

## Research Article

# Impact of Second Wave of COVID-19 Pandemic: A Systematic Report of Tri-City Region of Chandigarh

**Savita Chaudhary\***

Department of Chemistry and Centre of Advanced Studies in Chemistry, Panjab University, Chandigarh, India

**\*Corresponding author:** Savita Chaudhary, Department of Chemistry and Centre of Advanced Studies in Chemistry, Panjab University, Chandigarh 160014, India**Received:** June 02, 2021; **Accepted:** June 30, 2021;**Published:** July 07, 2021**Abstract**

The second wave of COVID-19 pandemic has blown the tri-city of Chandigarh with terrible shock waves among the residents. Being one of the top-notch per capita income cities in India, Chandigarh was found to be more vulnerable in this second wave of COVID-19 pandemic. This second wave of pandemic has caused high inflow of patients from nearby states and produced supplementary burden on the health care facilities in the city beautiful. The central aim of this work is to highlight the impact of this second wave of pandemic on the health of residents. The study represents the impact of second wave of COVID-19 on tri-city of Chandigarh by focusing on the main points of, (1) reported active cases from February to May, 2021, (2) number of deaths during this phase, (3) challenges faced during this time and (4) management and governance measures during this time. This kind of study helps to comprehend the impacts of second wave on Chandigarh and emphasized on the major lessons that can be learned during this phase. In one hand the study discussed the vulnerable impact of pandemic on clinical and economical situation of city, whereas on other hand it explains the timely measures taken by the administration to curb the surge of this second wave. Overall, this second wave of pandemic lead to an outstanding opening for tri-city planners and policy architectures to take necessary and timely actions towards making the city more susceptibility to pandemics.

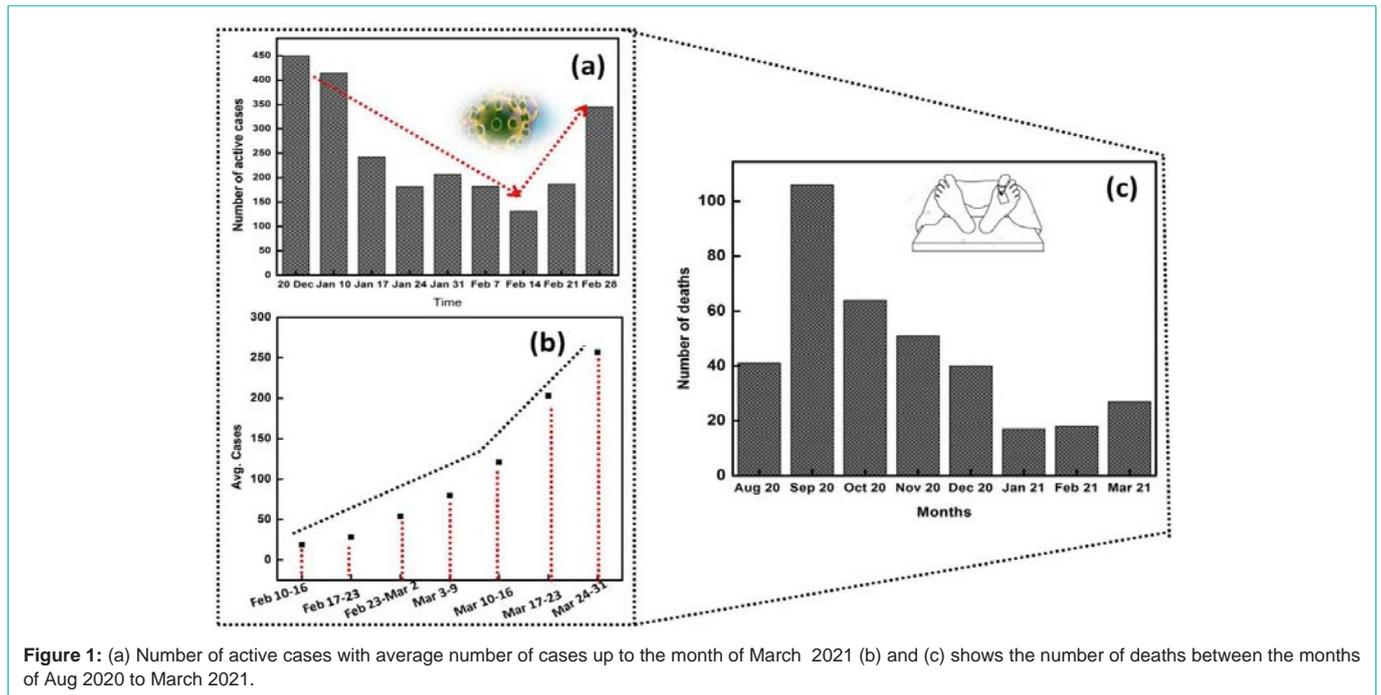
**Keywords:** COVID-19; Pandemic; Second wave; Governance; Administration**Introduction**

The commencement of year 2020 was remembered as the century's most dangerous human curse in the name of COVID-19 pandemic [1,2]. India, being the second-most distressed country in the world from this pandemic and struggling to curb the spread of virus in first wave of pandemic [3]. The load of the pandemic was visualized in term of nation economy conditions and sudden increment in the unemployment rate in the informal sectors [4,5]. The nation circumstances were aggregated to its crest in the second wave of pandemic in year 2021. The second wave of pandemic clutched everyone's consideration due to terrific aggravation in the number of infected cases and death in India [6,7]. In comparison to the first wave of pandemic, this second wave has largely shaken the Indian nation in term of reduced amount of healthcare facilities. People lost their life due to the non-availability of life saving drugs and oxygen in some cases [8]. Indian rural residents have also been significantly affected in this second wave of COVID-19 pandemic [9]. The second wave of pandemic has possessed a significant increase in the hitch of novel corona virus infection, particularly spikes in poverty and decrement in the health care facilities in India [10]. The limited access to superior health care facilities in rural areas has further worsened their situation in this second wave of COVID-19 outcomes in the year 2021 [11-15].

Cities like Chandigarh with one of the top-notch per capita incomes in the country has also witnessed terrific impact of second wave of pandemic [16]. Being the location of Chandigarh on the

boundary edge of Punjab and Haryana and having primary health care institutes like General Multi Speciality Hospital Sector 16, General Medical College & Hospital Sector 32 and Post Graduate Institute of Medical Education and Research (PGIMER), the city beautiful is considered as the centre of economic growth with good health facilities [17,18]. Conversely, the high inflow of people from nearby cities like Mohali and Panchkula for job and education purposes has made the city more vulnerable in this second wave of COVID-19 pandemic [19]. This pandemic has entailed huge inflow of patients to Chandigarh and possessed additional costs on communities and health care facilities [20,21].

In order to understand this issue, the current article highlights the impacts of second wave of COVID-19 pandemic disaster on tri-city region of Chandigarh, Mohali and Panchkula. The work highlights the challenged faced by the tri-city in this second wave of pandemic with essential planning, recuperation, and preventative measures that were taken to deal with this disaster. The second wave of pandemic has brought our interest in the issue of city susceptibility to pandemics and has revived interest in this topic. As the prediction of third wave in near future may further increase our keen interest towards gathering the information of preparatory measures of the city and its adaptive measures to deal with pandemic in near future [22,23]. In this cognizance, this article presents an unprecedented opening to comprehend how tri-city of Chandigarh is affected by second of COVID-19 pandemics and what preventative measures were taken to curtail the dreadful impacts and enhance sustainability rate.



**Figure 1:** (a) Number of active cases with average number of cases up to the month of March 2021 (b) and (c) shows the number of deaths between the months of Aug 2020 to March 2021.

## Methods

### Study site and concept

The whole scrutiny of the situation during the second wave of COVID-19 pandemics has been done on the tri-city region of Chandigarh (Figure 1) which lists the impacts on Chandigarh, Mohali and Panchkula city.

### Data collection and analysis

The number of COVID-19 cases reported by the Health department of cities and newspaper reports were the principal source used for the compilation of dataset. This work explains the different quantitative and qualitative resources of data, including reported cases in tricity, number of deaths and recovered patients, total number of reported cases in this phase of time and analyzes the diverse range of challenges faced during this time. The information used for the data compilation include from the reported cases on the website of Chandigarh administration and official information released by tri-city of Chandigarh, media reports as well as personal informations obtained from the wide range of views and proficiency. This data was further divided into different categories which involve number of cases reported during the month of February to May 2021, the number of deaths and recovered patients in the second wave of COVID-19 pandemics. The study was commenced in May 2021, in which the chosen city-wise number of COVID-19 cases was collected from the mentioned sources. The database was prepared to comprehend the patterns of spread of this second of pandemic in month wise manner from February to May 2021 for tri-city of Chandigarh. To illustrate the evolving circumstances in this second wave, the comparative data from September 2020 to January 2021 has also been discussed in the work. The respective challenges faced by the tri-city of Chandigarh and the preventative measures taken for curbing the spread of virus has also been discussed in this work. The compiled data clearly indicate the propensity, vulnerability and

preparedness of the city.

## Results

The second wave of corona virus (COVID-19) pandemic has started from the mid month of February and attained its peak in the month of May in tri-city of Chandigarh. This wave has influenced approximately every phase of human life in tri-city of Chandigarh. This deadly health catastrophe has generated mental and health chaos in people's lives. Its impact can be visualized by seeing the increment in the number of infected cases in the city. In comparison to 7,595 reported cases with 106 deaths in the peak month of first COVID wave in September 2020 in Chandigarh, the second wave has shaken the city very dreadfully. There were around 17,399 reported positive cases in the month of May 2021 followed by 15,648 cases in the month of April 2021 in Chandigarh. Therefore, the month of May in 2021 was considered as the nastiest month in second wave of COVID-19 Pandemic in Chandigarh. The PGI, Chandigarh has confirmed that double mutant (B. 1.617) variant was mainly behind the second wave of COVID Pandemic in the tri-city region of Chandigarh [24,25]. The surging trend in infected patients was witnessed after 20 December 2020 in Chandigarh. The weekly trend shown that city has crossed around 450 active cases in the last week of December 2020. This trend further enhanced with 414 active cases on 10<sup>th</sup> January 2021. After that, there was some sort of decrement in the weekly number of cases upto 21<sup>st</sup> February 2021. However, the last week of February witnessed around 84% increment in the active cases in Chandigarh (Figure 1a).

On 3<sup>rd</sup> March 2021, Chandigarh has witnessed 472 reported cases with total of 21,906 reported cases and 354 number of death till date from the starting of the pandemic. The number of recovered patients was around 21,080. However, Panchkula and Mohali reported 133 and 665 cases respectively on 3<sup>rd</sup> March 2021. However, there was a significant increment in the number of average positivity rate in

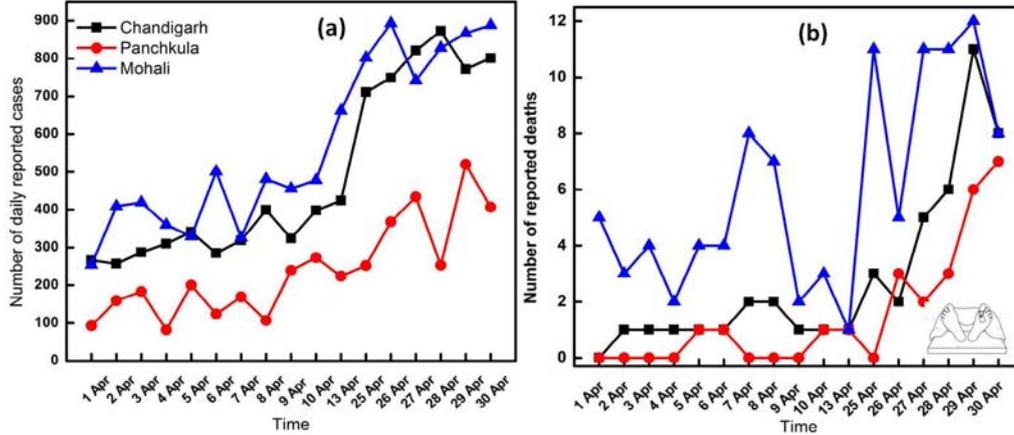


Figure 2: (a) Number of reported corona case and (b) number of deaths in tri-city of Chandigarh during the month of April 2021.

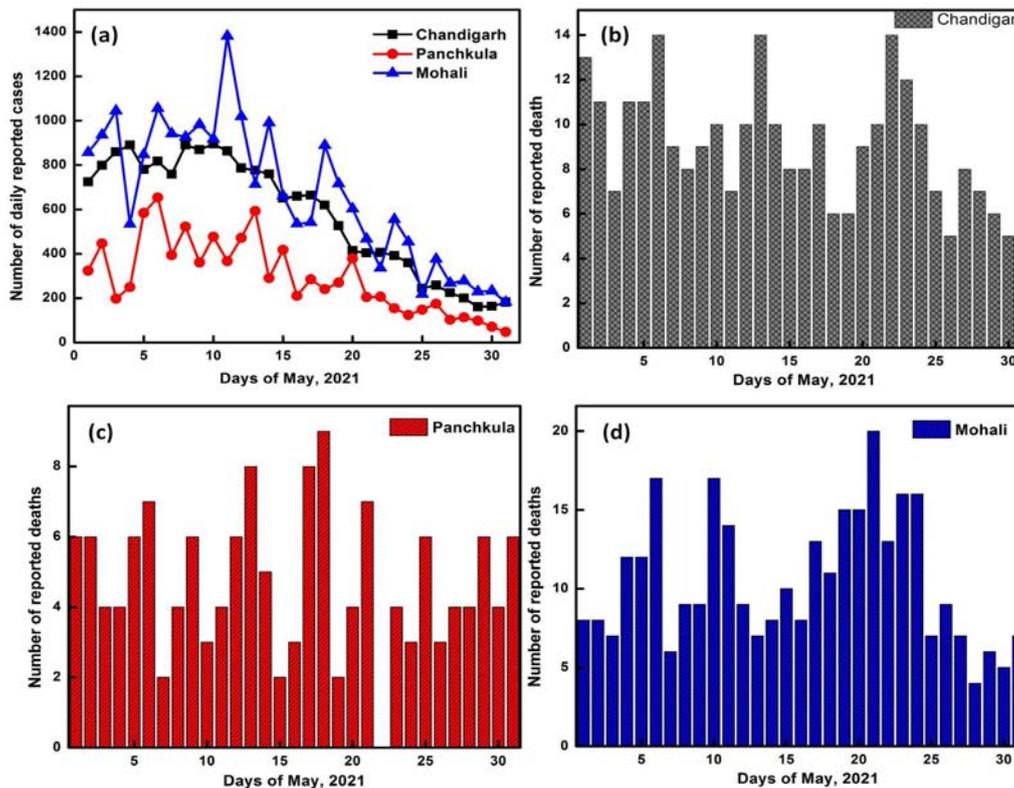


Figure 3: (a) Number of reported corona case and number of deaths in (b) Chandigarh, (c) Panchkula and (d) Mohali during the month of May, 2021.

reported cases in the month of March (Figure 1b). The comparison of number of death from the month of September 2020 to February 2021 is given in Figure 1c. There was linear increment in the average number of weekly infected patients. However, the daily death rate is under control in the month of March 2021 (Figure 1c).

However, the situation starts worsening in the month of April, 2021. This second wave of COVID-19 pandemic compelled the authorities of Chandigarh to close down the schools and other educational institutions in and around the city. The number of cases showed a significant increment for the tri-city (Figure 2a). As per the

published interview report in leading newspaper, Prof. G.D. Puri, Dean and Head of Department of Anesthesia and Intensive Care, PGI, Chandigarh said that the enhancement in the fatalities in the second wave of pandemic was mainly due to the late reporting of patients to the hospitals [26]. The self prescribed use of steroids in early stages by infected patients has also worsened the situation in city.

With highest 183 single day reported fresh cases of patients in Panchkula on 3<sup>rd</sup> April made it as a 5<sup>th</sup> affected district in Haryana. However, the number of cases in Chandigarh and Mohali were around 287 and 419 respectively 3<sup>rd</sup> April. With each passing day of April,

2021 shown linear increment in number of COVID infected patients in tri-city of Chandigarh. The weekly positivity rate was 2<sup>nd</sup> highest in country in Chandigarh (14%) after Maharashtra in the month of April 2021. This second wave of pandemic was seemed to be more transmittable and dangerous among public. However, the starting week of April has shown non-serious behaviour among people with less worried about social distancing and mask wearing attitudes in public places. This second wave has significantly affected people less than 50 years of age as compared to higher infection rate in older people in first wave of COVID pandemic in 2020. All the hospitals of tri-city were overstretched to their maximum limits in the month of April 2021. The acute shortage of COVID beds in this month had further worsened the situation in the tri-city. The medical facilities including critical care beds, ventilators for high risk patients were found to be decreasing with each passing day in the month of April. The high consumption rate of medical oxygen and other used drugs such as remdesivir and tocilizumab in hospitals has tremendously increasing their black marketing in tri-city and put extra pressure on the attendants of COVID patients. Panchkula has reported 8,014 reported cases with 53 deaths in the month of April 2021. Whereas, the total infected patients reached to 42,647 and 46,570 in Chandigarh and Mohali. The increment in COVID patients was around 176% in case of Mohali in the month of April 2021. As per the reported data, the hospitals have shown increment in the positivity rate of infection among surgical and trauma patients. The sudden increment in the number of deaths in the tri-city had imposed extra burden on the crematoriums. The large inflow of beneficiaries at vaccination centres has created the shortage of medicines. The city witnessed deserted look at many of the vaccination centres due to finishing out of stock.

In comparison to the positivity rate of 2.2 % in the month of February 2021, the peak month of May, 2021 has shown an increment of positivity rate to 16.7%. The deadly blow of corona second wave has reached to its maximum in the month of May, 2021 (Figure 3a). Around 275 people had lost their life in Chandigarh due to this virus in the month of May, 2021 (Figure 3b). The total number of reported cases was around 17,399 in Chandigarh. The situation of Mohali and Panchkula was also dreadful in the month of May. May, 2021 was considered as a deadly roller coaster drive for both the patients and their attendants in the tri-city of Chandigarh. Mohali has shown the biggest spike of around 1045 patients on 3<sup>rd</sup> May, 2021.

## Discussion

The lockdown fear among pupil had thronged them to markets for buying vegetables, fruits and essential household items. The vaccination shortage has further decreased the inoculation drive in tri-city. In comparison to middle class people of tri-city who was facing problem of searching health care facilities, the other people from labour class community have faced the major threat of losing their income source. The people especially working in the hotels, saloons, drivers in schools, labours at industrial sectors, street vendors was found to be quite uncertain during this second wave of COVID pandemic. The month has witnessed the shortage of ventilator beds in all government and private hospitals. The patients were struggling for critical care beds in hospitals. The long queues of patients for COVID testing and in vaccination centres were few other problems of tri-city. The emergency wards of government hospitals were overflowed with the corona patients. The hospitals have displayed acute shortage of

staff and necessary infrastructure to cope up with the situation [27]. As a result, the inconvenience faced by other serious patients was unexplainable over here. The positivity rate dips to 13% on 24<sup>th</sup> May. In addition, the patients admitted to hospitals have also shown the complementary fungal infections [28]. The diabetic patients were found to be more prone to the mucormycosis in tri-city hospitals. Around 50 cases of black fungus were found to be active on 27<sup>th</sup> may 2021 on Chandigarh on an average of daily inflow of 10 patients at PGI with mucormycosis. This sudden increment in the black fungus cases in the tri-city had possessed the shortage of amphotericin drug. The overcharging by ambulance services in tri-city has given extra burden on patients.

However, the joint efforts of doctors and administrative officers of tri-city have come as a great source of rescuer in this second wave of pandemic. The initial step was to isolate and test the number of contact persons of infected patients. These contacts were advised to follow home isolation for 17 days. The imposition of night curfew in Mohali on 3<sup>rd</sup> April onwards has displayed a dip of 1.4% in the positivity rate of COVID infection among people. The vaccination drive was stated in both government aided and private hospitals for benefitting large number of people of tri-city. With the sudden rise in the number of cases, the hospital decided to stop the elective surgeries and utilizing their manpower in curbing this deadly wave of Corona. Under the leadership of our Honourable Governor of Punjab, Shri V.P Singh Badnore, the city has significantly coming out from this second wave of pandemic. In order to curb the spread of virus, the UT Administrator Shri Badnore announced the closing of all educational institutes in the city. The administration had further breaking the transmission chain of virus *via* making small containment zones and imposing weekend curfews in the cities [29]. The enhancement in the screening and monitoring of containment zones were done. The Municipal corporations of tri-city have restated the sanitisation drive in the public places. The administration had stated house-to house survey to check the infected patients and motivating the beneficiaries to get vaccination. The oxygen auditing teams were made to keep a check on the medical O<sub>2</sub> consumption in hospitals [30]. The capping on indoors and out door gathering in marriages and other rituals were restricted to 30 and 50 respectively. The timing for night curfew has been increased from 6 pm to 5 am. To decrease the burden on crematorium due to the sudden rise in the deaths were overcome by installing more gasifiers chamber at crematorium. The administration has also appointed officers to help people in performing last rites of patient who lost their life due to this deadly virus. In order to ease out the burdens from government hospitals, the UT administration has given a clarion call for setting mini COVID centres in tri-city. The oxygen fitted auto ambulances were started in tri-city to curb the overcharging rates by private ambulance services in the city. The easy accessibility to O<sub>2</sub> cylinder was made possible at home quarantine patients by the efforts of UT administration in return of easy deposit of security amount. The private oxygen refilling vendors were approached by the administration to curb the increasing demands in tri-city. The overcharging by the private hospital was properly managed by the administration. The time to time advisory from the Director, PGI has enhanced the knowledge of common pupil of tri-city regarding the over use of self prescribed steroidal drugs at home. He appealed the patients to stay at home if there oxygen saturation level were above 95%. So that proper care was given to high risk

patients at city hospitals. The high consumption of oxygen at hospital has further increased the risk of fire in hospitals. This situation was controlled by the proper checking of fire hydrants in hospitals. All the hospitals have followed the guidelines issued by the Ministry of Health and Family welfare for proper screening, diagnosis and management of mucormycosis in tri-city. In order to compensate losses faced by the shopkeepers, the administration has issued fresh guidelines to open non-essential shops from 9 am to 4 pm in tri-city. The oxygen demand of hospitals was managed in association with Red Cross society of tri-city by starting the oxygen concentration banks for COVID patients. The tri-city has imposed the strict restrictions on the non-essential movement of vehicles during weekend lockdown in the month of May, 2021. The sero survey was conducted for the contact tracing in the month of April, 21.

In order to increase the awareness among people of tri-city, the educational institute such as Panjab University has come forward by conducting various series of webinar in association with the leading doctors and researchers amongst India and abroad [31]. People were made aware about the serious impact of self prescription of steroids and maintenance of proper hygiene during this pandemic. The issue raised amongst the final year students of different degree course during first wave of pandemic was easily resolved under the leadership of PU, Vice Chancellor Prof. Raj Kumar [31]. The University had conducted special examination for final semester students who so ever were not able to give their exams in September 2020. This initiative of Panjab University was found to be quite beneficial for several students. The regular online classes were conducted by teachers during this second phase of pandemic. The problems of research scholars of Panjab University were sorted out by giving them more time to submit their thesis and synopsis. The deadlines for submitting the M.Phil dissertations by the students were increased till December 2021, by the competent authorities of Panjab University under the leadership of Prof. Raj Kumar. The authorities have further started to keep the records of interstate movement of hostel staff for curbing the spread of virus in hostels. The vaccination drive was initiated at the health centre and Dental College of Panjab University. The university authority has decided to provide the off-campus accessibility of e-resources to students. The setting of Western Command hospital with bed capacity of 100 at International Student Hostel in Sector 25 campus of Panjab University has given some relief to the city hospitals [32]. The ongoing semester classes were made through online learning mode. The students were aware about the online learning platforms like SWAYAM *via* the faculty member of Panjab University. The Panjab University in partnership with Molekule Inc. USA has disturbed around 271 air purifiers in various hospitals in tri-city of Chandigarh [33,34].

The combined efforts of health care workers both from the government or private sectors have made it possible for tri-city to overcome this shocking second wave of corona pandemic. Overall, this second wave of pandemic lead to an outstanding opening for tri-city planners and policy architectures to take necessary and timely actions towards making the city more susceptibility to pandemics.

## Conclusion

The current second wave of corona pandemic has shaken the tri-city to its limits. The positivity rate of as Chandigarh was found to be

second highest in the country. The double mutant (B. 1.617) variant was mainly behind the second wave of COVID Pandemic in the tri-city region of Chandigarh. This wave has witnessed the more infection among the people with age group less than 50 years as compared to the first wave, where mostly older people were infected more. The city faced the acute shortage of health care supplies including ventilators, ICU beds, vaccination, and various drugs used for the treatment of patients infected with corona virus. In addition, the city reported the spiked cases of mucormycosis in COVID infected persons. However, the joint efforts of doctors and administrative officers of tri-city have come as a great source of rescuer in this second wave of pandemic. Though This kind of study helps to comprehend the impacts of second wave on Chandigarh and emphasized on the major lessons that can be learned during this phase. In this cognizance, this article presents an unprecedented opening to comprehend how tri-city of Chandigarh is affected by second of COVID-19 pandemics and what preventative measures were taken to curtail the dreadful impacts and enhance sustainability rate.

## Acknowledgement

Savita Chaudhary is thankful to DST Inspire Faculty award [IFACH- 17], Haryana State Council for Science and Technology [HSCSIT/R&D/2020/476].

## References

- Anderson RM, Heesterbeek H, Klinkenberg D, Hollingsworth TD. How will country-based mitigation measures influence the course of the COVID-19 epidemic? *Lancet*. 2020; 395: 931-934.
- Leach M, MacGregor H, IScoones I, Wilkinson A. Post-pandemic transformations: How and why COVID-19 requires us to rethink development. *World Dev*. 2021; 138: 105233.
- Gupta D, Fischer H, Shrestha S, Ali SS, Chhatre A, Devkota K, et al. Dark and bright spots in the shadow of the pandemic: Rural livelihoods, social vulnerability, and local governance in India and Nepal. *World Dev*. 2021; 141: 105370.
- Choutagunta A, Manish GP, Rajagopalan S. Battling COVID-19 with dysfunctional federalism: Lessons from India. *South Econ J*. 2021; 87: 1267-1299.
- Kumar S, Maheshwari V, Prabhu J, Prasanna M, Jayalakshmi P, Suganya P, et al. Social economic impact of COVID-19 outbreak in India. *Int J Pervasive Comput Commun*. 2020; 16: 309-319.
- Poudel K, Subedi P, 2020. Impact of COVID-19 pandemic on socioeconomic and mental health aspects in Nepal. *Int J Soc Psych*. 2020; 66.
- Workie E, Mackolil J, Nyika J, Ramadas S. Deciphering the impact of COVID-19 pandemic on food security, agriculture, and livelihoods: A review of the evidence from developing countries. *Current Res. Env Sustainability*. 2020; 2: 100014.
- Iftimie S, Lopez-Azcona AF, Vallverdu I, Flix SH, Febrer GD, Parra S, et al. First and second waves of coronavirus disease-19: A comparative study in hospitalized patients in Reus. Spain. *PLoS ONE*. 2021.
- Xu S, Li Y. Beware of the second wave of COVID-19. *Lancet*. 2020; 395: 1321-1322.
- Wise J. Covid-19: Risk of second wave is very real, say researchers. *BMJ*. 2020; 369: m2294.
- Gupta PC, Kumar PM, Ram J. Impact of the COVID-19 pandemic on clinical ophthalmology response. *Ind J Med Res*. 2021; 153: 200.
- Das L, Dutta P, Bhadada SK, Rastogi A, Wallia R, Mukherjee S, et al. *J Endocrine Soc*. 2021; 5: A627.
- Pal R, Sachdeva N, Mukherjee S, Suri V, Zohmangaihi D, Ram S, et al.

- Impaired anti-SARS-CoV-2 antibody response in non-severe COVID-19 patients with diabetes mellitus: A preliminary report. *Diabetes & Metabolic Syndrome: Clinical Res & Rev.* 2021; 15: 193-196.
14. Prasad KT, Gandra RR, Dhooria S, Muthu V, Aggarwal AN, Agarwal R, et al. *Res. Care* 2021; 66: 213-220.
  15. Aggarwal AN, Agarwal R, Dhooria S, Prasad KT, Sehgal IS, Muthu V. Impact of chronic obstructive pulmonary disease on severity and outcomes in COVID-19 patients: A systematic review, *Int. J. Noncommunicable Dis.* 2021; 6: 10.
  16. Chalana M. Chandigarh: City and Periphery. *J Planning His.* 2014; 14: 62-84.
  17. Sarin M. Urban Planning in the Third World. *The Chandigarh Experience Verfassung in Recht und Übersee.* 1982; 17.
  18. Kalia R. Chandigarh: A planned city. *Habitat Int.* 1985; 9: 135-150.
  19. Sharma R, Balasubramanian R. Assessment and mitigation of indoor human exposure to fine particulate matter (PM<sub>2.5</sub>) of outdoor origin in naturally ventilated residential apartments: A case study. *Atm Env.* 2019; 212: 163-171.
  20. He X, Lau EHY, Wu P. Temporal dynamics in viral shedding and transmissibility of COVID-19. *Nat Med.* 2020; 26: 672-675.
  21. McGowan ML, Norris AH, Bessett D. Care churn-why keeping clinic doors open isn't enough to ensure access to abortion. *N Engl J Med.* 2020; 383: 508-510.
  22. Colenda CC, Applegate WB, Reifler BV. COVID-19: financial stress test for academic medical centers. *Acad Med.* 2020; 95: 1143-1145.
  23. Sullivan-Marx E. Aging in America: how COVID-19 will change care, coverage, and compassion. *Nurs Outlook.* 2020; 68: 533-535.
  24. Ram J. Chandigarh PGI confirms presence of double mutant B.1.617 variant. 2021.
  25. Ram J. Covid surge during 2nd wave attributed to double-mutant strain: PGIMER. 2021.
  26. Puri GD, This is war and there's no time to cry for our losses: PGI Covid panel head, *Hindustan Times*
  27. Puri GD. Only emergency surgeries to be conducted at Chandigarh PGIMER. 2021.
  28. Gupta AK. Black fungus an epidemic: Chandigarh. 2020.
  29. Brar M. Night curfew from 6 pm in Chandigarh. *Mohali.* 2021.
  30. Salyal AS. Limited oxygen supply choking private hospitals in Chandigarh. 2021.
  31. Punjab University-COVID-19. 2020.
  32. Rohtaki H. 100 Army paramedics to man 100-bed O<sub>2</sub> hospital at PU. 2020.
  33. Mehra A. Panjab University collaborates with US Firm for assembling its air purifiers in Indian hospitals. 2020.
  34. Mohan V. Panjab University, Chandigarh facility joins hands with US-based firm. 2020.