International Journal of Management, IT & Engineering
Vol. 10 Issue 12, December 2020
ISSN: 2249-0558 Impact Factor: 7.119
Journal Homepage: http://www.ijmra.us, Email: editorijmie@gmail.com
Double-Blind Peer Reviewed Refereed Open Access International Journal - Included in the International Serial Directories Indexed & Listed at: Ulrich's Periodicals Directory ©, U.S.A., Open J-Gate as well as in Cabell's Directories of Publishing Opportunities, U.S.A

Tropospheric NO_2 and Covid-19: A preliminary comparative study between two districts, Sheohar and Begusarai of Bihar State in India

Pallavi Kumari[a],
Richa N K Sharma*[a]
V. S. Rathore[a]
*[a]*Assistant Professor, Department of Remote Sensing, Birla Institute of Technology, Mesra, india*

Abstract:

The present study is a comparison between the reported number of cases in two districts i.e. Sheohar and Begusarai of Bihar state in India. While Sheohar had the minimum number of reported cases the other, Begusarai reported maximum number of cases during a peak of the pandemic (15th to 17th April 2020) simultaneously. The present paper aims to examine the changes in NO2 in the atmosphere over these districts during the above mentioned dates. The Covid19 data was available through the ISRO portal 'Bhuvan' and the national portal of India for Covid-19, i.e. covid19india.org. In addition, the data form the COVID-19 test centers of Begusarai was also collected and was used for Hypothesis testing with Chi Square. QGIS 3.12.3 software has been used for processing satellite data for atmospheric NO2 and map generation [1]. MS excel has been used for calculation of Chi-square values. The observation from the data shows that the atmospheric concentration of No2 was indeed lower in the Sheohar district. The Chi-square results for the collected data indicated that the Covid-19 was equally probable over all age groups, and ethnical groups and gender.

KEYWORDS: Satellite Data, Covid-19, QGIS, GIS, Chi Square.

1. Introduction

The virus, Covid-19 is a second version of SARS (Severe Acute Respiratory syndrome), which came up in the year 2003. According to WHO Corona virus are a large family of viruses that causes illness ranging from the common cold to more diseases such as (MERS-COV) [2]. It is a Zoonotic disease. Its origin may be especially from civet cats or/ and Bats. Its Incubation Period may range from 2-12 days (avg.5th day) and its clinical features range from no symptom (asymptomatic) to severe pneumonia and death. On January 30th 2020 this disease was first detected in a student who returned from Wuhan to India. Its spread is through droplet infection (cough sneeze) and surfaces (table tops, desks tops etc.). Bhuvan, a geo portal of Indian Space Research Organization. (ISRO), has information developed on its dashboard, they have also developed geovisualization of this disease. Data can be got through participation of members of the general public at wwww-covid.19india.org. Thus, in this we get different types of data and information, how the disease is spreading and demographic data. The Indian government imposed the first nationwide public curfew on March 22nd , 2020. This lockdown was followed in 3 phases (i) March 24th to April 14th , 2020 (ii) April 15th to May 3rd 2020 (iii) May 2nd to 17th May 2020. The effect of lockdown was such that there was a reduction in the ground rate of the disease. The effect could also be noticed on environmental factors around the world in terms of

International Journal of Management, IT & Engineering
Vol. 10 Issue 12, December 2020
ISSN: 2249-0558 Impact Factor: 7.119
Journal Homepage: http://www.ijmra.us, Email: editorijmie@gmail.com
Double-Blind Peer Reviewed Refereed Open Access International Journal - Included in the International Serial Directories Indexed & Listed at: Ulrich's Periodicals Directory ©, U.S.A., Open J-Gate as well as in Cabell's Directories of Publishing Opportunities, U.S.A

improvement in air quality. With the help of satellite remote sensing for understanding the growing air pollution levels [3]. In India researches have indicated very high pollutant concentration over the Indi-Gangetic plain.. The main effect of lockdown on improving the air quality in various cities across datasets. GIS (Geographic Information System) is dynamic Geography where in the maps are digitally displayed with a lot many attributes which can be updated in seconds[4]

.2. Study Area

Bihar is located in the eastern region of India between latitude 24°- 20'- 10" N~27°- 31'- 15" N and longitude 82°- 19'- 50" E ~ 88°- 17'- 40"E. It is an entirely land–locked state, in a Sub Tropical region of the Temperate zone. It lies mid between the humid West Bengal in the east and the sub-humid Uttar Pradesh in the west which provides it with a transitional position in respect of climate, economy and culture.

The state Bihar is divided into 38 districts which are further subdivided into 534 blocks.

Begusarai extends from 25.15 N latitude to 25.45N longitude and from 85.45 E longitude to 86.36 E longitude. It lies in North Bihar and in the middle of the mid Ganga plain. Its total area is 1918 sq km.

Sheohar extends from 26.52 N latitude and 85.3 E.It has an average elevation of 53 metres (173 feet). Sheohar is bordered by 3 districts from north and east Sitamarhi from west and east Champaran and from south Muzaffarpur.

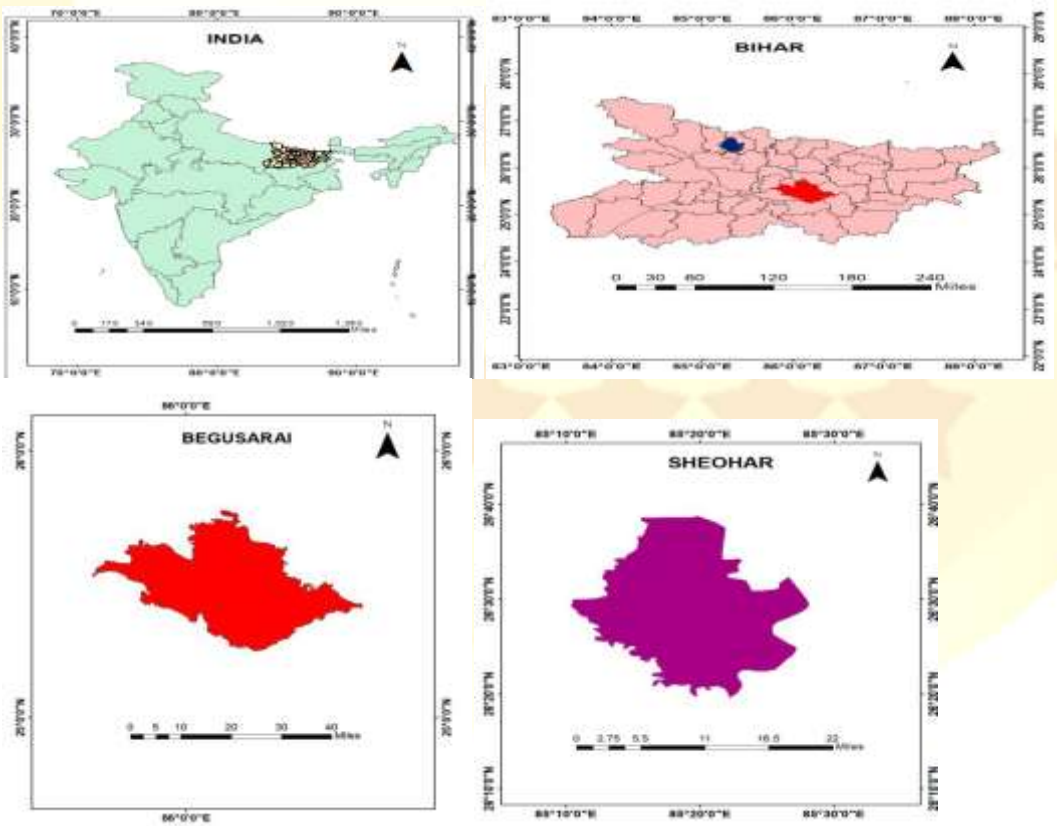


Fig. 1 Study Area

International Journal of Management, IT & Engineering
Vol. 10 Issue 12, December 2020
ISSN: 2249-0558 Impact Factor: 7.119
Journal Homepage: http://www.ijmra.us, Email: editorijmie@gmail.com
Double-Blind Peer Reviewed Refereed Open Access International Journal - Included in the International Serial Directories Indexed & Listed at: Ulrich's Periodicals Directory ©, U.S.A., Open J-Gate as well as in Cabell's Directories of Publishing Opportunities, U.S.A

3. Materials and methods

3.1 Data collection

The NO_2 data is taken from the web site of NASA Giovanni. This data was collected for two consecutive years viz., 2019-2020.The tropospheric NO_2 columns from OMI source of NASA's EOS-Aura satellite which was launched in 2004 was downloaded and processed. The data is taken from 15-17 April 2019 to 2020 years. COVID-19 Data was download from India's National portal (www-covid.19india.org.) and Bhuvan (a geo portal of Indian Space Research Organization ISRO) wherein the death counts, confirmed cases, active cases recovery rate pertaining to Cocid-19 are updated within 24 hrs. In addition Chi-square test which is a non-parametric statistic test was also carried out to check the Null Hypothesis of the Covid-19 patients for Begusarai district. This test was developed by Karl Pearson in 1900.

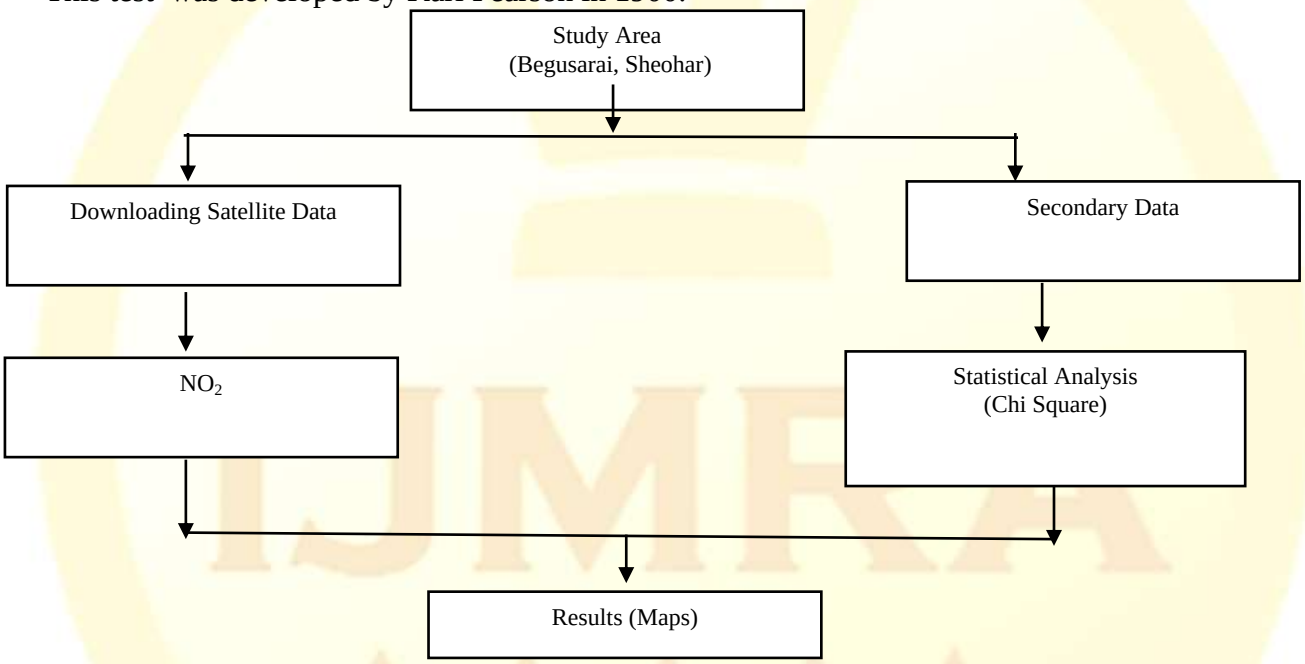


Fig. 2Methodology

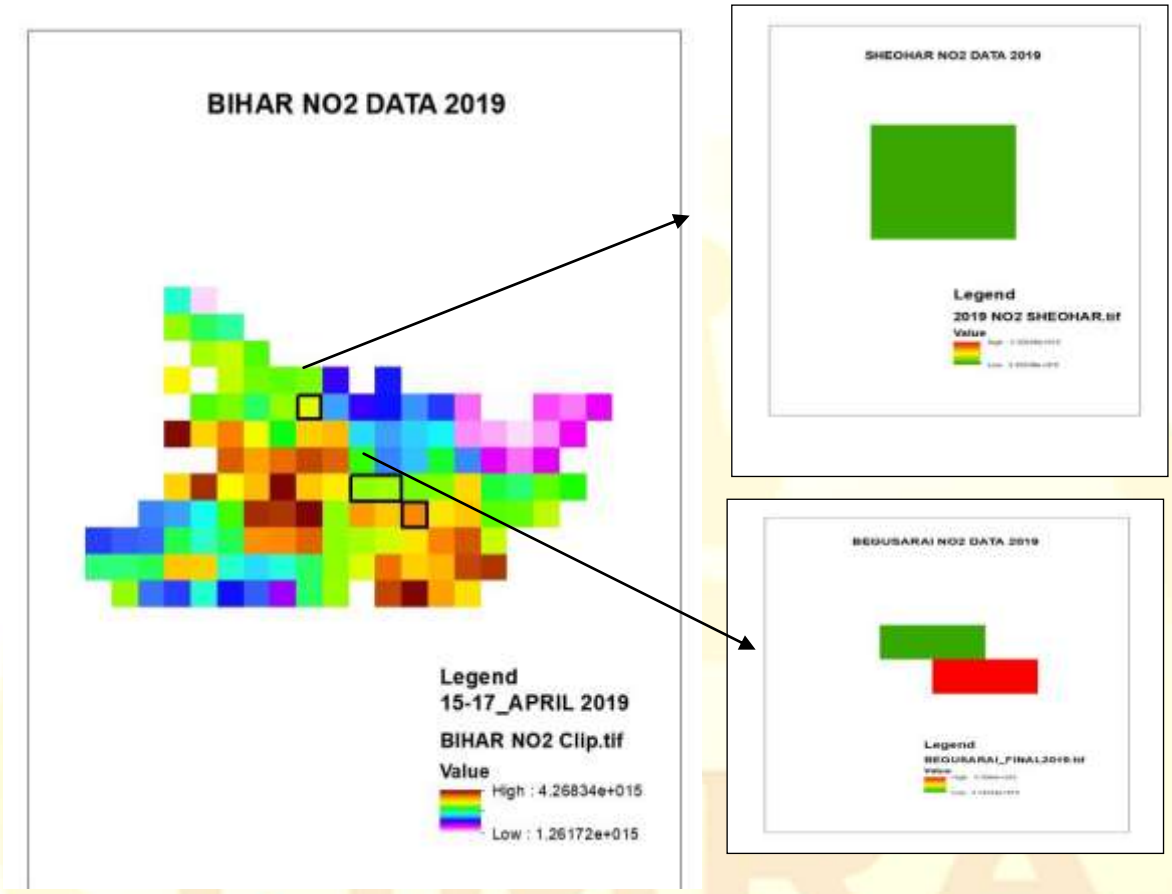
4.Results and discussions

The results are analysed hereunder in two sections.

4.1Analysis of Tropospheric Nitrogen

The NO_2 data was taken from two districts of Bihar in which the emission of NO_2, was mapped for 2019 and 2020.Whein the value of NO_2 was higher in Begusarai as compared to the other district under study it was seen that the sum of confirmed cases was also higher for the same district. in Sheohar NO_2 was less as compared to Begusarai and also were the sum of confirmed cases .

International Journal of Management, IT & Engineering
Vol. 10 Issue 12, December 2020
ISSN: 2249-0558 Impact Factor: 7.119
Journal Homepage: http://www.ijmra.us, Email: editorijmie@gmail.com
Double-Blind Peer Reviewed Refereed Open Access International Journal - Included in the International Serial Directories Indexed & Listed at: Ulrich's Periodicals Directory ©, U.S.A., Open J-Gate as well as in Cabell's Directories of Publishing Opportunities, U.S.A



International Journal of Management, IT & Engineering
Vol. 10 Issue 12, December 2020
ISSN: 2249-0558 Impact Factor: 7.119
Journal Homepage: http://www.ijmra.us, Email: editorijmie@gmail.com
Double-Blind Peer Reviewed Refereed Open Access International Journal - Included in the International Serial Directories Indexed & Listed at: Ulrich's Periodicals Directory ©, U.S.A., Open J-Gate as well as in Cabell's Directories of Publishing Opportunities, U.S.A

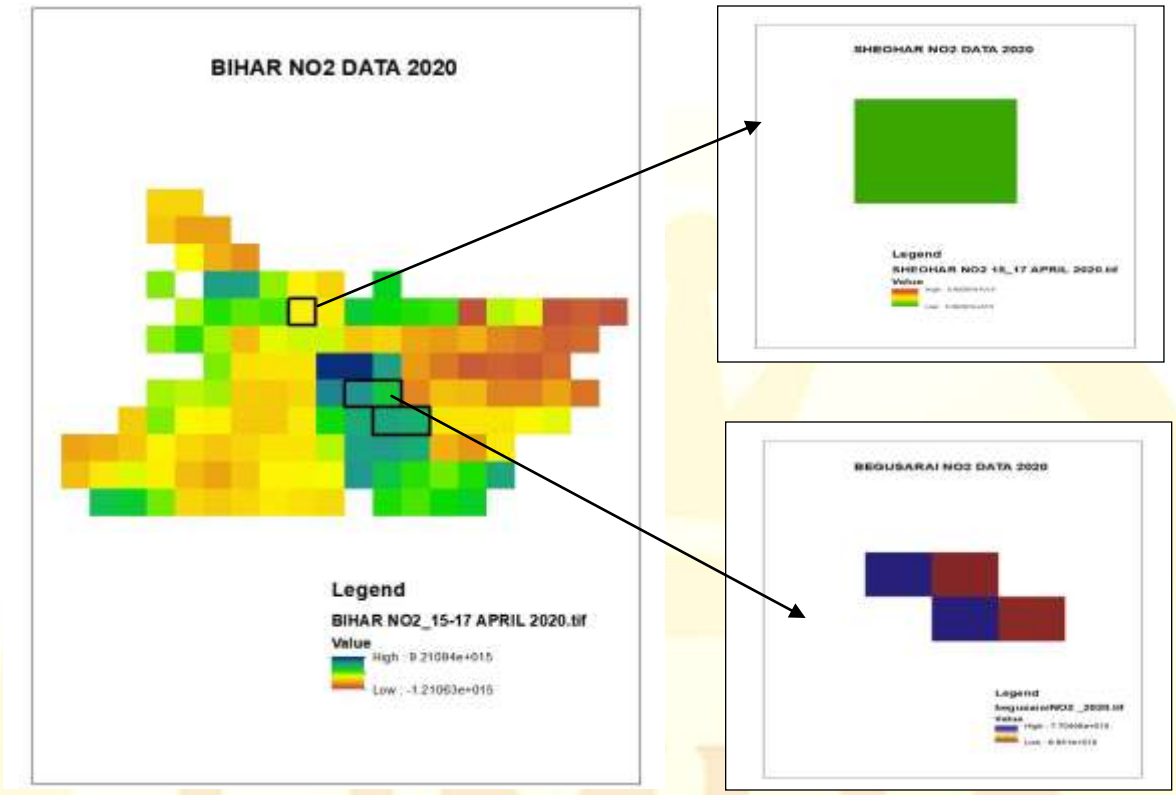


Fig. 3No_2 Map of the study area as derived from the satellite data in the present study

4.2 Analysis of Chi-Square test

Chi-square test for data was collected from the Shahebpur Kamal Block COVID 19 center from 19th May to 25th July 2020 from Begusarai district of Bihar.The test was performed to check the null hypothesis over al age groups, ethnic groups and sexes.

In the present study P_{cal}(calculated) was less than T_{cal}, at 95% confidence level. Therefore Null hypothesis was not rejected; Null hypothesis has to be accepted statistically. Hence it could be concluded for the small area under study that COVID19 was equally susceptible for all sexes age and ethnic groups.

4.3 Further Scope of Study

This is a very preliminary study. The study area being very small, relationship between with COVID 19 and atmospheric NO_2can be furtherd with a larger area wherein many more pixels of NO_2 may be identified to established this relationship. More Covid-19 Data from various countries would also help in further investigations globally.

Acknowledgment

The authors express their gratitude to the National Covid portal and ISRO's Bhuvan, whose data was used in this research. The authors are also thankful to the GIOVANNI site from where the satellite data for the tropospheric NO_2 was obtained.

References

[1] Gonzalez, R.C. and Woods R.E. (2002), Digital Image Processing second edition , Prentice Hall.

[2] Yosra,A.H., Fawzy, Md., Elaswad, A.S., Kenny, S.P. and Shehata, .A., (2020), "The COVID-19 pandemic : A comprehensive review of taxonomy, genetics, epidemiology, diagnosis, treatment and control", Clinical Medicine 9(4),pp1225.

[3] Biswal, Akash; Singh, Tanbir; Singh, Vikas; Khaiwal, Ravindra and Mor, Suman (2020), "COVID -19 lockdown and its impact on tropospheric NO2 concentrations over India using satellite-based data", Heliyon vol (6).

[4] Azevedo, L., Pereira, M.J., Ribeiro, M.C. et al. (2020), "Geostatistical COVID-19 infection risk maps for Portugal". Int J Health Geogr 19, 25. https://doi.org/10.1186/s12942-020-00221-5.