

One Health Application in Management of Zoonotic Diseases
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Module - 8
Lecture - 14

The Integration of Human, Animal and Ecosystem Health in Control and Prevention of these Diseases

Good afternoon, everyone. This is Dr. Simmi Tiwari. I am Joint Director and heading the Division of Zoonotic Diseases at National Centre for Disease Control which is the apex organisation for Ministry of Health and Family Welfare for all technical perspectives with outbreak investigations and other non-communicable diseases as well. So, here I am to speak about the Zoonotic Diseases and One Health approach.

So far you have been come across various principles of One Health, what exactly does it mean, why it is important. So, you have covered a lot many aspects. So, continuing with the chain, I would be giving a brief overview what exactly is One Health with zoonotic perspectives. So, that is my area of expertise. So, here we go.

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Learning Objectives

1. WHAT IS ONE HEALTH
2. ONE HEALTH CORE DOMAINS
3. ONE HEALTH - HISTORICAL PERSPECTIVES
3. DRIVERS OF ONE HEALTH – ZOONOSES
4. TRANSMISSION DYNAMICS AND PATHOGEN SPLILL OVER
5. MAJOR PANDEMICS AND INDIAN SCENARIO
6. GLOBAL AND NATIONAL ONE HEALTH INITIATIVES
7. STAKEHOLDER OF ONE HEALTH
8. ONE HEALTH IMPLEMENTAION STRATEGY
9. GAPS , CHALLENGES AND WAY FORWARD
10. RESOURCES

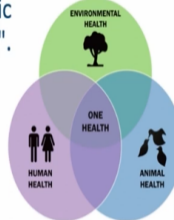
So, these are the learning objectives what I am expecting from the students to learn from these particular few set of slides that what exactly is the One Health; already it has been covered in the previous slides; what exactly we do with the One Health core domains and what exactly is the spectrum of One Health.

And we will be looking at about the historical perspectives of One Health, drivers of One Health, what exactly do we mean by the transmission dynamics which is obviously a quite complex phenomena to understand, what exactly do we understand by the pathogen spillover, major pandemics and Indian scenario, global and national One Health initiatives, stakeholders of One Health and how do we go for the mapping, One Health implementation strategy, what are the prevailing gaps, challenges and the way forward, and what resources are there to be referred for you.

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What is 'One Health'

- One Health is a transdisciplinary approach which entails a mutual collaboration , coordination and communications between different sectors to address the risk at human-animal and environmental interface .
- World Health Organization definition “ One Health" as an approach to designing and implementing programmes, policies, legislation and research in which multiple sectors communicate and work together to achieve better public health outcomes".



So, what do we understand by One Health? One Health is a transdisciplinary approach which entails a mutual collaboration, coordination and communication between different sectors to address the emerging risks at the human, animal and environment interface. There are many definitions which has been given by many of the organisations, but to refer here, I would like to quote the WHO definition that One Health is an approach 2D design and implement the programs, policies, legislations and research in which multiple sectors, they communicate and work together to achieve better public health outcomes.

So, means the bottom line is here that the health is not only to be restricted and viewed with the perspective of human health but it should be seen with vis-a-vis animal health perspective and the environmental domains.

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ONE HEALTH - HISTORICAL PERSPECTIVES


- **Hippocrates**, Greek physician, wrote "Airs, Waters, and Places" – the harbinger of One Health Concept
- 19th century **Dr Rudolf Virchow**- 'Between animal and human medicine there is no dividing line—nor should there be.
- **Dr William Osler**- studied the links between human and animal health
- **Indian Scenario**- Bhole Committee Constituted in 1946- suggested that "**health and development are interdependent**"
- 2004: Human and animal health experts at a symposium convened by Wildlife Conservation Society extends the concept of 'One Medicine' to 'One Health, One World'

Planetary Health

Eco Health

One Health

HEALTH FOR ALL



So, One Health is not a new concept. Way back in the hypocrises, the Greek physician wrote that there is a cross linkage between the airs, waters and places and there is no segregate line which could be segregate, apart from these 3 disciplines which are prevailing in our nature. In nineteenth century, Dr. Rudolf Virchow who is a great Scientist, he given a code which is still valid today that there is no dividing line between the animal and human infections and human medicines and nor there should be such line.

Dr. William Osler, he has done several studies to establish linkages between the human and animal health. And if we look at the Indian scenario way back in the board committee, they gave an important principle to realise the primary health concept in the Indian health system, the importance of intersectoral coordination. So, that is also one of the important beginning to establish the intersectoral coordination which is again a synonym for One Health approach in the health and development which are interdependent.

If you look at the One Health concept, there are 2 overarching concepts on this; there is a Planetary Health and the Eco Health. Planetary Health is a broader umbrella which encompasses both the Eco Health as well as the One Health. So, One Health is a little bit narrow down concept but if we look at the overall health for all, we need to look at the Planetary Health vis-a-vis Eco Health also in similar disciplines.

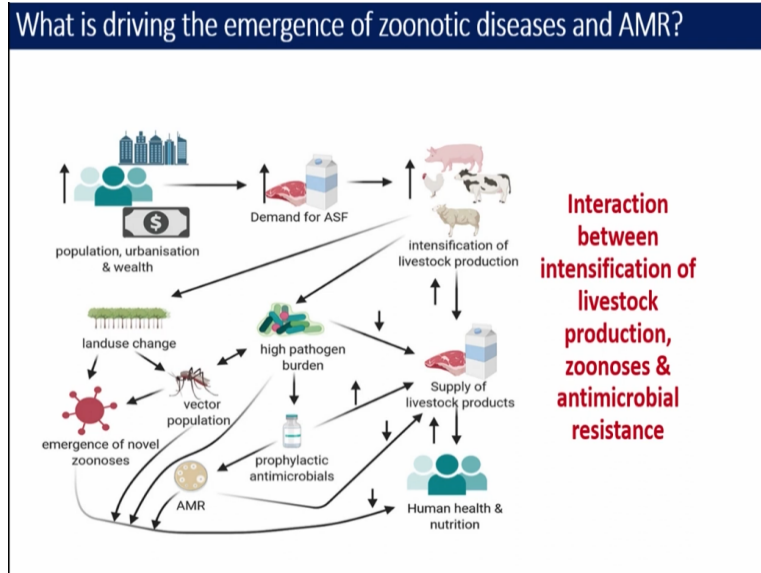
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So, what we look at the One Health spectrum, it is not only restrained or it is not only constrained to the infectious diseases. There is a broad arena One Health. First and foremost, we are already covering the zoonotic diseases in One Health and vector borne diseases, environmental health and the climate issues; they are another area of concern wherein One Health principle is very important; antimicrobial resistance, food safety and security;

But apart from these infectious diseases and these One Health core domains, we have area of concern wherein One Health is very valid, are the mental health, non-communicable diseases and chronic ailments and the occupational health, where One Health needs to be there in principle and if we want to achieve a win over these problems in the human health.

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So, what exactly are the driving forces? What exactly are the risk factors responsible for emergence of zoonotic diseases and antimicrobial resistance? There is a complex arena. There are many factors which are playing, interplaying for emergence of zoonotic diseases and the antimicrobial resistance. We know that we are a largest livestock population. There is a merging, there are shrinking land and we are continuously interfering with the wildlife arenas.

And there is a huge demand of the antibiotics; there is a huge growth requirement for the livestock productions and huge travel. Within seconds we are traveling from one corner of the globe to another corner. So, these are the things which are putting our whole community, not only the human but also the animals and our environment at a risk for this emergence of zoonotic diseases and other risk factors.

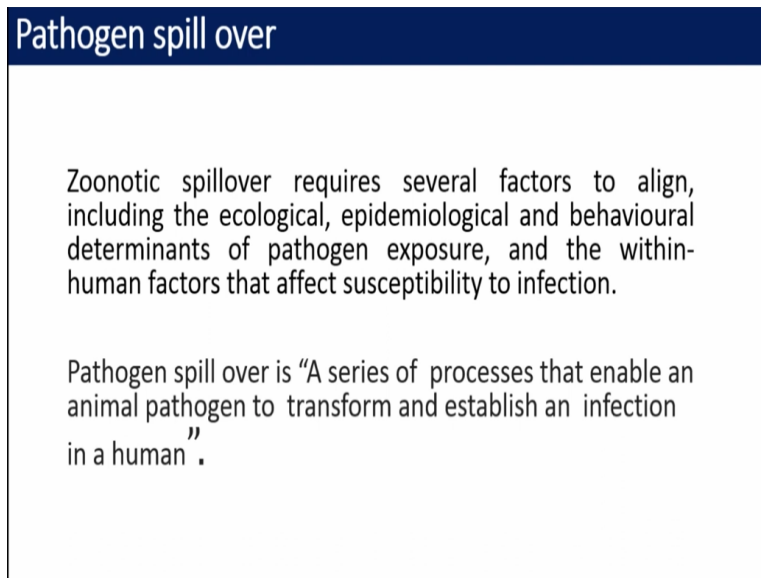
And we know that the population dynamics is changing all together, how the urbanisation is happening, how the landscape uses are changes and how we are losing the biodiversity on a consistent scale. So, these are all factors which are in a complex manner they are interacting with each other and giving rise to emergence of novel pathogens to which even we do not know where they are and how they are interacting, how they are going to harm our whole planet.

So, that is all about this emergence of zoonotic diseases and the contributing risk factors. So, I would like to touch upon a word what exactly do we mean about the pathogen spillover. Why we

are concerned about One Health? Why we are concerned about biodiversity and landscape usage? Because we are constantly at risk for emergence of new pathogens. There are many pathogens which are hailing in the wildlife species and in the animals but there is a close contact and we are venturing into the domains of wildlife species.

So, there is a constant risk that few of the pathogens which are not known to the human health, they may spill over towards the human boundary.

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Pathogen spill over

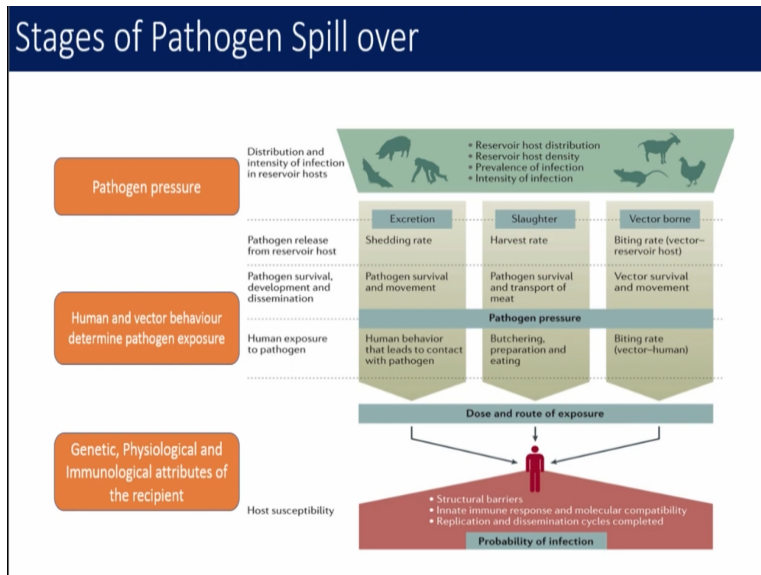
Zoonotic spillover requires several factors to align, including the ecological, epidemiological and behavioural determinants of pathogen exposure, and the within-human factors that affect susceptibility to infection.

Pathogen spill over is "A series of processes that enable an animal pathogen to transform and establish an infection in a human".

So, what we understand by the zoonotic spillover, it is a series of processes that enable an animal pathogen to transform itself and establish an infection in a human. So, that is a broad definition, which is given to understand the pathogen spillover mechanism. There are of course many factors which are required to happen this kind of incidence, to happen this kind of untoward incidents like there should be an ecological epidemiological behavioural determinants of pathogen exposure and which should constantly have a complex interaction with several of human host factors and other reservoir factors.

And of course, one of the important factors to look into consideration is the susceptibility of the human host to a particular infection.

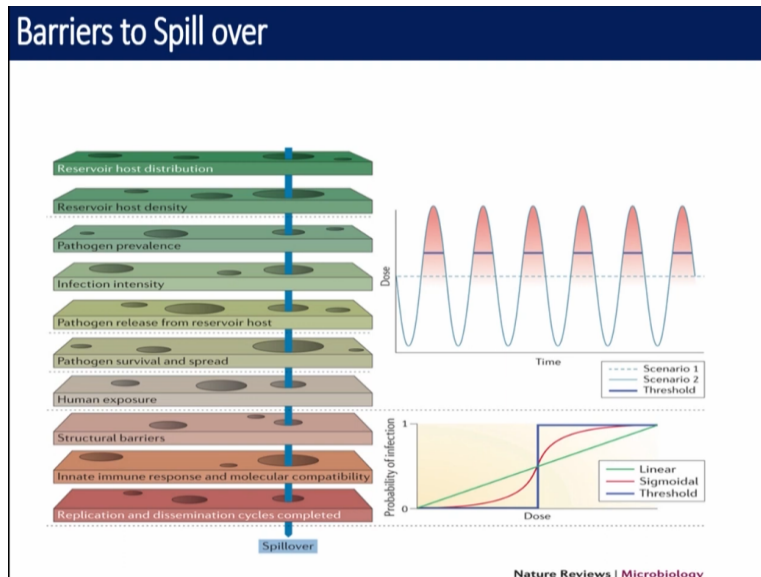
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So, if you look at the stages of pathogen spillover, we can divide very well into the 3 stages. There is a constant pathogen pressure which plays an important role for the reservoir host distribution, reservoir host density, prevalence of infection and intensity of infection. So, these 4 factors, they lead to the pathogen pressure build up. And then, the second stage is the human and vector behavioural determinants subsequent to a pathogen exposure; so, how these things they interact and leading to the progressive stage for the pathogen spillover.

And the next determinant is the dose and route of exposure determinant and which is a complex interplay between the genetic, physiological and immunological attributes of the recipient. So, given these 3 stages, we can understand that how a pathogen spillover happens between the species, but it is not an easy easy phenomena.

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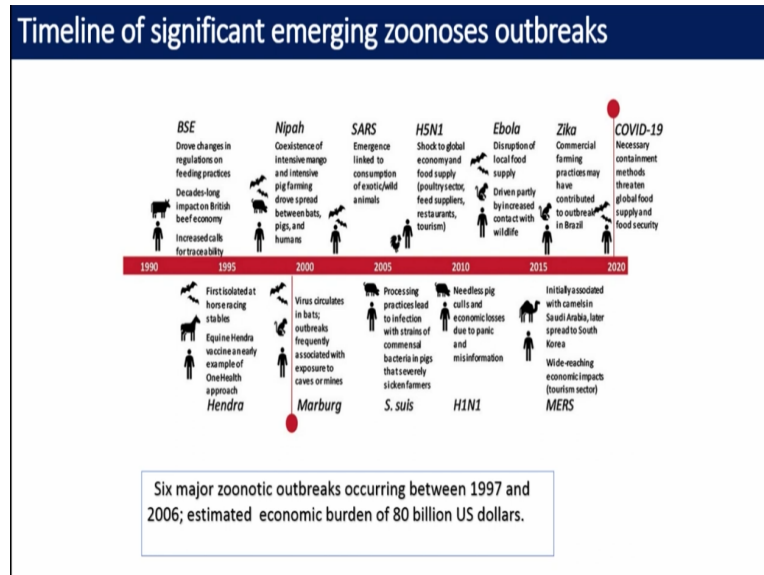
There are complex barriers, there are so many layers which a pathogen has to cross to enable for causing an infection in the human species. This particular diagram is giving you a kind of different holes, but there are many barriers like reservoir host distribution, host density, what is the prevalence of pathogen, what is the virulence of a particular organism which is surviving in a particular environment.

And similarly, what exactly are the factors leading to the extent of pathogen survival and what are the various channels which are spreading that pathogen in a particular complex environment? What exactly is the microbiota which is playing a complex interplay between the other ecological factors and biodiversity factors. There are several factors which are entailing the human exposure and the human behaviour aspects that how humans are venturing into the other areas and how the biodiversity loss is playing a complex role for making a human more susceptible to the newer pathogens.

Then there may be many of the structural barriers and one of the important things how till date there may be so many pathogens may be existing in our nature; but why every pathogen is not able to cause disease that there is an innate immune response and molecular compatibility which is required for an infection to be able to cause a disease in a host and there is again a complex replication and dissemination cycle.

So, these are all things which need to be looked into and these are complex transmission dynamics which need to be understood once we understand the spillover mechanism of a pathogen from cross species, across the cross species barriers.

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So, if we look at the timeline of the significant emerging zoonotic outbreaks, we know all the major outbreaks which has been creating a havoc to the human mankind and cause a greater economic and social burden. These are all from the zoonotic aspects. We know the Nipah outbreak, SARS, Avian influenza, Ebola outbreak, Zika and the COVID-19, the global pandemic which is still ongoing at many places.

Apart from this, Marburg virus and MERS Coronavirus that was another a big outbreak which has caused a huge socio-economic burden and these all can be said to be an example of cross species spillover of the pathogen. So, these are all zoonotic pathogens which has been creating a devastating impact on the mankind.

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Reasons for 'One Health' attention in India

1. India is the **fastest-growing country**
2. **Large surface area (32,87,263 km²)** that accounts for 2.4% of the total world area
3. Enormous population size of approximately **17% of world's population**
4. India **shares border** with 7 countries
5. International Travel
6. Heavily forested with a total **forest cover of 708,273 km²**, which is 21.54% of the total area of the country
7. Increasing livestock population- 536.76 million (11.6% of worlds total)
8. **Huge Wet market** sector and industrial **animal trade**.
9. Globalization and Industrialization
10. Biodiversity and land scape changes, Deforestation
11. **Increasing consumption of antibiotics**



So, what exactly are the reasons for the One Health attention in India? We are very much at the verge of getting zoonotic diseases spillover events. India is considered to be a hotspot for the major zoonotic diseases outbreaks. Although the India's biodiversity is matching with its neighbouring countries, but still given the population landscape, given the life sector population and given the wildlife species, a forest cover which is approximately 21.54% of the total country, and given the many of the wet market and industrial animal trade activities which are happening in the India, it is certainly a centre for One Health attention globally.

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One Health in Action - Global

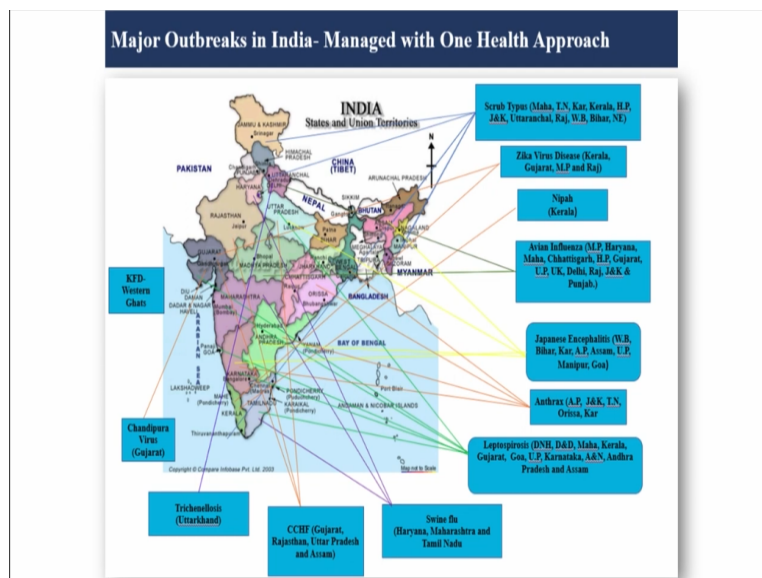
- The UN quadripartite (WHO-OIE-FAO-UNEP)
- G20 forum on One Health
- UK G7 forum strongly advocates for countries for having highest level formal mutual cooperation agreements on “One Health” activities.
- CDC One Health and GHSA
- Bill and Melinda Gates Foundation
- Asian Development Bank

So, if we look at the One Health in action at the global perspective, we all know that the UN quadripartite, WHO, OIE now called as a World Organisation of Animal Health, Food and Agriculture Organisations and UNEP, they, this UN quadripartite has come in a long way to establish a One Health mechanism at a global scale with a constant urge to the member countries to implement the One Health principle in their ongoing health policies and programs.

And second important platform wherein we are looking One Health in momentum is the G20. They have come together and continuously discussing the One Health agenda in their meetings. UK G7 forum has also advocated strongly that the One Health should be there and they have formed a highest level formal mutual cooperation agreements on the One Health activities and they have identified a high level One Health expert group on One Health.

CDC at USA and Global Health Security Agenda that is again given an importance and it again echoes the voice of One Health. And Bill and Melinda Gates Foundation, we know that they are quite active on One Health agendas. And another important is Asian Development Bank. They are looking at many of the One Health activities and they are taking up the agenda of the development corridors and importance of One Health.

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If we look at the major outbreaks in India, none of the states is spared of the zoonotic diseases outbreaks. So, this particular map is showing that we are constantly reporting the outbreaks of

zoonotic diseases across the states. We are constantly receiving many of the media alerts which come into the system and then they get investigated by the rapid response teams and also the state level expert groups.

And we do have a One Health mechanism in place, wherein cross sectoral and multi-disciplinary teams go and investigate these outbreaks. And these outbreak reports are very much on the public domain and I would urge the students that they can look into these particular case studies. These are on the NCDC website, IDSP and IHIP portal. So, there are many outbreaks which are in the; and we at NCDC and under the IHIP, we compile all the reports and put it in the public domain so that we can look at how the state is taking action in a multi-disciplinary aspect to curb these zoonotic diseases outbreaks.

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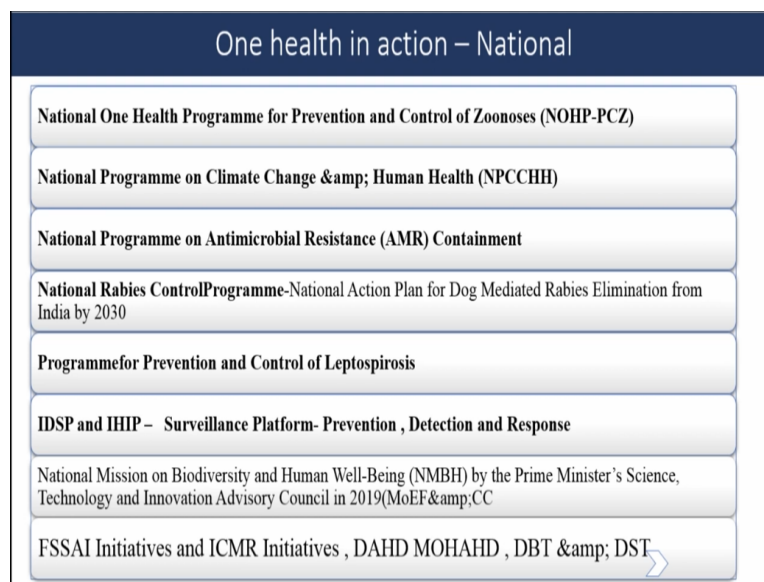
So, if we look at the field experiences globally, there are many experiences like from Cambodia and Nepal. There is a healthy forest project in Cambodia which used a system based integrated approach to get better health outcomes along with the better environmental outcomes. So, this has given a good experience that how we have linked the forest people with our communities and how this project has shown a success.

And again there is an example of Sierra Leone, wherein they have demonstrated a healthy living and safe living with the bats by applying a One Health principle in action. Similarly, Republic of

China, they have successfully shown the Schistosomiasis control and this was again based on the One Health principle. And one important project and which has shown a success story in the Chad Republic, a human and animal vaccination delivery to the remote nomadic communities.

So, these are all the field basis success stories but there are many more to tell; but given the limitation of time for this particular course, I have selected few of these field experience that wherein the community level, One Health principle that has shown a beautiful success stories for implementing the One Health at the grass-root level.

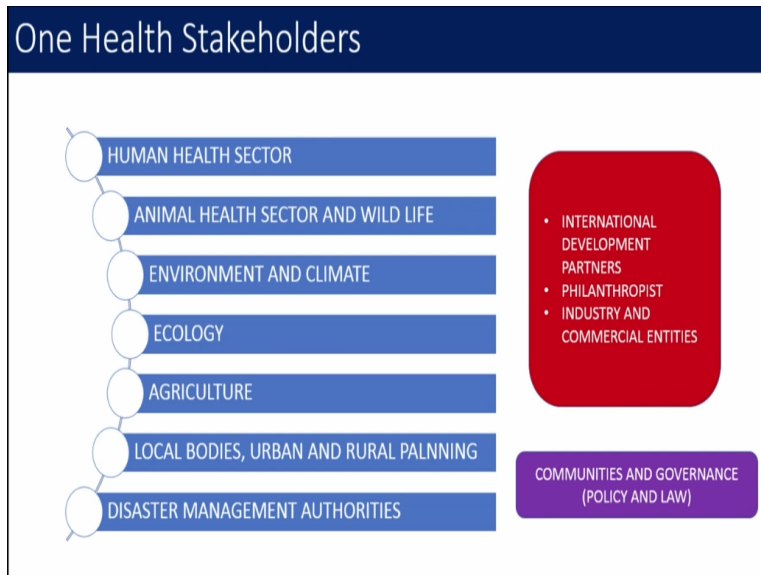
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So, we have many programs at the national level which have One Health in principle. Few of them are enlisted out here but there are many more activities which are being undertaken by the other ministries as well. These are few I have picked up from the Ministry of Health under NCDC only National One Health Program for Prevention and Control of Zoonosis, National Program on Climate Change, National Program on AMR, Rabies Control Program, Leptospirosis Control Program, IDSP and IHIP, National Mission on Biodiversity and Human Well-being which is under the aegis of Ministry of Environment Forest and Climate Change.

And there are several initiatives which are being undertaken by the FSSAI and ICMR, DAHD, Ministry of Fisheries Animal Husbandry, DBT and DST.

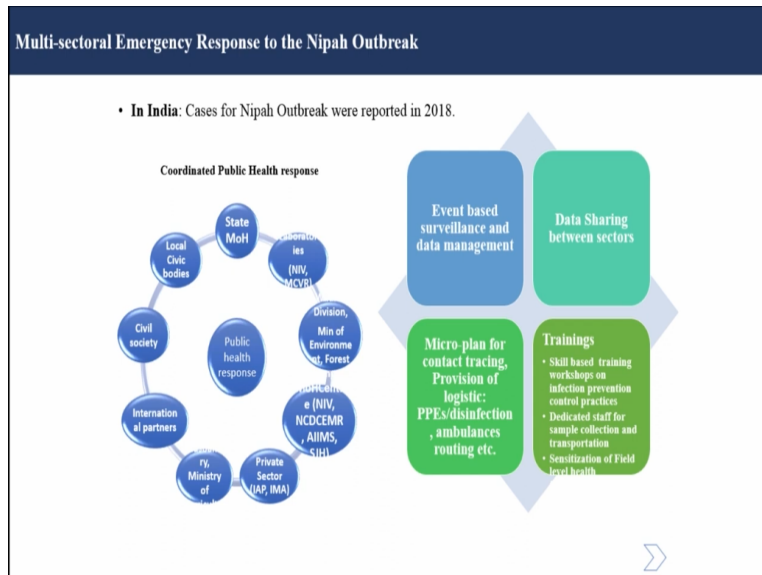
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So, now one of the important aspects that who are the key players in One Health domain? So, one of the important activities that we should map the One Health stakeholders. So, key players, we all know, Human Health Sector, Animal Health Sector, Environment and Climate, Ecological Disciplines, Agriculture Disciplines, Local Bodies, Urban and Rural Planning Bodies, Disaster Management Authorities.

And apart from these, International development partners, philanthropists, they have to play a key role; industries and commercial entities. And apart from these, community and governance, means policy making bodies and law enforcement agencies without which One Health cannot be success.

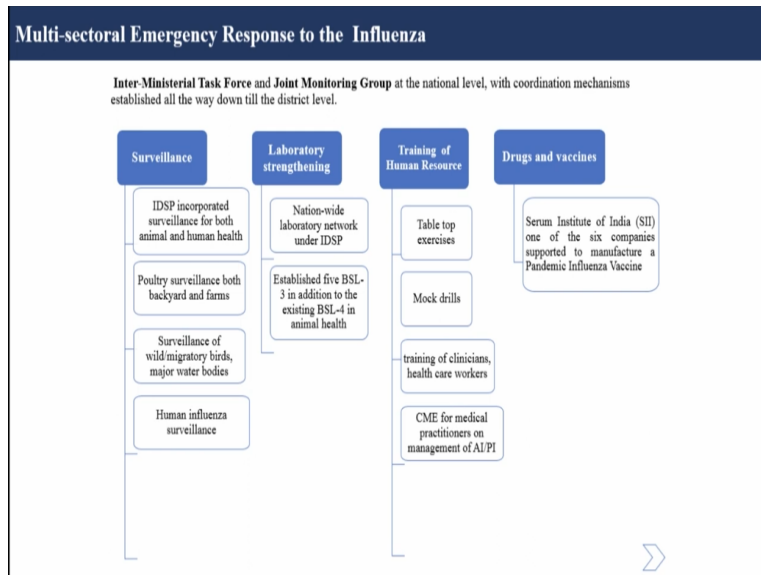
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This is an example that how the Nipah outbreak was curbed in Indian scenario using a One Health approach. So, the event-based surveillance system in data management was already in place when the Nipah hit the Kerala state. We ensured minimal essential data parameters to be shared between the sectors. Micro planning was done, contact tracing was one of the important activities to curtail, to contain the Nipah outbreak within that particular district.

Logistics: PPE, disinfection, ambulance; there were many activities which were on field these were applied to contain the Nipah outbreak at that time. Training was ongoing with all the key stakeholders and with all the field functionaries as well as the physicians those who were treating the Nipah patients, suspected Nipah patients. So, we all know that this Nipah outbreak was reported in 2018, but it was very successfully contained within geographical boundaries of Kerala state itself and this is an example to be cited on the global platform, and wherein the One Health played a key role.

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Similarly, we know there is already a multi-sectoral emergency response which do exist for the influenza outbreak. We do have an inter-ministerial task force and joint monitoring group at the national level with coordination mechanism which has established all the way down till the district level. We do have all the domains wherein One Health is in principle required and established to response, to establish a response to the influenza, like surveillance, laboratory strengthening, capacity building of the various categories of the human health sector as well as the veterinary sector, and of course the logistics supply with respect to drugs and vaccines.

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India's response to COVID-19: We all know that we have been able to successfully manage the COVID-19 pandemic limiting the economic loss to a minimal level as compared to many of the countries in the world. So, this was again where the multiple sectors, they come together and joined hand to save the country from the COVID-19 pandemic. All the agencies, they have worked hard; NCDC, ICMR, Emergency Medical Response Division at the Ministry, Disaster Management Cell at the Ministry, National Disaster Management Authority; they have been playing a key role in managing the COVID-19 pandemic.

And apart from these, many of the technical partners, they played a very important role in COVID-19, whether it is an area for generating rapid evidences that how we are going to address the COVID-19 and also the pharmacology, pharmacopia, they have come together and they have helped Indian Government in or not only in the Indian Government but the neighbouring countries, be it in a diagnostic help or be it in a vaccination help. So, how we have managed the COVID-19 just with the One Health principle.

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Implementation Strategy for One Health Approach in India

- Disease prioritization
- Mapping of stakeholders and Joint Risk Assessments
- Developing Policy, Guidelines and SOPs
- Identification and pooling of resources
- Legislative frameworks and mechanism to address cross cutting issues
- Joint plan of actions
- Implementation and review and reassess



Now, what are the key strategies if we want to implement the One Health in India? Not only India but on a global scale, these are 4-5 bullets which I have chalked out that these are the necessary steps if we want to implement the strategy of One Health. First and foremost, for a particular geographical area or particular geographical unit, if we want to implement a disease

specific One Health approach, we need to prioritise that particular disease, to what extent it is important for us and to what aspect it is important for other sectors.

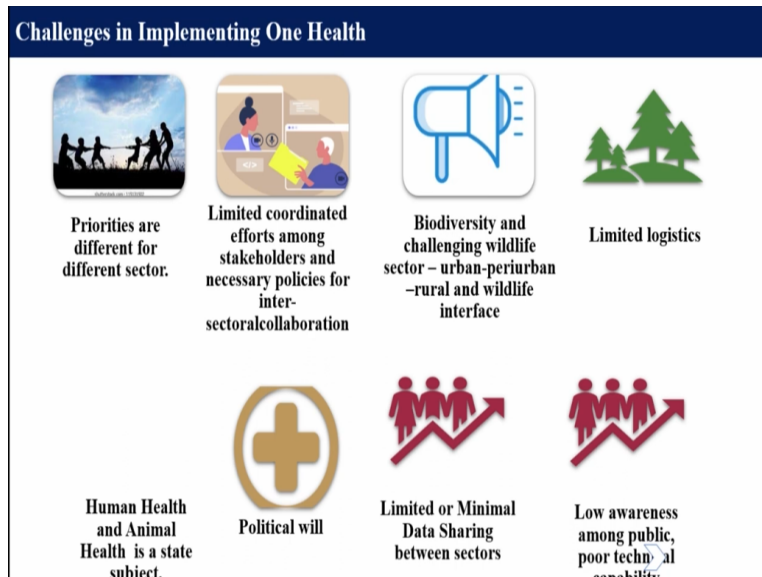
So, disease prioritization has to be done keeping in perspectives of all the stakeholders. So, there are many methodologies for disease prioritization. We go by the analytical hierarchy process, decision tree modelling and many other statistical tools, but first and foremost requirement for going for the disease prioritisation is that we should have a basic data sets with us to go for a disease prioritization exercises.

So, this is the first step in disease prioritization. This is for the implementation strategy. Then, second one is the mapping of stakeholders. What are the important stakeholders would be required for a particular One Health strategy? And of course, the joint risk assessment; before making any kind of strategy, all the stakeholders need to come together on a single platform for going the joint risk assessment of a particular disease entity or any of the health problem.

Then, formulating standard policies, guidelines and operating procedures for epidemiological investigations and also the laboratory investigation. So, this is also one of the important steps for implementing One Health in a true sense. Identification and pooling of resources, legislative frameworks, mechanism to address the cross cutting issues which should be clearly delineated in any of the One Health strategy.

Joint plan of actions with clearly delineated, clear explicitly stated roles and responsibilities all the stakeholders; and of course the monitoring indicators that should be there within a plan; and of course, after getting implementation, a review and reassess the strategy. So, these are the basic steps for implementation of One Health in true sense at any level, be it a national, be it a regional or be it a grass-root level.

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So, One Health is not free from challenges. We know that it is a complex discipline. So many challenges are there if we look at the priorities are different for different sector. If we look at the wildlife sector or the veterinary sector, they are mainly concerned about the revenue generation. So, human health is a service sector but veterinary sector is all together for a revenue generation.

So, these are the cross cutting areas, but these can definitely be sorted out on a mutual dialogue and mutual consensus basis without disturbing anybody's mandate or anybody's priorities. And secondly, we have a limited coordination among the stakeholders and there are policy gaps which do exist not only in the Indian scenario but also on the global platform. So, once we are recognising the One Health as an important discipline, so, these things are being addressed in the various policy documents.

Biodiversity and challenging wildlife sector, urban, peri-urban, rural and wildlife interface; that is very complex. We need to make a balance between our pace of development and to what extent we are losing our biodiversity. How on a global platform these things have to be addressed? There are many UN Conventions we are being held. There should be some checks that has to be implemented once a developmental project is being instituted in a geographical region. So, that is one thing.

And we all have meager resources, be it a human health, wildlife sector or the veterinary sector, we all struggle with the limited logistics. So, One Health teaches us that we can share the resources, we can pool the resources. We can pool the technical expertise, bring together and make the efficient uses of resources so that we can realise the One Health concept. And in the Indian scenario particularly, maybe many countries across the world, a policy is framed at the national level, but once it is coming to the implementation level, human health as well as animal health, we know in the Indian is a state subject.

So, there are boundaries between the national stakeholders and the state level stakeholders. So, there is some kind of limitations once it comes to the implementation of a particular strategy or particular policy at the state or district level. So, what exactly is the solution for this? We should bring all the stakeholders on One Health platform and we should involve the communities and a bottom-up approach keeping in loop of all the concerned, those who are the implementing partners.

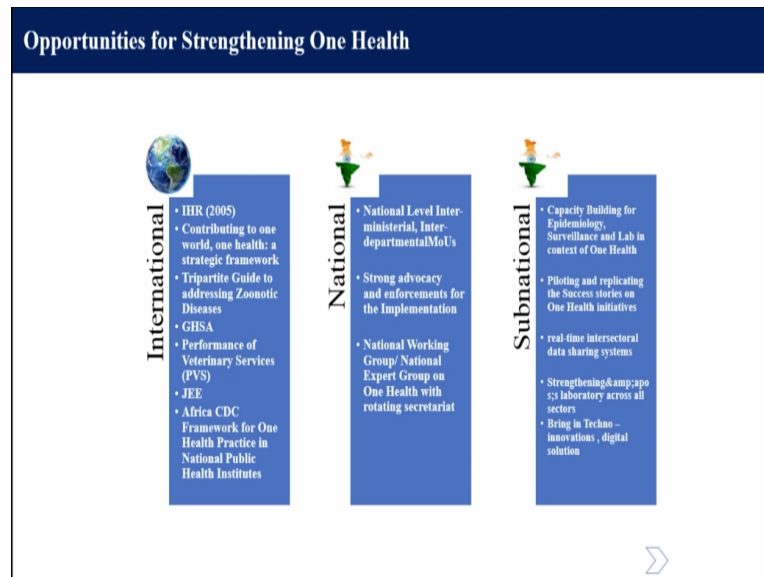
Not only just pushing the things from above is going to solve the One Health, but we need to bring all the stakeholders together with a bottom-up approach and making a consensus and convincing them that why it is important for them. And one of the important things that we need political will to implement any kind of program or strategy, one important issue is the, which is a very sensitive that data sharing mechanism. There is lot to speak on that.

What exactly are the minimal data sharing parameters? That has to be delineated; that has to be brought out and the data should be shared across the sector. And be it a regular basis or be it an event based, but there should be a structured mechanism for the data sharing. Now, with the digital technology available, work is being done to integrating various digital platforms for a data sharing so that we can go ahead with the early warning signals; we can detect the things on time and establish an appropriate public health response.

Undertaking various programs for awaring the communities; that is also one of the important areas and challenges wherein our communities do not know the importance of One Health. They do not know what exactly are the zoonotic diseases because, and what exactly do we mean by the

antimicrobial resistance and how the climate can be, a climate change is affecting our health. So, building an awareness programs for the community, so, that is also one of the important things to consider in realising One Health.

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There are many opportunities at the international, national and sub-national level. Many documents are there which could be referred for and which is being referred by many countries and being adopted. We do have in-place international health regulations. We do have with us the tripartite guide for addressing zoonotic diseases; Global Health Security Agenda documents are there.

We have a standard methodology to undertake the PVS pathways workshops and joint external evaluations across the sectors, then Africa CDC framework for One Health. These are all the standard documents which could be utilised, which could be used and which could bring in practice to make One Health in reality, and wherein the government can learn from these core documents.

And at the national level, we do have many of the mechanisms existing for making One Health in practice, like National Level Inter-ministerial, Inter-departmental MOUs. Many of the National Working Groups do exist; Task Force Groups which has been constituted on the disease


specific task groups are there. Many of the research agendas are there on One Health platform at the national level.

And sub-national level also, many of the agencies are coming together for various capacity building exercises, joint trainings between the health and veterinary sectors and strengthening of laboratories. So, these all are efforts at the sub-national level to implement the One Health.

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One Health Governance for Pandemic preparedness

- ❑ Identification of One Health Expert Panel with appropriate representation of technical and policy making professionals
- ❑ Advocacy of One Health across the sectors
- ❑ Community Engagement
- ❑ Financial & structural reforms in public health sector and Reforms in existing Public Health and Animal Health Policy
- ❑ Workforce development - Designing and introducing a Standard One Health Curriculum to prepare Unique skilled professional in One Health
- ❑ Modalities for consistent and sustained access to a reliable supply of safe and effective medicines to treat both humans & animals
- ❑ Pressing need for Research collaborations in field of vaccine development,
- ❑ A gap analysis on the current regional institutions coalition network for pooling, and sharing of resources in case of emergencies.
- ❑ Technology-based solutions for generating EWS and Guidance on minimal essential data parameter to be shared across the sector for appropriate and timely response



So, what exactly do we understand by the One Health governance for pandemic preparedness? We do understand there should be an identification of One Health expert panel with appropriate representation of technical and policy making bodies. The advocacy for One Health across the sectors is required. Community engagement is again an important thing. Fiscal gaps to be addressed.

And what exactly are the structural reforms in true sense are required, not only in the health but also in the veterinary sector. Workforce development is also to bridge the gap between the available skilled manpower and we do understand with this course coming that there is a growing need of One Health experts those who do understand the transdisciplinary and cross-cutting issues and how to solve those problems which are coming to realise the One Health challenge.

So, this is not only to be undertaken in the event of emergencies, but it should be systematic exercises outside the boundaries of emergencies and to address the endemic threats, endemic diseases which we are suffering. Then we know that we are in a technology boom. So, technology based solutions and to imbibe those technologies in our existing work domain and we can look forward to have with artificial intelligence and machine learning data triangulation methods for early warning signals by using the historical data available with us.

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So, many of the resource materials are there. I would request to look into these important documents, Tripartite Guide for Zoonosis, National Framework on One Health. There is a beautiful document by World Bank on One Health Operational Framework. Then, recently the

WHO, FAO, World Organisation of Animal Health and UNEP, they have jointly launched the One Health Joint Plan of Action.

So, that is very much available on the web, freely downloadable. So, I would ask the students to look into these documents to have a better understanding of the One Health. So, there are many technical guidelines which are posted on the NCDC website. So, many of the diseases specific CD alerts, many of the guidelines, these are available. So, these could be easily accessed by the students.


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And few of the guidelines and publications on zoonotic diseases has been brought out by the National Centre for Disease Controls; these can also be looked into.

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National Response for AMR Containment- RED LINE CAMPAIGN



LOOK OUT FOR THE RED LINE

- Anti-Microbial Resistance awareness campaign urges people not to use medicines marked with **red vertical line**, including antibiotics, without a doctor's prescription.
- These medicines are called the '**Medicines with the Red Line**'.
- The 'red line' will help the users to differentiate them from other drugs.
- This campaign is aimed at discouraging unnecessary prescription and over-the-counter sale of antibiotics causing drug resistance for several critical diseases including TB, malaria, urinary tract infection and even HIV.

I would like to mention a word about the National response for the AMR containment, the Red campaign. So, this is one of the beautiful campaigns which was launched by the national AMR program division, wherein all the communities are asked to adopt this red line as a learning that what are the events when the antibiotic should be used. So, the red line campaign which was launched by the Ministry of Health to make communities aware about the rational use of antibiotics.

So, there are many of the IEC strategies which are being implemented for awaring the various target audiences, not only the communities but also the health and frontline workers, veterinary workers, for making them aware about the zoonotic diseases and other areas of One Health.

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So, this is the IEC material. These all can be accessed on the NCDC website. So, thank you very much. So, this was all from my side; and for any questions, you can reach out to me on my given email id. So, thank you.