Title :- Impact of COVID-19 pandemic on the Tuberculosis case findings of India: Exploration of the magnitude of the threats as well as the available opportunity to mitigate the threats.

Running Title: - Tuberculosis case finding in India in the context of COVID-19 pandemic: A threat and an opportunity!

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ABSTRACT

Introduction: Due to COVID-19 pandemic, performance of many programs has been declined and Tuberculosis (TB) program is not an exception. TB case detection and notification has been recognized as one of worst hit area. The objective of this study was to explore the TB notification status of India during this pandemic and explore options to mitigate the issue. **Methods:** A secondary data analysis was performed on open-source TB notification database of India. Relevant literature review was done to find out remedies based on the different initiative taken by different states of India. **Results:** In 2020, total TB notification decreased in all the states in comparison to 2019. The percentage of loss in the country was 34%. Private TB notification also decreased in 2020 in all the states except in Jharkhand. The percentage of loss in private TB notification in the country was 35%. Notification started declining in the month of February 2020 and it was lowest in the month of April-2020.The trend of notification began to improve since May 2020 when the States started taking innovative initiatives like Integrated TB Covid Case Search. **Conclusion:** Due to the ongoing COVID-19 pandemic the notifications of TB cases declined noticeably which has a serious implication in terms of silent spread within household and community. But the picture can be improved with integrated approach for TB-COVID case finding & management.

Key Words: Impact of COVID on TB , TB Notification in India, Integrated TB COVID activity, Threats & Opportunity during COVID, Initiatives to improve TB Surveillance, TB Surveillance during COVID Pandemic

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1. **Introduction:** The COVID-19 pandemic is straining health systems worldwide. The rapidly increasing demand on health facilities and health care workers threatens to leave some health systems overstretched and unable to operate effectively. The World Health Organization recommended that countries should identify essential services that will be prioritized in their efforts to maintain continuity of service delivery[1].

   Here, we need to remind a long pervading infectious disease and mortality related to it – which is tuberculosis (TB). TB is world's leading infectious killer disease, nearly 10 million people get affected and around 15% succumb to it each year[2]. India accounts for 27 per cent of the global burden with an estimated 2.69 million cases annually. TB deaths have an adverse effect on the Indian economy and the associated cost is measured to be at least $32 billion each year[3].

   Due to the pandemic situation, there is irregularities and uncertainties in sputum sample collection and transportation. Due to irregularity of hospital services & movement restriction there is less presumptive TB patient foot fall in the hospitals. All these are leading to less TB case detection and notification. We know from previous epidemics that reduced access to care, medicines and diagnostics for people with life-threatening conditions, such as TB, can lead to an increase of deaths from these underlying conditions[4].

   Considering these backgrounds, the objective of this study was to explore the TB notification status of India during COVID19 pandemic and explore options to mitigate the issue.

2. **Methods:**

   A secondary data analysis was performed on open source TB notification database of Nikshay portal [5]. For state wise comparison data from twenty larger states (states with a population of more than 10 million as per census 2011) were taken into consideration. Data were accessed for the period of 1st Jan 2019- 31st Jul 2020. Year to date comparison for the period of Jan-July were made. Total TB notification (public + private) and notification from private sector were separately compared. While comparing the notification data in each state, percentage loss in TB notification during January – July 2020 as compared to January – July 2019 was calculated. All the analyses were done using Microsoft® Excel® (2016). Month-wise trend of notification (public and private) since last one year (Aug-19- Jul-20) has been shown as line diagrams.

   For this article public domain secondary data (aggregated numbers only) without any personal identifying information of any human participant was used.

   Relevant literature review done to find out remedies based on the different initiative taken by different states of India.

3. **Results:**

   Table 1 summarizes the state wise total and private TB notification during Jan 19-July 19 compared to Jan 20-July 20.

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Total TB notification: Total TB notification decreased in 2020 in all the states when compared with 2019. The percentage of loss in the country was cumulatively 34%. Among the states, highest loss was documented for Tamil Nadu (44%) and lowest was for Telangana (19%).
Private TB notification: In the year 2020 the proportion of private notification in the country was 28% with highest being in Bihar (41%) and lowest in Jammu and Kashmir (8%). When compared with 2019, private TB notification also decreased in 2020 in all the states except in Jharkhand. The percentage of loss in private TB notification in the country was overall 35%. Among the states, highest loss was at Tamil Nadu (54%).
Figure 1 showing the month wise trend of TB notification (Public and Private) in last 12 months (August 2019- July 2020). Notification stated declining in the month of February 2020, it was lowest in the month of April-2020. Since May 2020 it has started to recover.

4. **Discussion:**

Decreased TB notification: The study documented decreased TB notification in India in comparison to previous year. This can be explained as there was inadequate case finding efforts during COVID pandemic. Due to movement restriction, lack of transport, shifting of human resource towards COVID care there were no or very poor active case findings and sub center referrals. Out of fear and uncertainty not all chest symptomatic patients were visiting to health institute to seek for TB testing. Other study also reported 25% decline in global TB case detection over a period of 3 months as compared to the level of detection before the pandemic[6].

Decreased private TB notification: Our study identified 35% decline in private TB notification in the country, which is slightly higher than public sector (34%). Private sectors are profit based institutions. Due to several reasons including less patients' foot fall, lack of sufficient infrastructure to tackle COVID situation, a reasonable number of the private hospitals closed temporarily. Due to fear, lack of clear guideline and lack of confidence, many private practitioners stopped practicing. Those who were practicing were usually avoiding care of respiratory symptomatic patients including presumptive TB cases.

Implication of less TB notification and missing cases: If TB patients are not detected or notified treatment adherence could not be monitored. A Study predicts that this might lead to a predicted additional 190 000 (56 000 – 406 000) TB deaths (a 13% increase), bringing the total to 1.66 (1.3 – 2.1) million TB deaths in 2020[6].

Decreased notification is due to COVID? Due to COVID pandemic, performance of many programs has been declined and TB program is not an exception. Notification started declining since February 2020 and the first COVID case in India was on 27th January 2020[7]. Lowest notification was in the month of April and India declared country-wide lock down on 24th March[8]. All these temporalities strongly suggesting that TB notification decreased due to the direct & indirect effects of COVID-Pandemic.

Mitigation plan can prevent the disaster: Study is showing that the trend of notification began to improve since May 2020 when GOI, WHO, State Governments started taking innovative initiatives like Integrated TB Covid Case Search (ITCS)[9]

Recommendations - Amidst the immense threat there are few opportunities also to improve TB case findings**.**

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- **Vulnerability Mapping:** The population who are vulnerable to TB, mostly they are vulnerable to COVID-19 also. During COVID period one of the earliest activities should be the vulnerability mapping exercise. This mapping exercise can be done jointly with COVID response team. Activities like active case findings (ACF) can be focused based on this exercise.
- **Active Case Findings**: Nation or Statewide ACF can be planned after cessation of the community spread of COVID-19. Focal ACF (not district-wide) can be planned immediately for the area of high proportion of vulnerable population but not having active COVID transmission.
- **Strengthening sample transport system**: Lockdown and irregularity of general transport system caused disruption of sputum sample transport from peripheral health center to Designated Microscopy Center (DMC) / Cartridge Based Nucleic Acid Amplification Test (CBNAAT) site. To mitigate the issue, context specific innovative solution should be adopted. Some of the examples, as adopted by the States are - merging of TB sample transport with other sample and logistic transport system, deployment of human carrier (Bike troops) , involving Indian post and arrangement dedicated bi/tri-weekly vehicle for priority samples from field to CBNAAT sites and district to Intermediate Reference Laboratory[9]
- **Integrated TB-COVID action plan**- During this pandemic shifting focus and resource from COVID to TB is not possible and not advisable also. But area of common interest can be identified to synergize the thrust to create a win-win situation. Few of such area of synergy might be-
    - Establishment of system of hospital and community-based cough screening. Making testing protocol for ruling out TB after/along with testing for COVID [11].
    - Setting up Air borne Infection-cum-TB screening set up at Health Care Facilities for screening, segregation, fast tracking, and testing of cough symptomatic patients.

5. Conclusion:

Due to the ongoing COVID-19 pandemic the notifications of TB cases declined noticeably which has a serious implication in terms of silent spread within household and community. Though the pandemic has a potential to have a devastating effect on healthcare program performances, but the outbreak is giving an opportunity to find weakness in our system to strengthen it. Due to striking similarities in mode of transmission and disease manifestation a comprehensive approach can be adopted for COVID control which will further help in case finding and controlling of TB.

Table 1: Year to date comparison (2019 vs 2020) of state-wise total TB notification during Jan-July and proportion of private notification during 1st Jan'20- 31st Jul'20

State	Total TB Notification during Jan'20-Jul'20	Total TB Notification during Jan'19-Jul'19	% loss: 2019 vs 2020	Private Notification during Jan'20-Jul'20	Private Notification during Jan'19-Jul'19	% loss: 2019 vs 2020	% Pvt Notification during Jan'20-Jul'20
ANDHRA PRADESH	38898	68835	43%	10078	15501	35%	26%
ASSAM	21455	34054	37%	3699	5630	34%	17%
BIHAR	52804	83810	37%	21508	30899	30%	41%
CHHATTISGARH	20339	29937	32%	5811	8227	29%	29%
DELHI	53317	76058	30%	14545	19290	25%	27%
GUJARAT	75692	108444	30%	25731	36883	30%	34%

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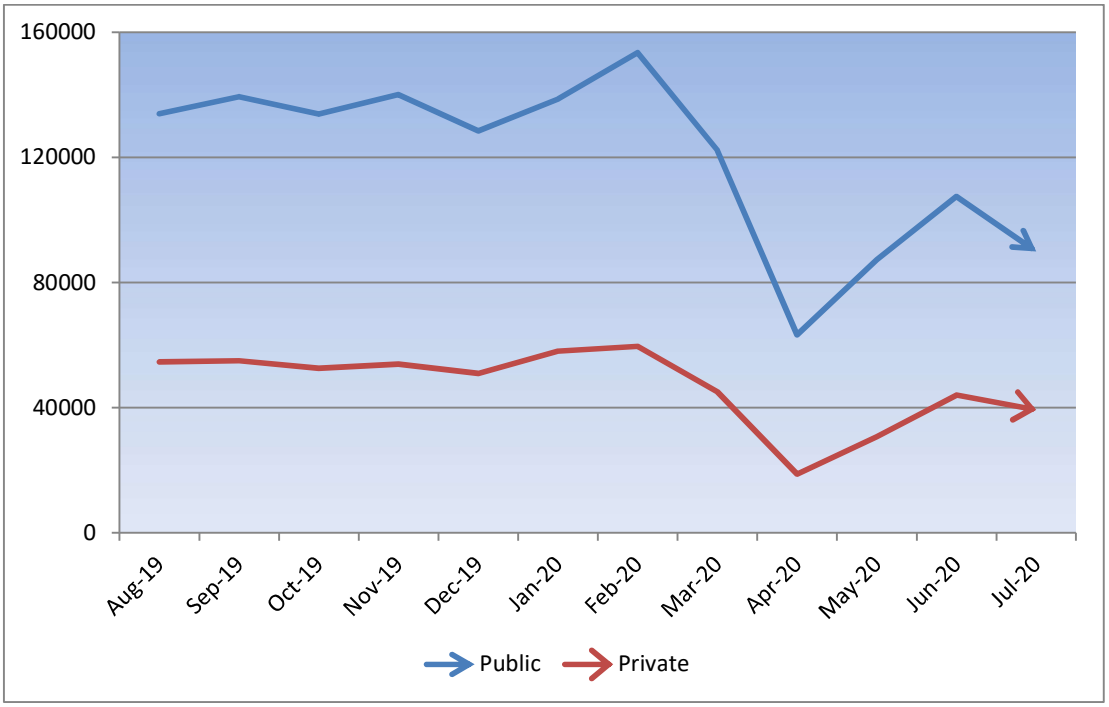
HARYANA	40451	51979	22%	13140	15702	16%	32%
JAMMU and KASHMIR	5632	8142	31%	453	711	36%	8%
JHARKHAND	26309	39386	33%	8699	8698	0%	33%
KARNATAKA	41159	62033	34%	10310	13291	22%	25%
KERALA	13185	16983	22%	3235	2972	9%	25%
MADHYA PRADESH	83320	126299	34%	18123	33140	45%	22%
MAHARASHTRA	91513	149646	39%	33283	55166	40%	36%
ODISHA	27892	35851	22%	2475	3043	19%	9%
PUNJAB	30664	41582	26%	7302	10058	27%	24%
RAJASTHAN	86337	120642	28%	23061	35914	36%	27%
TAMIL NADU	42631	76444	44%	9398	20230	54%	22%
TELANGANA	39114	48174	19%	12807	13851	8%	33%
UTTAR PRADESH	209944	335139	37%	64632	111841	42%	31%
UTTARAKHAND	13043	18673	30%	3557	4626	23%	27%
WEST BENGAL	49511	78415	37%	10288	18518	44%	21%
INDIA	**1090202**	**1650325**	**34%**	**304528**	**467657**	**35%**	**28%**

Figure 2: Month wise trend of TB notification (Public & Private) during last 12 months (August 2019-July 2020) in India.



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