individuals, but or everybody else who's got a risk factors for vaccine-preventable infection, and getting them vaccinated is key because it is going to, reduce infections, but Also, then also reduce the requirement for either antimicrobials or secondary infections. If it is a viral infection related to this, and the data suggests that they too, are going to benefit from vaccination and certainly going to benefit from also this issue of AMR.

As you said, the data suggests that in this age group, the elderly AMR-related mortality has almost doubled in the last 20 years. So certainly, vaccination is going to be key, because again, in many settings, low and middle-income countries, we may not have the antimicrobials to treat some of these infections, so you probably want to prevent these infections, and therefore prevent the need for an antimicrobial course of treatment, or the need for unnecessary antimicrobials.

So, yes, you know, AMR and vaccination are interlinked, especially in vulnerable populations who are elderly.

Erta Kalanxhi 30:15

Thank you very much. I wonder what kind of practical steps one can take to make sure that adult vaccination is sort of introduced more broadly and is advocated, because while we have an issue with access so having access to vaccines, there may be other issues for accepting vaccines. I will quote a doctor that I was talking to in the GARP Kenya workshop that it is difficult to sell vaccines to a healthy adult person because prevention is not always prioritized. So, okay, without making this question very convoluted, are there any practical steps that you think should be taken, for example, in South Africa, to really make sure that this life course vaccination takes off?

Sipho Dlamini 31:19

Yeah, so the practicalities are that there is a whole list of vaccines, for example, in the adult we would like to have, RSV, influenza, pneumococcal, and herpes zoster. So, the practicalities are that you must look and see what the epidemiology is in your setting. So, for example, influenza is a low-hanging fruit in many countries, and that, I think, is a first practical step to getting all the, you know, all your adult population groups who are vulnerable to influenza, to get the yearly influenza vaccine. What is often difficult is how we sell vaccination in either high-risk groups or even groups who perceive themselves to be healthy, and how we make those arguments for why vaccination is important. I think the link between AMR and vaccination is important because there is a good link, and you can make good policy arguments for it, whether it is cost-effective, there is a cost-effective argument there. There is a good public health policy there.

Then also, for the general population, you know you may take your cleanser vaccine because you are living with an old person at home, so if you are living with your grandmother, it makes sense for you to get vaccinated because you don't want to give grandmother influenza, which might cause her to suffer from mortality or morbidity from that.

So, I think it is about choosing and being practical about what is important in your country and then building up for the other vaccines that are important in that group. I think the main issue is also, how do we make vaccines accessible? Policymakers and countries need to develop programs where it becomes easy to get vaccinated as well, just like what we have done for childhood vaccination, it just becomes part of routine care. So, if you are diabetic, you are going for your diabetic check, and it's just before the winter season, it is part of the checklist. You know, as you are getting your medication for diabetes, somebody is also saying, Look, you need to influenza vaccine.

Erta Kalanxhi 33:39

Very clear. Um, one last question, what about immunization groups in South Africa? There are many stakeholders and players. Are they aware of AMR? Is AMR on their agenda? From your experience,

Sipho Dlamini 33:57

Yes, I think in Egypt, globally, there is a growing recognition of the synergies between a good vaccination program and the benefits to AMR. I think the pediatric data has certainly shown that.

So, if you look in the literature, there's good evidence that pneumococcal vaccination has reduced the AMR burden in children. There is some literature that is emerging for adults, even influenza, there is some good evidence to show that by getting influenza vaccination, you are reducing the use of antimicrobials in adults. So, there is a beginning to appreciate the evidence that vaccination plays a role in mitigation. What needs to happen, really is an expansion of adult immunization, and really capturing high-risk population groups, and then moving broadly to that.

So, there is that discussion beginning to happen in South Africa. Our National Immunization Committee is beginning to look at that and choosing a way of starting to implement that in key populations.

Erta Kalanxhi 35:16

Great. That is great to hear. Thank you very much for clarifying that, because all of these different nuances are play and play an important role in the access issue, because countries also must prioritize, and sometimes it is better to make the right decision when you have all the information. It seems like AMR is a big part of certain vaccines and should play a part in the decision-making process.

To my knowledge, there is no standardized way or framework for doing that at the country level. So, this is one of the issues that we see, or the question that is often asked is that there is no specific there are no specific guidelines that the country labels for evaluating the importance of certain vaccines. And there are a lot of reasons for that, but we can continue the discussion. We are in a good transition to talk to Anand from the WHO. He is leading the National Action Plan monitoring, monitoring, and evaluation unit at the AMR division. Anand, thank you very much for taking the time to join us today.

I wanted to talk to you a bit about national election plans. I think you are the one. You are the expert here on National Action Plans (NAPs) on AMR. We have learned a lot from working with this, in these plans.

I was going to ask you specifically about the recently released WHO framework, the people-centered approach for national action plans. It is very interesting to listen, to hear a bit more about it. Now that the political declaration is there, it has some recommendations. There are opportunities for countries to review and expand their national action plans, to make them better than before, and the people-centered approach seems promising in the sense that it can sort of be a novelty to this new plan.

So, I would like to hear more from your side and talk a bit about the approach and how vaccines are positioned there.

Anand Balachandran 37:49

Great, yeah. Thank you so much Erta and good morning and good afternoon or good evening to People joining in.

Thanks for this opportunity. So, why did the WHO develop a people-centered approach? We have been reviewing the performance of the global action plan since 2015, and over six to seven years of work, and looking at the data. We saw that progress is very, very patchy, and ad hoc. It is primarily donor-driven initiatives, and the focus has been on what colloquially we call the drugs and bugs approach, really focusing on surveillance or the antibiotics. And we felt there were two critical issues. One is there was no comprehensive package that countries are adopting in implementing their national action plans. And secondly, for me, as a sociologist by training, what is important is that people were missing in the global action plan, and there was, I think, a mention of patients just twice in the entire document.

So, when we started looking at the whole AMR program in most countries, we saw that people's barriers and challenges to addressing health care were not included at all in the discussions in the framing of the national action plans. What also became clear is that there were clear health system gaps not being addressed. AMR cannot be addressed without addressing critical health system gaps so we felt we

needed to reframe this from a drugs and bugs approach to putting people at the center of addressing AMR.

This approach has four critical pillars, and two foundations, the four pillars. The first pillar starts with prevention, and here the focus is on immunization, water, sanitation, hygiene (WASH), and infection, prevention, and control. So, we really feel this should be the core pillar of addressing AMR prevention should be the first step. In fact, I often wear, wear a badge on my jacket that says prevent AMR, prevention first, and because by addressing the emergence of infections itself, we can really make a dent in the AMR burden.

The second pillar that we focused on, and there were questions about this, is access to basic health services and essential public health functions. Do people, if they have infections, have access to basic, essential public health functions, including that they do not have very high out-of-pocket expenditures, or they have access to primary health care clinics, etc?

The third critical pillar and this was again, completely missed in the global action plan, is the focus on diagnostics. Okay, do people have access to diagnostics? I think at the primary health care level, it might not be feasible, but do they have networks, reference labs that you know, medical professionals can send samples to, etc? This will also help then build the capacity for microbiology and lab technicians supply chains, etc. So, this whole element was missed in the global action plan. So, we needed to make sure that diagnostics and diagnostic stewardship were a critical third pillar.

The fourth pillar is appropriate treatment. Do people have access to the basic antibiotics? Well, there's so much discussion in all these side events and meetings all over the world on new antibiotics. And you know, pumping in billions for new antibiotics, most of the world, people don't have access to the most basic antibiotics and use them appropriately. You know, they have not been trained. They do not have the knowledge, or regulations are not being enforced and implemented in most countries. So, those are the four key pillars: prevention, access to health services, diagnosis, and appropriate treatment. But underpinning that is what our colleague from Nepal also highlighted. We need good surveillance and infrastructure. This needs to happen, and the second infrastructure is strong governance within the AMR Coordination Committee that has financing, the ability to reach out to other stakeholders, etc. So, immunization is very important. In fact, it is in the first pillar. I would like to make two additional points here. One is the global action plan itself included a lot of focus on immunization.

In fact, the core indicators for measuring the global action plan included four critical antigens. I think it was if I am not mistaken, pneumococcal vaccines, influenza type B, rotavirus, and one more measles. So, there were, there were four critical antigens covered in the global action plan monitoring mechanism to really encourage countries to say, at the minimum, can you track this, the coverage of these four antigens? Because this will have an impact on antibiotic use in the future. And then there were some additional ones included, like typhoid vaccines as well. So the global action plan included an emphasis on vaccinations and also emphasis on research and development for vaccines that are more effective, etc.

So, that is the second point we should not forget we started by emphasizing vaccinations, but we see that the linkage has not been made effectively. So thanks to the work by the One Health Trust and also my colleagues and WHO vaccines and immunization teams, I think this linkage is being further developed and highlighted, and the effectiveness of vaccinations to reduce AMR, I think the investment case is being made very, very clearly that investing in certain vaccines will have an impact on reducing AMR.

So, I wanted to highlight that the third point is that we have a fantastic opportunity now. And the UNGA declaration has been adopted. But also keep in mind, that the World Health Assembly (WHA) endorsed a 10-year strategic and operational framework for those who to address drug-resistant bacterial infections, so anyone in the healthcare sector. This is the roadmap. The UNGA declaration is a political declaration, but from an ethical perspective, the 10-year strategic and operational priorities adopted by the World Health Assembly is really a roadmap, that has a clear emphasis on vaccinations as well. The big opportunity is we have the global action plan is going to be updated by 2026.

So the immunization community should really make sure that certain critical elements that you are pushing for, are part of the global new global action plan. For example, the AMR committees should include maybe a working group on immunization. In many countries, this does not exist. So they can look at data. They can analyze data together. They look at how they can engage in most national action plans, there is no link to the immunization program in the country. So there is a immunization 2030, agenda, you know, that's there at the global level. So the AMR strategy must be linked to these national immunization programs as well. And I think there needs to be more linkages also in civil society immunization. You know, my previous work experience was in polio eradication. We have a tremendous civil society engagement in immunization. You know, we need them to start talking about the co-benefits of addressing AMR by strengthening immunization. I think ITR folks are not going to be coming to every single program to say AMR is a problem and do something, but I think other programs should understand the benefits, co-and benefits of their own work. They will be addressing AMR if they do their work, better invest in immunization, etc. So those are some three high-level points that I wanted to make. Thank you.

Erta Kalanxhi 47:16

Thank you so much. Anand. I think I have very, very good points, illustrating, really, some of the things that must be done. I really liked your comment, or value your comment, the comment that you said about working groups that sort of are or they call them technical working groups that are involved in national action plan implementation. It is true that while there are working groups on infection prevention control (IPC), for example, surveillance, awareness, and immunization could be one of them, and they are lacking at the moment, so but it's only through working, I think, and looking at the evidence together that it's possible to really contextualize and understand how these strategies can

integrated from a theoretical perspective, as you said, it makes sense we should benefit from this sort of mutual interest of addressing AMR and infectious disease. However, it's like working together, which makes, or provides the grounds for better collaboration. So there that would be a really good way. Y

You have sort of answered part of my next question, because I was going to ask you, we have the global action plan, and then we have the national action plan that each country has adopted and many of them have shared similarities and sort of mirrored the global action plan. The WHO has played an incredible role in helping shape these national action plans. Is there a way that you can support countries, or other ways, like steps that the WHO can take to help sort out all the different elements in this picture and make sure that immunization is included, sort of more objectively in the national action plan now you did mention the working groups. But if you have any other comments, sort of happy to hear from you.

Anand Balachandran 49:18

Excellent point. So, as a first step here, at headquarters, we are working closely with the immunization program and the team, and we have meetings with them every two weeks, cross-cutting groups, where they engage, and we have these discussions.

But what we want to see at the WHO level is, these interactions go down the chain at the regional level and at the country level, and sadly, in public health, you have these silos, right? Everyone wants to do their work, and everyone else is almost seen as a competitor, which is sad for me. We are all competing for the same lives to be saved, I think. But this form of competition between the groups is not very helpful. So, we are trying to promote, you know better working with the immunization programs at the headquarters and at the other levels, but also as we start looking at updating the global action plan, we will also be updating the monitoring frameworks. We will also be updating what could a new national action plan look like.

So there are some core elements of these that can be inserted into the global action plan framework, which will then lead to how national action plans are developed. So, you know, if it is, for example, life course, vaccinations that were highlighted, that is extremely important, particularly as we see the global population aging in many parts of the world and the AMR burden significantly increasing in those communities. So we need to bring those elements into the global action plan update as well. So in fact, you know, one of my To-do lists for next week is to start engaging with the aging group, to say, okay, how can we start engaging with you now to become part of the global action plan update? What are your critical needs, etc?

So, I would say, you know, use this opportunity of the update of the global action plan to really provide, you know, information, inputs, and feedback, there will be global consultations that will include civil society and others as well, and based on that, is how National Action Plans are then going to be further developed. And we will also start looking at other partners, like GAVI for example, to see how they can highlight the value of, you know, certain vaccines or vaccinations on the AMR burden.

I think One Health Trust has already done excellent work in that. But I think we need these global players to also start highlighting these things.

Erta Kalanxhi 52:16

Thank you so much, Anand.

Anand Balachandran 52:18

I have in 2030 no 2029 we have to provide an update to the UN General Assembly on what we have achieved, and hopefully, we can show much closer working relationships between immunization programs and AMR and the actual impact of increased coverage and reduced burden.

Erta Kalanxhi 52:40

That is great. Thank you so much. And I think with these last comments, you have addressed some of the questions there. There have been a lot of questions here in the chat. I am going to just go through some of them. One of the questions was “Do you have plans for consulting with governments?” And I believe that's towards you Anand, perhaps, but it's not addressed to a specific panelist, but basically, the question talks about the need for consulting with governments at the government level, in order to get their buy-in, because it says without their engagement, it is hard to execute vaccination programs for people. So, government buying in is definitely an important one.

Anand Balachandran 53:47

They will play a critical role in the consultation process. You know, governments will provide feedback on the global action plan updates and various efforts, civil society, academic institutions, etc.

Erta Kalanxhi 53:54

So, one of the questions that was directed to me was explaining the reasons for the lack of clear guidelines in our country, whether it is the same in other countries, and whether we can use one country's solutions to apply to others. I think that this we sort of have discussed now. We are improving the guidelines. The global action plan will be updated. The evidence that is accumulating is out there, and organizations like One Health Trust and a lot of organizations in the space are working to bring this evidence forward to the countries. But again, in my opinion, one of the reasons for the lack is because previously, so much effort has gone into trying to understand the AMR burden that you know, there has not been a lot of effort or a lot of opportunities to really focus on the impact that prevention has. And as we have talked about it during the meeting today, the data, what we know now is a lot more than what we knew a decade ago. So now it's up to us to bring this evidence and communicate it in a way that it's understandable and can influence policy in various countries.

So there are many issues, but obviously, we are positive about the future. We think that there is an opportunity for change, and just the conversation we have today is excellent. You all come from different aspects, or, you know, you bring different experiences, and your expertise is sort of different in

the different nuances of AMR. So I am very glad we have come here together to discuss this topic today. I am aware of the time we're approaching the end. I see that many of the questions here have gotten the answers during our discussion. However, we will follow up with you over email. We have your email over here, so if there is any specific question that we feel was not answered, we are going to follow up in the chat.

So, I would like to ask maybe the panelists, if anybody has any closing remarks or any comments before we say goodbye for today, just leave the floor open. I would like to thank you, first, for taking your time, because it is a very busy week in many regards, so very happy to see this engagement and very active comments over here.

Anand Balachandran 56:47

If I may Erta, I think, we should not forget one of the comments in the chat, the social determinants of AMR. It is very important, and I think we cannot just keep focusing on the pathogens and the drugs. There are so many other drivers that lead to people you know, initially becoming infected with various infections. And those drivers, you know, whether it is based on equity or gender, etc., these social determinants play a very big role, and we are just beginning to understand that from the AMR perspective, but looking in the future, I think focusing on the aspect of prevention, these drivers, these social determinants, should be considered in any new plan or work.

Erta Kalanxhi 57:42

Fantastic. Siphon over to you.

Siphon Dlamini 57:44

Yeah, no, thank you. And I think there have been very good questions, and I just want to emphasize that life course, vaccination is again, an important aspect in trying to mitigate against AMR. I think, just like Anand said, again life, cost vaccination is one of where social justice or social equity in societies can be achieved. And I think this is important in low- and middle-income countries, where healthcare infrastructure may not be great. So, you know, poor access to diagnostics or access to treatments. But if you get vaccinated, you may not need diagnostics, you may not need treatment. So just something to think about and reducing economic costs related to illness if you get vaccinated, thank you.

Erta Kalanxhi 58:38

Yes, a great connection here, because as a closing argument, I would say that or comment on equity, thank you, Anand for bringing this up, and Siphon for illustrating the issue. Equity is a big element that we cannot underestimate, in fact, data and literature and data that are available and very easy to track online, show that where the AMR burden is greatest, you also have the biggest vaccination gaps.

So even though you know, I will stay away from making a causal relationship or inferring anything over here, I would like to say that the impact of vaccination, diagnostics, and access to antimicrobials that are not even second or third-generation can make a huge impact in the areas that have the highest burden. And that's why we're here trying to sort of really contextualize and bring forth this focus on prevention,

and make sure that, you know, we bring awareness to the fact that even though it's well understood, there are no specific frameworks or guidelines, there's not a lot of data at the country level to really bring these elements together, and we would like to see more effort if you know, organizing this story, making it more understandable and reachable at all levels.

This was a very good transition to not only say thank you and have a great rest of the week, but also to the promise for our next webinars that are going to focus on the social determinants of AMR, including gender, migration, climate, etc. So we look forward to engaging with you again, and we will see you again. Thank you very much and have a good rest of the week.

Thanks, everybody. Bye.