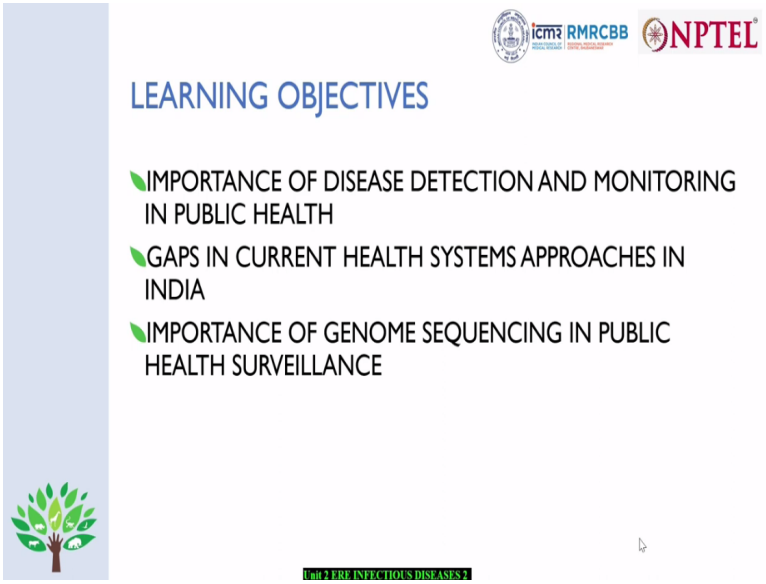
One Health
Dr. Mohan Papanna MD EIS
(Trained in Field epidemiology)
Faculty of Global Health
Huck Institute for the Life Sciences
Pennsylvania State University, USA

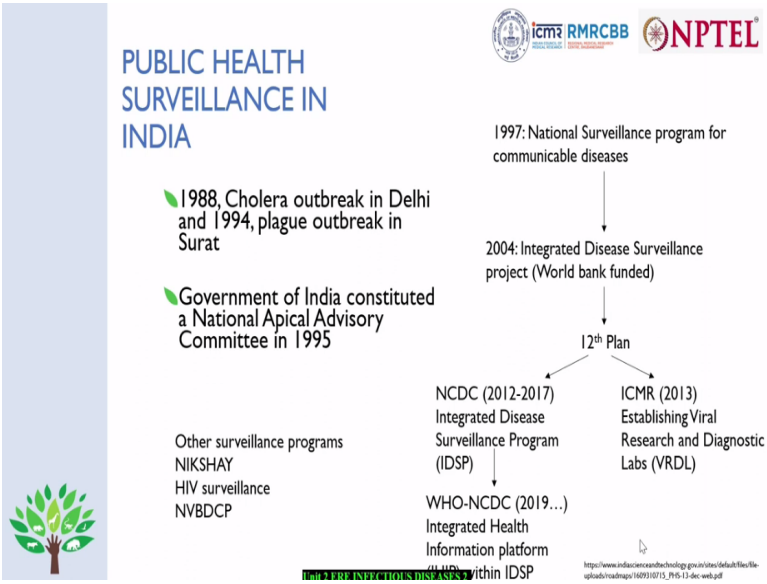
Lecture – 08
Importance of Disease Detection, Identification and Monitoring in Public Health

(Refer Slide Time: 00:17)



Hi, as part of unit 2 emerging infectious diseases and antimicrobial resistance module. Today, I will be discussing the importance of disease, detection and monitoring in public health, gaps in current health system approaches in India, importance of genomic sequencing in public health surveillance.

(Refer Slide Time: 00:33)



Here I would like to walk you all through how the public health surveillance in India has evolved over the last 30 years. Following the 1988 Cholera outbreak in Delhi and 1994 plague outbreak in Surat, the Government of India constituted a National Apical Advisory Committee in 1995. Based on the committee recommendations in 1997 National Surveillance program for communicable diseases was initiated.

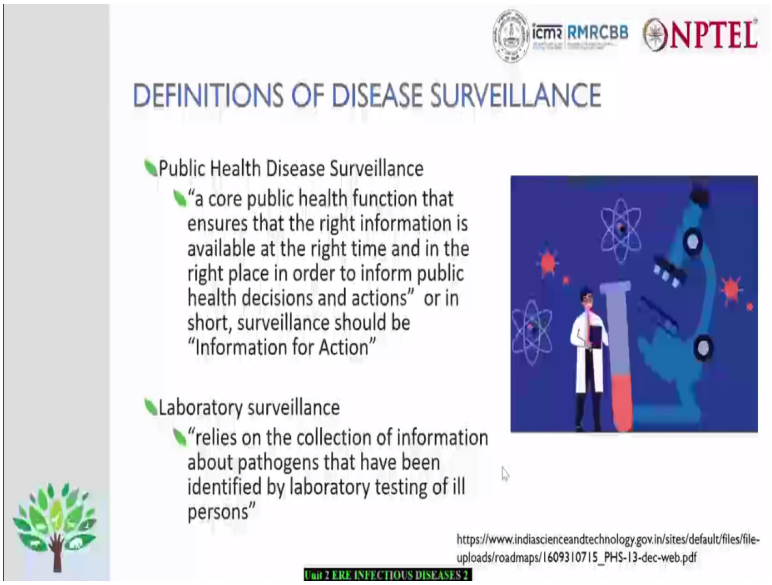
And in 2004 considering the needs to revamp the surveillance system especially for communicable diseases as more information was gathered from the previous program. The Government of India launched integrated disease surveillance project. So, this was in the project mode which was funded for 10 years by the World Bank and under the 12th plan in 2012 National Center for disease control was given the funds to initiate the Integrated Disease Surveillance Program which is called IDSP.

Simultaneously, ICMR also received the funds to initiate the Establishment of Viral Research and Diagnostic Laboratories which are called as VRDLs. So, the VRDLs are established across the country around 106 VRDLs are there in India. A Joint monitoring mission was invited to evaluate IDSP around 2017 or 18. So, based on the monitoring mission recommendations, the Government of India initiated the integrated health information platform where WHO and NCDC have joined hands together to initiate this web-based platform.

Basically to capture case based surveillance data which means any outbreak we should be able to get information both on the individuals as well as their associated lab data. So, it's not about the outbreaks and getting few lab reports, it is about getting lab reports for each and every cases during an outbreak. So, this platform also generates weekly and monthly reports and also has the ability to raise red flags or alerts whenever there is an outbreak for more than 33 diseases in the country.

So, other than this our country also has well established surveillance system for TB which is NIKSHAY and HIV we are aware that HIV program is also a well established program in addition we also have National Vector Borne Disease Control Programme. So, these are some of the well established programs which have been running from last 20 years to 30 years. So, this is a snapshot of how things have progressed in the recent past.

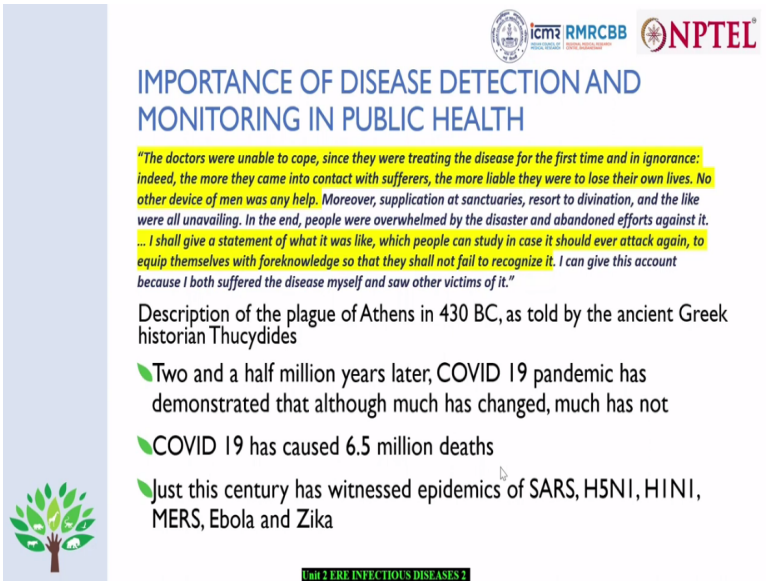
(Refer Slide Time: 03:45)



And then as we moving forward with discussing some of the basic aspects of surveillance especially the definition, how a public health person perceives or lab person perceives. So, when it comes to public health disease surveillance it is defined as a core public health function that ensures that the right information is available at right time and in right place in order to inform public health decision and actions or in short surveillance should be information for action.

At the same time lab based surveillance or lab surveillance is an integral part of public health surveillance. So, for a microbiologist or lab person surveillance means mostly collection of samples and reporting so it is much beyond that. So, though it realize on collection of information about pathogens that have been identified by testing ill persons. It is a very important and integral part of the public health disease surveillance which is very helpful in establishing especially the case based surveillance.

(Refer Slide Time: 04:58)



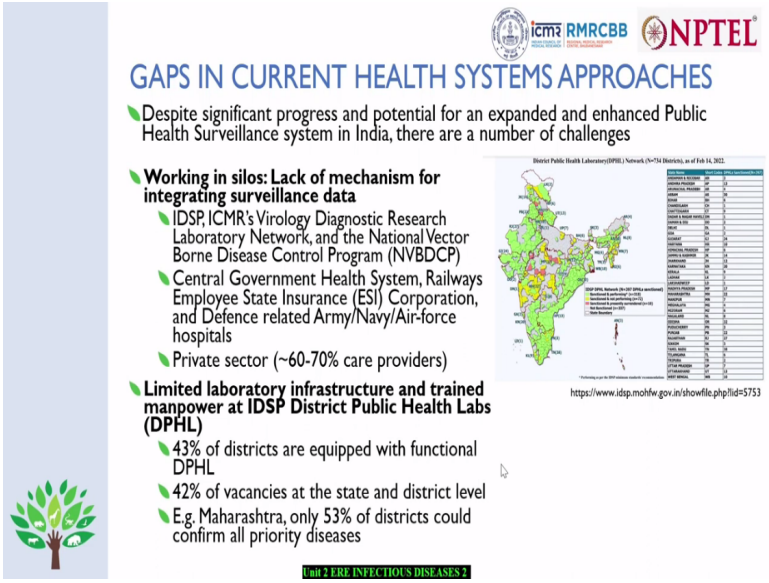
So, moving forward the main part of our discussion is we are gaining an understanding of the importance of disease detection and monitoring in public health. So, COVID-19 is one of those diseases which have opened a rise and also made us realize that though we have progressed a lot of in terms of diagnostic and establishing systems for disease surveillance. So, the pandemic kind of exposed the gaps or even the weaknesses in terms of disease surveillance.

So, here I would also like to quote lines from what the Greek historian described the plague outbreaks in Athens in 430 B.C. So, here he goes on to say that the doctors were unable to cope since they were treating the disease for the first time and in ignorance. Indeed the more they came in contact with sufferers the more liable they were to lose their own lives. No other device of man was of any help.

So, even after 2.5 million years later the COVID-19 pandemic kind of created a similar scenario and it demonstrated that although much has changed, much has not. COVID-19 has caused more than 6.5 million deaths and continuous to haunt us and this actually has also seen many other epidemics such as SARS, H5N1, H1NI, MERS, Ebola and Zika. So, this is one of the reasons why disease detection and monitoring becomes very important in public health or otherwise disease surveillance is important for any country.

It is global phenomena. We need to consider having good disease detection monitoring system to protect the public health.

(Refer Slide Time: 07:02)



So, here I would be touching upon some of the current health system approaches and the gaps as we are aware despite progress and potential for expansion and enhancement of public health surveillance system in India. There are number of challenges. So, I would be briefly discussing the three important challenges here. One is working in silos and lack of ability to integrate the surveillance data.

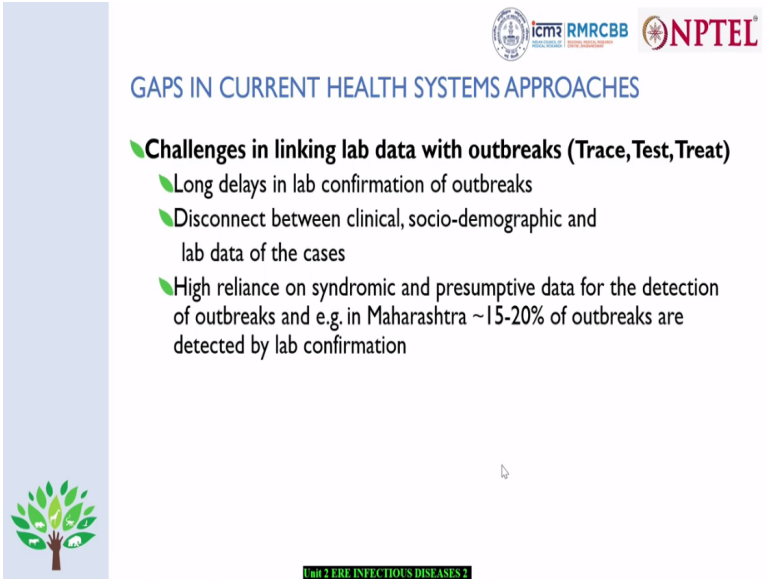
So, as discussed earlier we are aware that IDSP or VRDL network and National Vector Borne Disease networks are very well established and in addition to that Central Government also has the CGHS, Railways, ESI and defense. So, these are how the chain of hospitals and the Central

Government which do generate good quality data, but ability to integrating this data with the national surveillance data is again a big challenge.

And the next thing is the private sector where about 60 to 70 percent of our patient care is provided. Here again it is a big challenge when it comes to surveillance because hardly any data gets represented in the Government systems. So, that is one of the major gaps which needs to be addressed. In addition to this the limited laboratory infrastructure and trained manpower at IDSP district public health laboratories.

So, this is one of the major challenges the IDSP system faces and based on the current information available on IDSP, there are only 43 percent of the districts are equiped with functional district public health laboratories and almost 50 percent of the stack positions are vacant both at the state and the district levels. So, recent evaluation of the integrated disease surveillance project in Maharashtra showed that only 53 percent of the districts could confirm all priority diseases that basically means there is a large gap with the laboratory infrastructure and trained manpower.

(Refer Slide Time: 09:18)



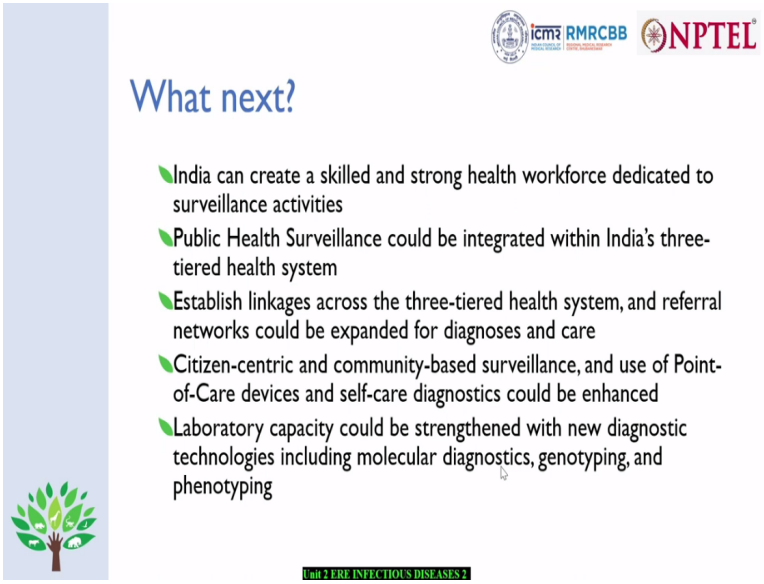
Coming to the next important challenge or the issues faced by the public health surveillance is the lack of ability to link the lab data with the outbreak or individual data. So, IHIP to some extent would be addressing this and that is one of the reasons why it was recommended that the

system needs to be revamped. So, basically track, test and treat so, which means that the server system should have an ability to precisely locate the geographic location of a case.

And then test the individual, collect the data and treat the person. So, what we still notice is that the long delays in lab confirmation of outbreaks. Disconnect between the clinical, social, the demographic and lab data of the cases and most weakest part is that we still rely mostly on the syndromic and presumptive data to detect outbreaks, for example, in Maharashtra only 15 to 20 percent of outbreaks are detected by lab confirmation which points that there should be a robous system which is supported by labs to confirm the outbreaks.

So, overall in terms of the gaps the major gaps are in terms of infrastructure, manpower and then again the way the surveillance system works. So, I think integrating the surveillance systems and coming up with platform like IHIP would be helpful, but long way to go.

(Refer Slide Time: 11:03)



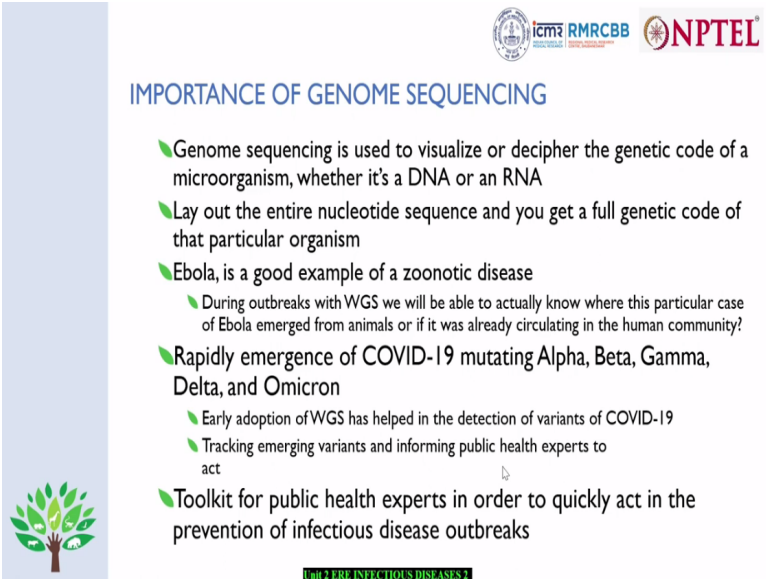
As next steps, here are few recommendations which we could follow to strengthen the surveillance system in India. So, one is creating the skilled and strong health force which is dedicated to surveillance activities. So, even at this point surveillance is not a very attractive program to get into. So, that is one of those major issues which needs to be addressed. Then again integrating the three tiered health system which is already part of public health services.

And then linking that with the referral networks especially the ICMR, VRDL networks or the National level institutions across the country so that we get a reliable lab data and also the district labs will play a major role in detection of the outbreaks and initiating the response. So, again we should develop some mechanism to integrate the three tiered health systems and the IDSP and also the various other platforms which are available in the country.

The thing which we also kind of realize which could be done better during the pandemic was making it more citizen centric or community based surveillance where using the point of care devices or self care diagnostics. So, as you all are aware the rapid diagnostics it is for COVID has been quite helpful in atleast for people coming up with their own diagnosis and reaching the healthcare system.

Also as I mentioned earlier, it is time that we just move forward with strengthening the labs in addition to the usual disease detection we also need to add new diagnostic technologies such as molecular diagnosis, genotyping and phenotyping. So, these could help us in getting more reliable lab confirmed outbreaks.

(Refer Slide Time: 13:14)



So, that is part of my previous discussion where I touched upon why it is important to have a disease detection and monitoring system and then I did discuss about some of the gaps in terms of integration of the surveillance data, then infrastructure, manpower then again lack of ability to

diagnose the outbreaks with help of lab confirmation. So, those are some of the major issues which need to be addressed.

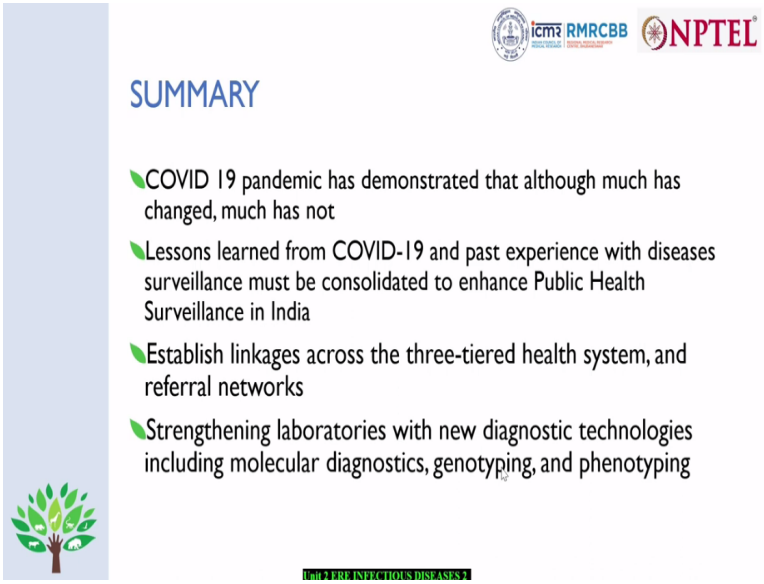
So, if you are coming to the importance of genomic sequencing. So, this is a pretty new technology which has been currently used. So, especially during the COVID it made us realize that genomic sequencing could be one of those most reliable Athens where we could get quick understanding of the variance and then move forward with planning the vaccination and other strategies.

So, what does genomic sequence basically do? It basically helps us visualize and decipher genetic codes of microorganism whether it is a DNA or an RNA. So, it basically lays out the entire nucleotide sequence and you get a full genetic code of the particular organism and this has been utilized very efficiently even during Ebola outbreaks. Ebola is one of those zoonotic diseases which could move from animal to humans.

So, during the outbreaks with the whole genome sequencing, we will be able to actually know where the particular case of Ebola emerged whether it was in the animal or if it is already circulating in human community so that way it is helpful and precisely coming up with the diagnosis as well as gaining and understanding of the spillover between humans and animals or animals and humans.

And another most important thing what we have also recently understood is the ability to use genetic data, genomic data in rapidly understanding the emergence of COVID mutations especially alpha, beta, gamma, delta and omicron. So, this helps us in detection of variance and also tracking the emerging variance and inform public health experts to act quickly. So, this is a very important toolkit for public health experts in order to quickly act and prevent the infectious disease outbreak.

(Refer Slide Time: 16:11)



In summary, COVID-19 pandemic has demonstrated that although much has been changed, much has not. So, which is an eye opener for us to addressing the gaps. So, the lessons learnt from COVID-19 and past experience with disease surveillance must be consolidated to enhance public health surveillance in India. Basically we have an understanding of how the surveillance system works and what could be done to tweak the existing system so that we have a better integrated information system which generates data for action.

And also as I mentioned earlier, it's again establishing the linkages across the three tiered health system and then referral networks of labs and strengthening laboratories with new diagnostic technologies especially with molecular diagnostics, genotyping and phenotyping. So, overall if these issues could be addressed the health surveillance system could function well and generate alerts for the public health actions. So, with this I conclude this discussion. Thank you.