PRESS RELEASE

IIT Mandi Researchers Plot Covid-19, Past Pandemics Across Seasons, Give Recommendations for Future

India has experienced a very high infection rate of COVID-19, leading to a collapse of health infrastructure. According to the study, a robust emergency plan to mitigate the spread of the next pandemic needs to be carefully planned. Knowledge of regions on the trajectory of a pandemic, reported here, will help better manage a future outbreak. This analysis will be useful for policymaking

Video Link:
https://drive.google.com/drive/folders/1XKYDrFqDBA0cpEd_mMghNIq4g84CjnzH?usp=sharing

MANDI, 6th January 2021: Researchers from the Indian Institute of Technology Mandi have identified the states with a high probability of being the first hotspots for the spread of COVID-19. The researchers reviewed the spread of COVID-19 and past pandemics in India for this study.

According to the study performed on 640 districts from April 1 to December 25, 2020, the hotspots of the pandemic in India have been states with high international migration and districts located close to large water bodies.

States such as Maharashtra, Tamil Nadu, Gujarat, Rajasthan, Karnataka, Delhi, Uttar Pradesh, and Andhra Pradesh were the hotspots for the COVID-19 pandemic in India. In almost all of these states, international migration is a significant factor. For this reason, the researchers recommend that in future cases of pandemic outbreaks, travel to and from these states should be carefully monitored.

Researchers reviewed the past pandemics and found common patterns between the Spanish Flu (1918-1919), H1N1 (2014-2015), Swine Flu (2009- 2010), and COVID-19 (2019-2021) outbreaks. It shows water bodies have a strong influence on a region's microclimate in terms of temperature and humidity, contributing significantly to regional climate change. It is commonly referred to as the lake effect.

The research was led by Dr. Sarita Azad, Associate Professor, School of Basic Science, IIT Mandi, and co-authored by Neeraj Poonia, research scholar, IIT Mandi. The findings of the research have been published in Current Science, a prestigious peer-reviewed journal.

Explaining the key findings of this research, Dr. Sarita Azad, Associate Professor, School of Basic Science, IIT Mandi, said, "*There has been a striking similarity in the focal point and route of transmission of different epidemics in India, such as Spanish flu, H1N1, Swine flu and COVID-19. Mostly all the pandemics have started and found their epicenters in the northern, western, and southern parts of India*."

She further added, "*Later, we also found that districts with direct access to large water bodies had a sudden increase in cases during monsoon (as high as 800%) compared to the preceding season. Hence, strict precautionary measures should be imposed in these districts before the beginning of monsoon season during an outbreak.*"

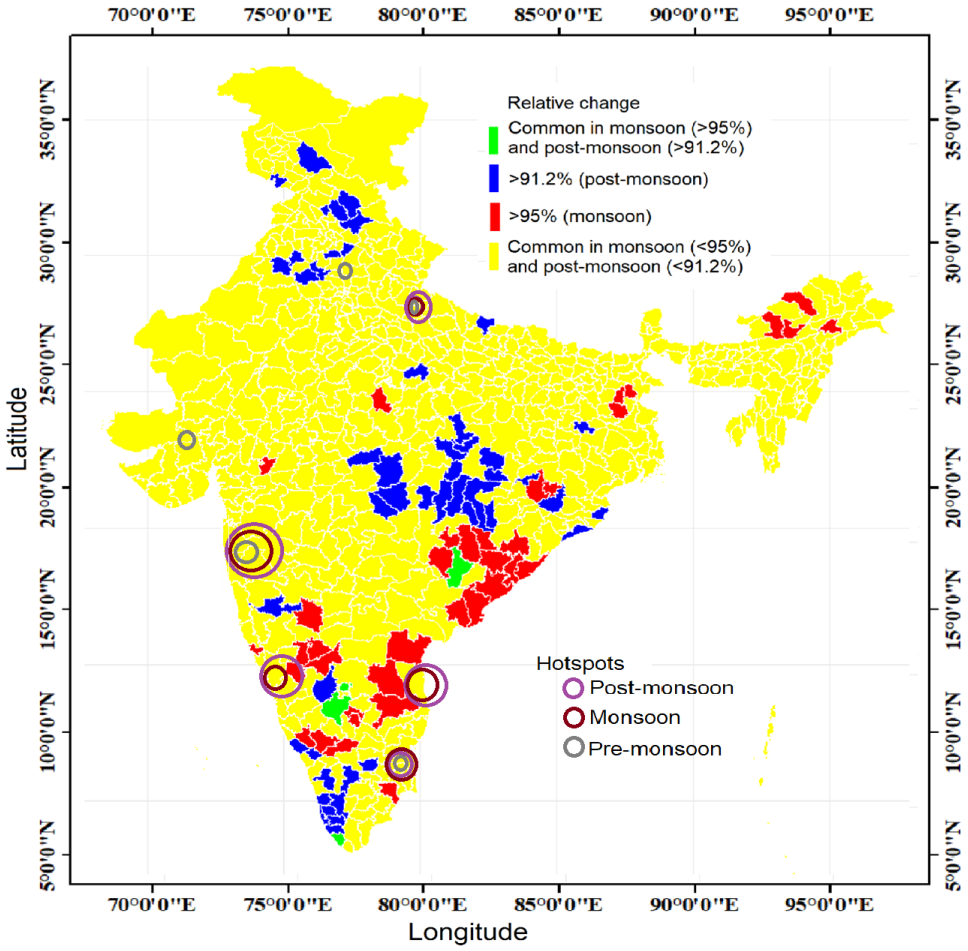
Furthermore, the researchers have examined the temperature variations across districts that are close to large bodies of water to understand the spread of COVID-19 in these areas. The average minimum and maximum temperatures in these districts are about 3 and 5°C lower than neighborhoods in July, which is attributed to the lake effect. The cooler climate conditions may have contributed to the increase in cases in districts that are close to water bodies.

In addition, the researchers have estimated R_0 values for these districts until 31st August 2020 and the results indicate that their R_0 values are much higher than those of the primary hotspot states.

In epidemiology, the basic reproduction number, commonly known as R_0, quantifies the disease spread and finds the expected number of cases directly generated by one case in a population. Researchers calculated the R_0 of COVID-19 daily reported cases using the exponential growth method.

Researchers recommend a targeted approach to be taken in states with a higher international migration rate and recommend that strict precautionary measures should be taken in districts near large bodies of water before the monsoon season begins. The high Ro observed in these districts during monsoon suggests that these areas be given priority if immunization is available.

Even though the transmission rate stabilized across the country in the winter season, the northern regions witnessed the highest increase in the number of cases. The complete trajectory of COVID-19 is shown in the figure below.



The researchers have also identified the states and districts where the government should have a more tailored and targeted approach in case a future outbreak occurs.

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About [IIT Mandi]

IIT Mandi has four Academic Schools and three major Research Centers. The Schools are: School of Computing and Electrical Engineering, School of Basic Sciences, School of Engineering, and School of Humanities and Social Sciences. The Centers are: Advanced Materials Research Centre (AMRC; set up with an investment of Rs. 60 crores), Centre for Design and Fabrication of Electrical Devices (C4DFED; has Rs. 50 crores worth of fabrication tools), and BioX Centre (has acquired research equipment worth Rs. 15 crores).

The unique, project-oriented B.Tech. curriculum is centred around its 4-year long Design and Innovation stream. From August 2019, IIT Mandi started 3 new and unique B. Tech. programmes in Data Science and Engineering, Engineering Physics, and Dual Degree in

Bioengineering. Since the inception of the Institute, IIT Mandi faculty have been involved in over 275 Research and Development (R&D) projects worth more than Rs. 120 crore.

IIT Mandi set up the IIT Mandi iHub and HCI Foundation (iHub; a section-8 company) on its campus at Kamand with significant funding of INR 110 crores from the Department of Science and Technology (DST), Government of India. The iHub is planned to fuel research and technology development, skill development, startup and innovation, and collaborations in the HCI and allied AI/ML areas in India. IIT Mandi is the only second-generation IIT to be featured at rank no. 7 in the Atal Ranking of Institutions on Innovation Achievements of the Innovation Cell, Ministry of Education, Govt. of India.

Twitter: @iit__mandi
Facebook: IIT Mandi
Website: https://www.iitmandi.ac.in

MEDIA CONTACT FOR IIT MANDI:
IIT Mandi Media Cell: mediacell@iitmandi.ac.in / **Landline:** 01905267832

Bhavani Giddu - Footprint Global Communications
Cell: 9999500262 / Email: bhavani.giddu@footprintglobal.com
Shai Venkatraman - Footprint Global Communications
Cell: 98202 98587 / Email: shai.venkatraman@footprintglobal.com
Kajal Yadav - Footprint Global Communications
Cell: 88059 66194 / Email ID: kajal.yadav@footprintglobal.com