Manage TB
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Lecture – 03
The Epidemiology of Tuberculosis
Session 02

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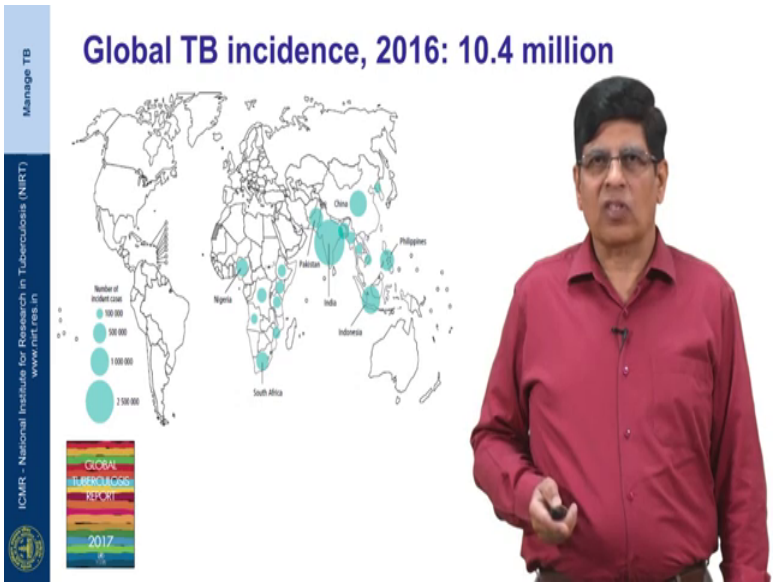

Let us look at the present disease burden globally and in India. In the year 2016 there were an estimated 10.4 million incident cases all over the world of them were 2.8 million occurred in India alone making it the highest TB burden country in terms of absolute number of incident cases.

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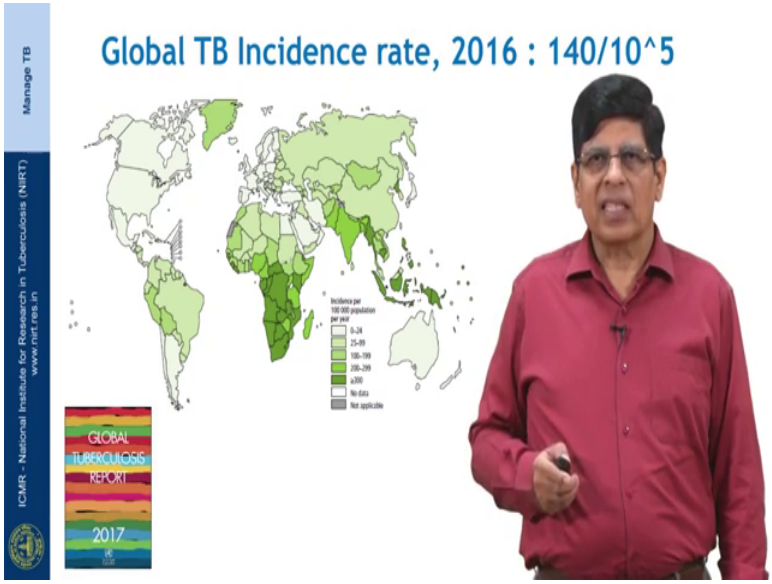

At the global level the incident rates per 100000 population was 140, while it was in excess of 210 in India. Although, there are other some countries in the African regions specifically the sub Saharan Africans where HIV is highly pandemic; the incidence rates in excess of 300 per 100000 were observed.

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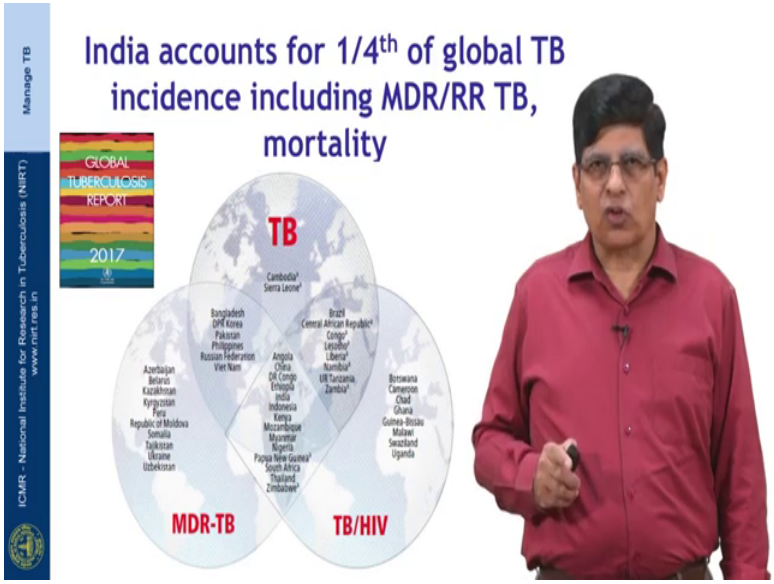

This slide shows that India is included in all the three high burden lists for overall TB 1, 2 HIV associated TB, 3 drug resistant TB. Each of these lists contains the list of 300 high burden countries and India is included in all the three. Overall India contributes about 25

percent of TB burden in terms of incidence as well as mortality for all the three types of TB that is all TB, HIV associated TB and drug resistant TB.

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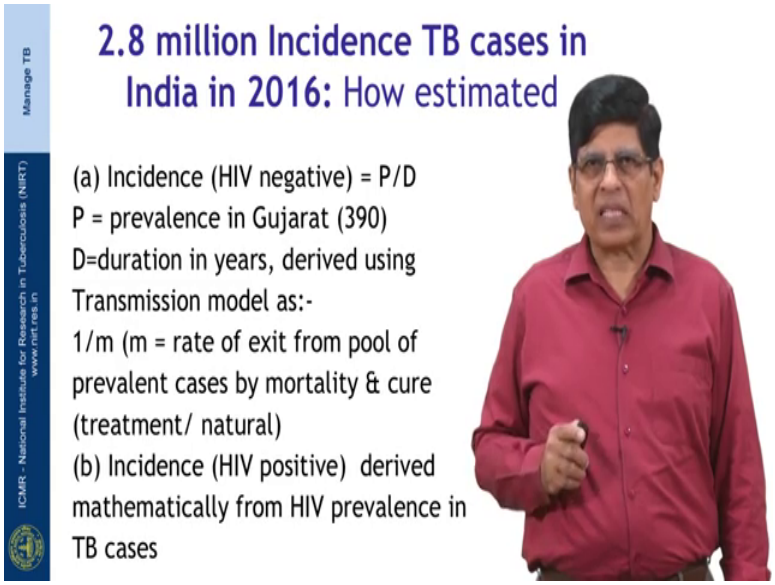

Now, how did we estimate this incidence to 2.8 million in India? Primarily estimation of burden is a complex process, several groups of individuals who were concentrating data on different disease aspects of the disease, another group of people work through transmission modeling and epidemiological modeling to find out the missing data and arrive at the best estimates of TB disease burden in terms of incidence, prevalence and mortality.

The current estimates of incidence in TB are based on this formula where incidences calculated as prevalence divided by duration. The prevalence was considered as that obtained during the statewide recently conducted survey in Gujarat and duration was estimated using transmission modeling.

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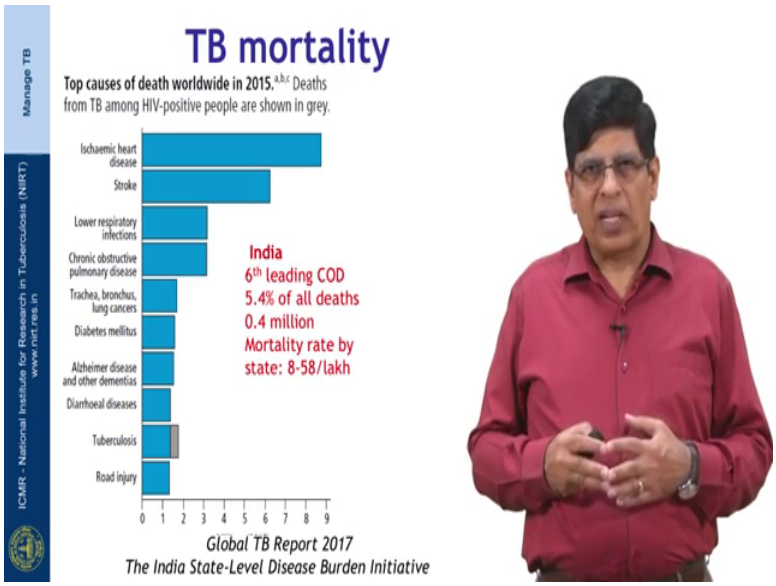

At the global level TB ranks 9th in the cause of mortality, about 1.3 million deaths are attributed to TB and there are additional 0.4 TB associated deaths in PLHIV. In India TB is the 6th leading cause of death accounting for 5.4 percent of all deaths.

More than 400000 people die in India every year. However, the mortality rate is highly variable from state to state starting from the lowest at 8 per 100000 in Kerala to 58 per 100000 in Uttar Pradesh.

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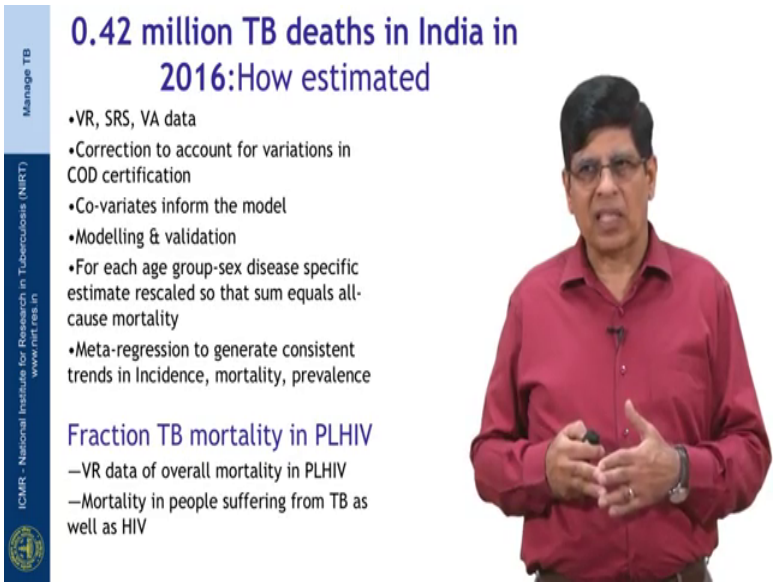

How did you estimate the deaths? The estimation of death is primarily based on data generated during vital registration data, sample registration surveys, verbal autopsy data as well as the medical certification of cause of death.

This data is corrected for garbage coding and the modeling is applied to see that the sum of individual cause mortality equals all cause mortality and then some sort of regression is generated. So, that the trends and incidence mortality and prevalence of TB are consistent with each other.

Fraction of TB mortality in PLHIV is estimated from vital registration data of overall mortality in PLHIV and the proportion of PLHIV that suffer from TB.

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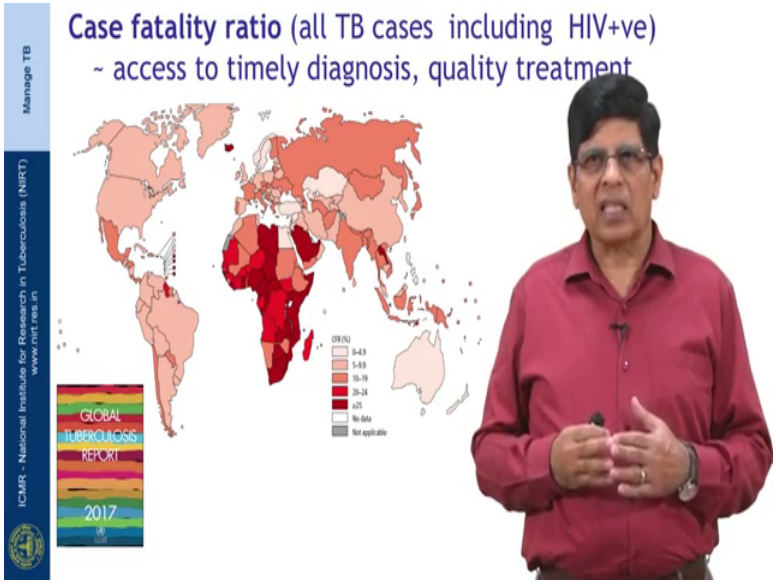

Case fertility ratio is another key epidemiological indicator of tuberculosis and it represents the some product of your case finding efficiency and the treatment efficiency.

In India about 17 percent of the incident cases succumb to the disease compared to 16 percent of the global level and we have to reduce this case fertility rate to less than 6 percent if we have to achieve the targets as envisaged under the anti v strategy.

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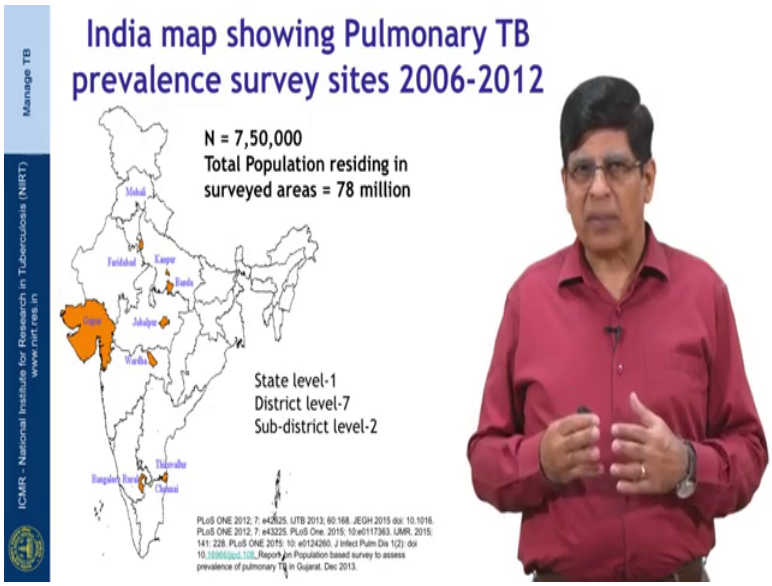

This map shows the areas where ten some national surveys were carried out recently. One of them was the state level survey that is in Gujarat other were district level surveys.

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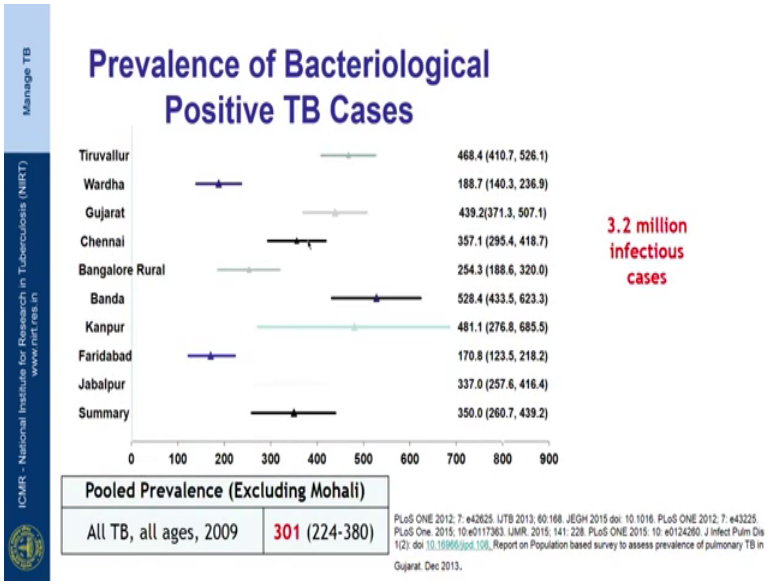

And you can see here that the estimated prevalence varied widely in different regions and the overall summary estimate of infectious TB that is vectorologically positive pulmonary TB was 350 per 100000 population at the national level and which was the pool prevalence. Therefore, at any given point of time there are 3 million infectious cases

which are transmitting infection to the community. The overall prevalence corrected for childhood TB and extra pulmonary TB was estimated at 300 per 100000 population ok.

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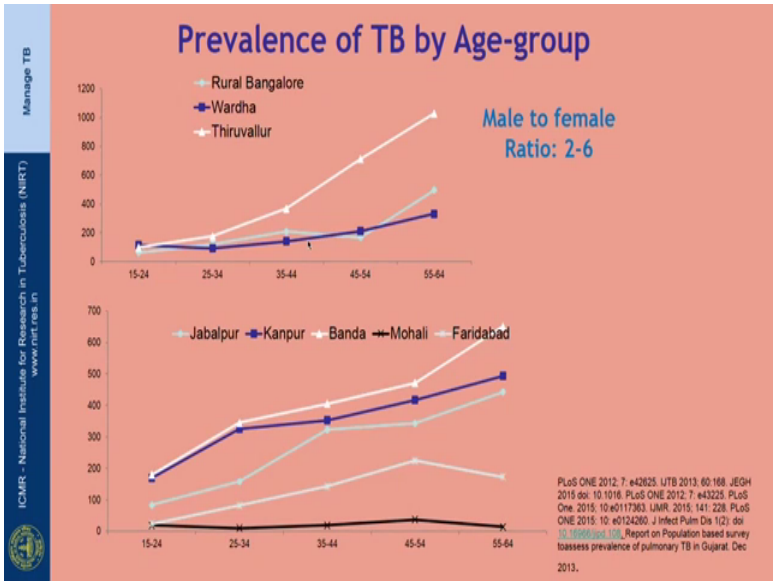

This slide shows that the prevalence rate increases as the age increases and the ratio of male to female prevalence is 2 to 6 in various sites. This ratio also increases with increase in age group.

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The first ever state level disease burden estimates for every disease and risk factor in India were disseminated on 14th November this year according to these estimates TB is

the 5th leading cause of loss of loss of (Refer Time: 06:26) in empowered action group states. It is a 6th leading cause in northeastern states and 13th leading causes other states. Basically disability adjust life years (Refer Time: 06:40) measure disease burden in terms of lives lost estimated in years and the years lost this because of disability.

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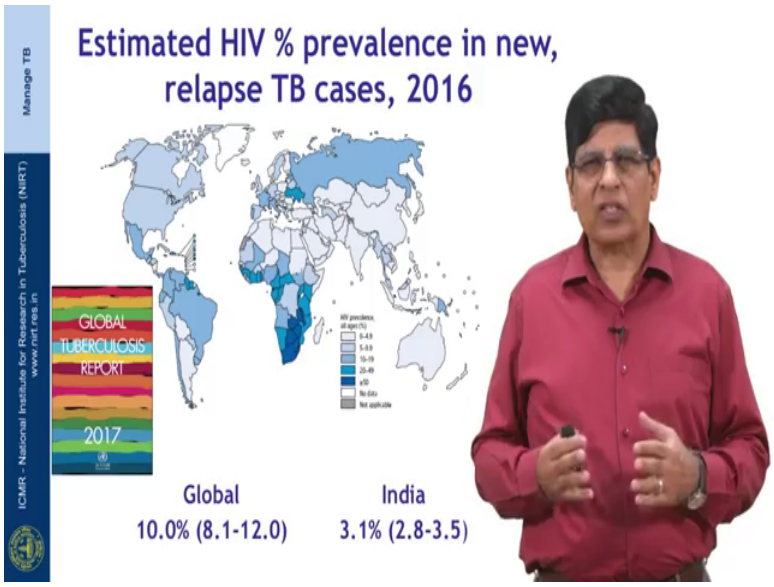

The overall prevalence of HIV in insulin TB cases was estimated at 10 percent in the global level and in India it was 3 percent.

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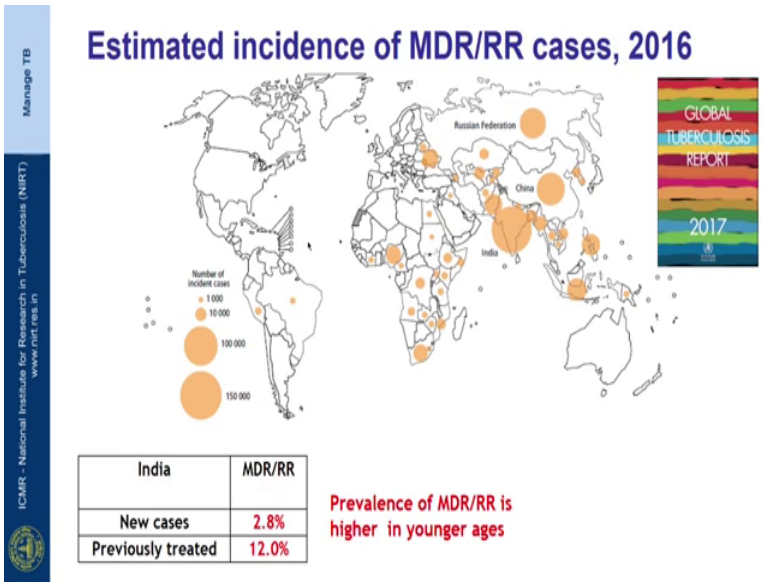

Recently India has carried out a national level survey to estimate prevalence of drug resistance in TB cases according to which 2.8 percent of new cases and 12 percent of previously treated cases were found to have either multi drug resistant TB that is resistance to INH as well as ampicillin or resistance to the ampicillin alone.

Now, these estimates show that though the overall proportion of patients who suffer from MDR RR TB has not increased over the years, but the data also shows higher prevalence of drug resistance in younger age groups compared to the older age groups which shows that active transmission is now ongoing in the community and we should expect higher proportions in the coming years.

Now, let us look at what has been the trend what I have been the trends in the burden of disease globally and Indian level.

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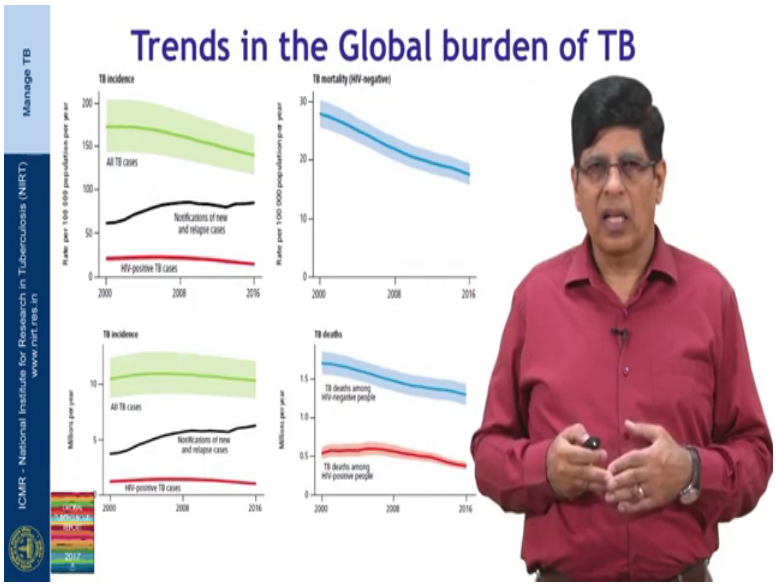

Now, since the onset of dots bears disease control programs the upper graph show that the incidence of TB as well as the mortality have seen a significant decline in the last 15 to 17 years; however, the decline is not.

So, significant in terms of absolute number of deaths that takes place every year or the absolute number of incident cases that arise every year and this is primarily because of the effect of increasing population size change in age structure as well as increase in the prevalence of certain risk factors like diabetes mellitus.

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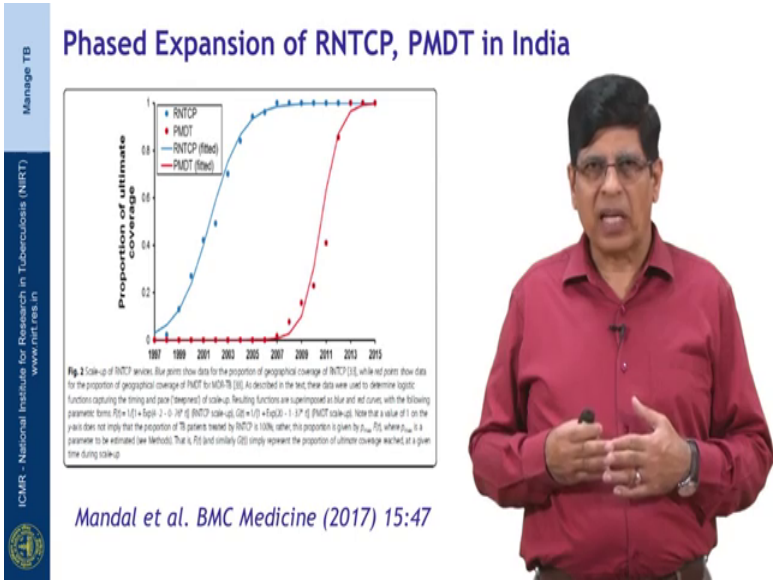

To understand the impact what RNTCP had just a recollection that RNTCP was initiated in India during 1997 and expanded in a phased manner to cover the entire 100 percent population geographically by 2006, the programmatic management of drug resistant TB was initiated in 2007 and it attained 100 percent geographic coverage by 2015.

Now, we have to keep in mind that 100 percent coverage does not mean that RNTCP was able to detect 100 percent cases in the community.

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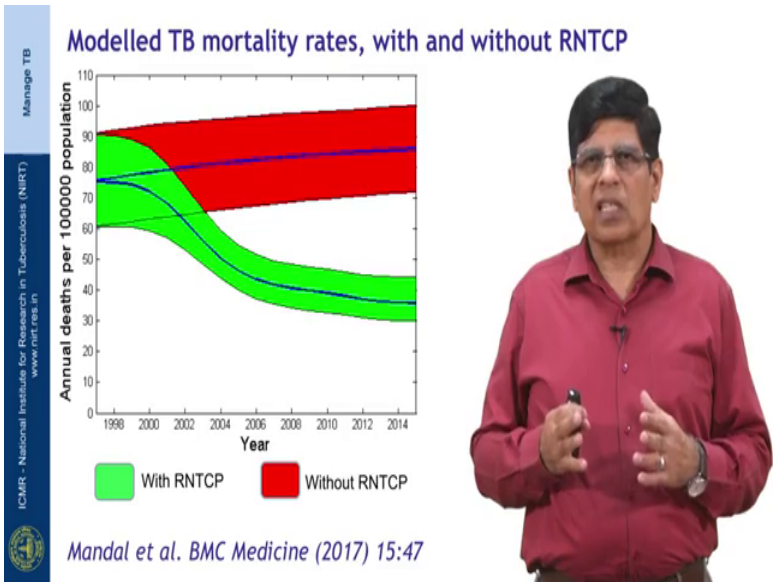

Now, this is one of the modeling outputs in which I have been involved which shows that if there was no RNTCP the mortality rates as represented by the red band would have increased over the years. What RNTCP has done is that it has helped us to decrease the mortality rate per 100000 population from something like 75, when we started with RNTCP to something like 34 in the year 2015.

Therefore, there has been more than 50 percent reduction in mortality rates as a result of RNTCP.

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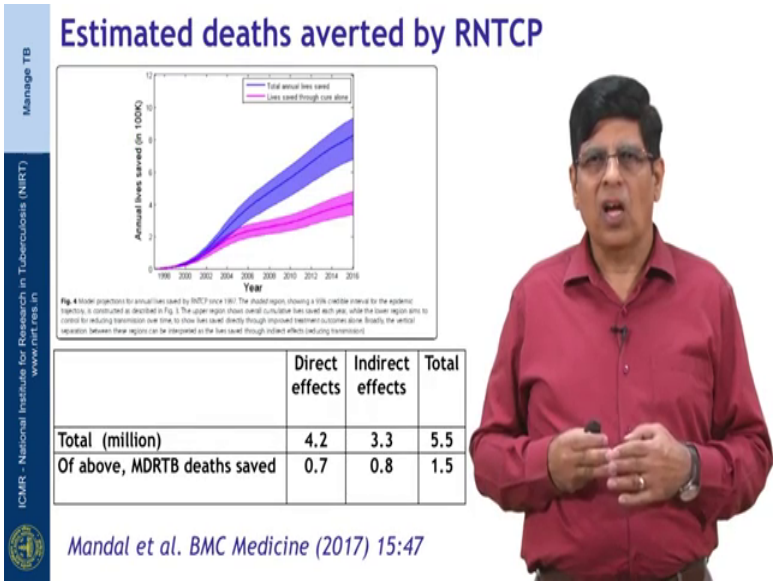

All this has resulted in saving of 7 million deaths 5.5 million because of drug sensitive TB and 1.5 million because of MDR TB and 40 percent of this reduction is a result of indirect effect by means of reducing transmission by attaining higher cure rates.

You can see that of the MDR TB that was saved 50 percent are because of indirect effect that is because of reduced transmission there are fewer cases who were given first line treatment and. So, lesser number of incident MDR TB cases and so, lesser number of MDR TB deaths. This highlights the importance of preventing MDR TB as well as curing MDR TB.

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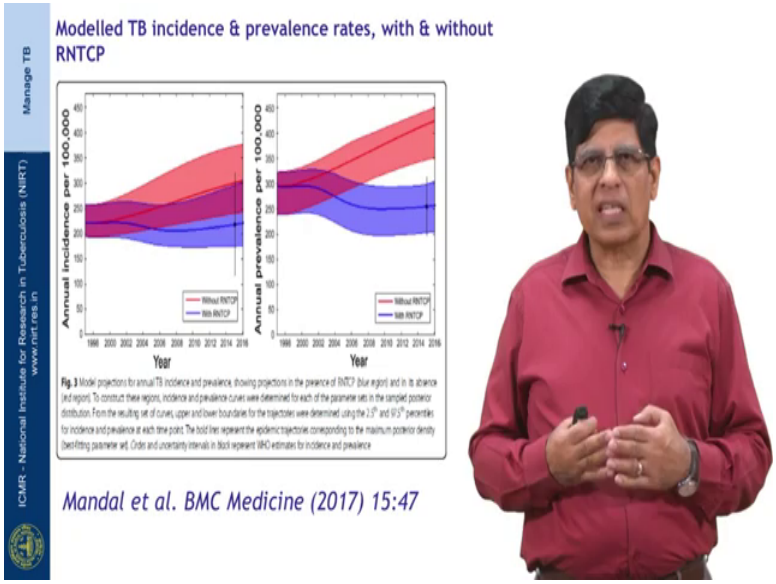

Now, initial years of RNTCP saw a decline in prevalence and incidents, but after that the model shows that the rates are stabilized these are again primarily the increasing population size and the life expectancy and prevalence of diabetes primarily which work in direction opposite to that of RNTCP as far as the trends are concerned.

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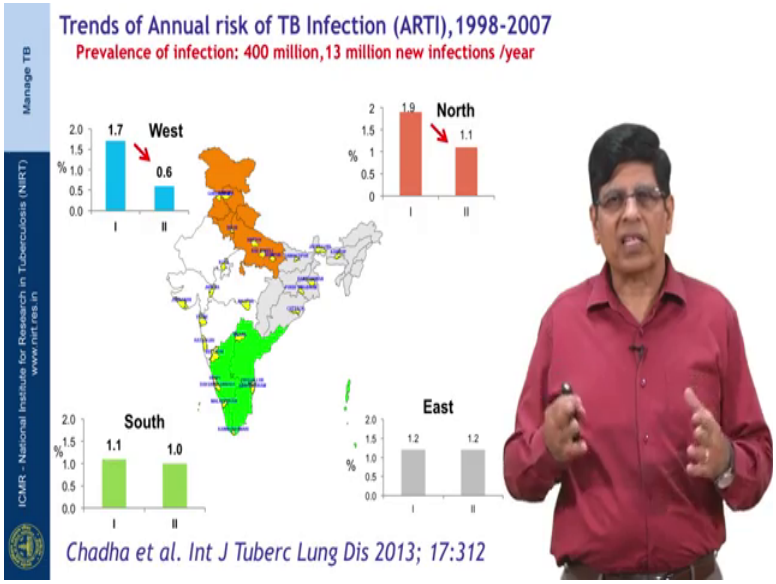

We have conducted two rounds of a new risk of TB infection surveys which showed a 4 percent decline in transmission of infection every years; however, in good program conditions we expect they declined to be somewhere around 10 percent per year. 1

percent of people get infected every year which means that there are 13 million new infections per year compared with the new HIV infections which are estimated to be less than 100000 per year.

At any point of time there are 400 million people who are harboring the tubercle bacilli in their bodies and they are liable to break down to TB and therefore, new TB cases will keep emerging in the community for a number of years to come.

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So, where do we go from here? The end TB strategy has a vision of 0 TB deaths the targets as envisaged under the end TB strategy are reduction in the number of TB mortality in terms of absolute number of people that die from TB every years by 90 percent compared to 2015 levels.

Reduction in the incidence by 80 percent compared to 2015 levels and the government of India envisages to attain these targets 5 years earlier that is 20 to 25 presently.

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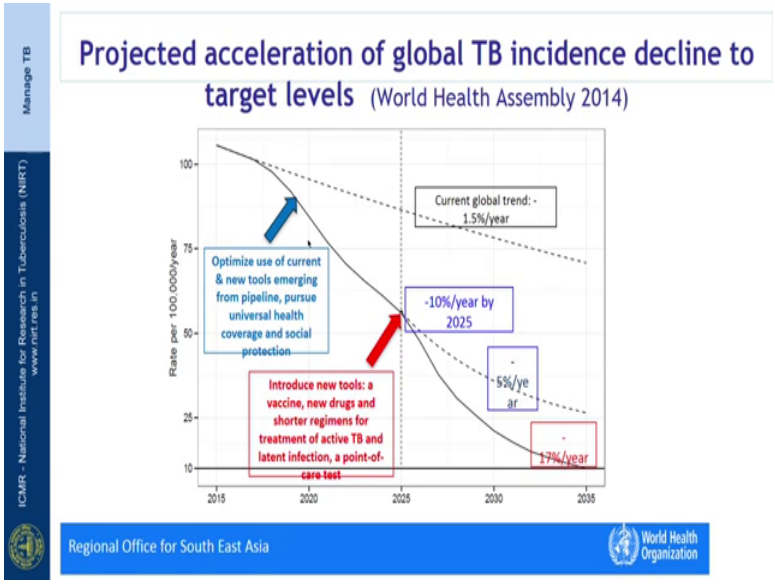

The TB incident is declining slowly. But if we use the current tools which are available to judiciously, also provide universal coverage with good quality services to private patients as well. The quality of treatment should be as good as that is provided in the public sectors, then we will be able to hasson this period of decline by about ten percent per year.

However, that alone will not be sufficient to attain the targets of eliminating TB from India are globally and probably the efforts are on and we will have a new vaccine say by the year of 2025 which will help us to again further increase the slope to about 17 percent per year. Slide also shows the importance of latent TB treatment infection starting from 2025, but then we do not have to wait till 2025.

For example, as I mentioned earlier that LTBI treatment that is latent image infection can be initiated even now among all the household contacts and in other the highest group of people who suffer from TB.

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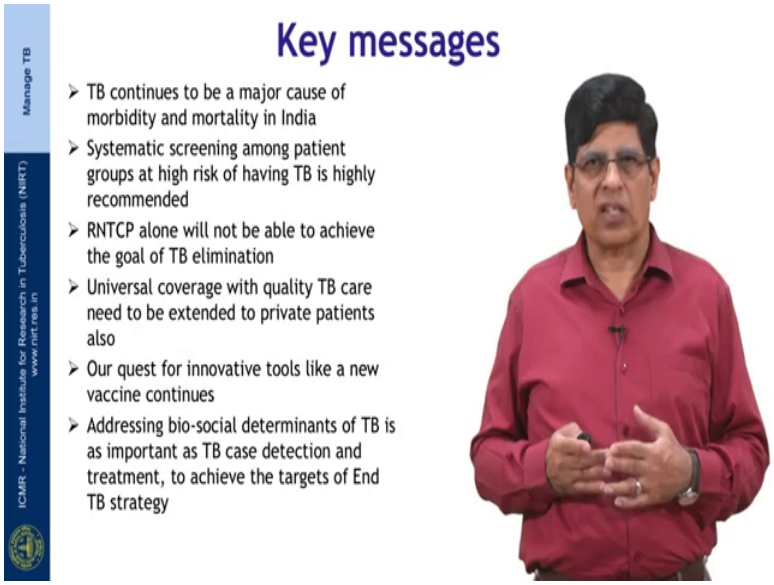

Therefore the key messages of the session on TB epidemiology today were that TB continues to be a major cause of morbidity and mortality. The systematic screening among patient groups at high risk of having TB is highly recommended. However, provision of quality TB services under the public sector alone will not be able to achieve the goal of TB elimination.

Therefore, universal coverage with quality TB care need to be extended to private patients as well. Our quest for new innovative tools like a new vaccine continues and hopefully we will have one in near future. Addressing bio social determinants of TB is as important as TB case detection and treatment to achieve the targets of end TB strategy.

Thank you so, much.