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Iranica Journal of Energy & Environment
Journal Homepage: www.ijee.net
IJEE an official peer review journal of Babol Noshirvani University of Technology, ISSN:2079-2115

Assessment of Air Pollution Changes during COVID-19 Pandemic in Jiangsu Province of China from 2018 to 2021

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P A P E R I N F O

Paper history:
Received 24 October 2023
Accepted in revised form 03 April 2024

Keywords:
Criteria air pollutants
Lockdown
Pandemic
Particulate matter
Spearman's correlation

A B S T R A C T

The COVID-19 pandemic, which began during early 2020, had been a worldwide problem, resulting in significant fatalities. In China, the pandemic resulted in strict lockdowns, restricted movement, and reduced transportation. This resulted in improvement of air quality in many cities in China. The objective of the study is to compare the nature of air quality pre-COVID period (2018-2019) and during COVID period (2020-2201). The following air quality parameters were investigated, air quality index (AQI), particulate matter ($PM_{2.5}$ and PM_{10}), sulphur dioxide (SO_2), nitrogen dioxide (NO_2), ozone (O_3), and carbon monoxide (CO). The present investigation results will augment to the current understanding on the air pollution situation during the COVID-19 pandemic in Jiangsu Province in China. The study revealed that air quality in Jiangsu Province improved during the months when COVID-19 positive cases increased. The reduction in air pollutants concentrations started during 2020 and reached a maximum during 2021. Overall the air quality index (AQI) improved by 8.2 % and air pollutant reductions achieved were, PMs (≈ 21%), SO_2 (26.2 %), NO_2 (13.6 %), O_3 (2.4 %) and CO (10.4 %). Cities in Jiangsu Province with high air pollutant concentrations achieved a moderate reduction. The correlation between air pollutants and AQI was positive except for O_3. The implications of the study are, reduction of fossil fuel powered vehicles and industrial activity can make notable positive impact on the air quality of the region.

***doi**: 10.5829/ijee.2024.15.04.11*

INTRODUCTION

One of the widespread pandemics of the 21st century was the COVID-19 pandemic. Till date, more than 700 million people have been infected and over 7 million people have died (1). The COVID-19 originated during November-December 2019 in China, through Wuhan as the epicentre. In March 2020, COVID-19 was characterized as a pandemic by the world health organisation (2). With the rapid spread of the disease and increase in the number of deaths worldwide, countries implemented lockdown measures. It started with days, extended to weeks, and further continued to months. The period of lockdown varied among the counties and depended on the number of cases tested positive for COVID-19. Lockdowns were either followed nationwide or were decided by different states or provinces in the country based on COVID-19 positive data. For instance, Austria had four lockdown periods from 2020 to 2021, first lockdown during March-April 2020 (28 days), second lockdown during November 2020 (27 days), third lockdown during December 2020-February 2021 (43 days), and the fourth lockdown during November-December 2021 (27 days). Similarly, in Canada, different provinces had different periods of lockdown. British Columbia had two lockdowns, first during March-May 2020 (61 days) and second during November 2020-January 2021 (62 days). Ontario in Canada also had two lockdowns, the first during March-May 2020 (58 days) and the second during April-May 2021 (28 days) (3). China introduced the zero COVID policy and followed strict lockdowns, mass testing and quarantine measures to

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Please cite this article as: Johnson AC. Assessment of Air Pollution Changes during COVID-19 Pandemic in Jiangsu Province of China from 2018 to 2021, Iranica Journal of Energy and Environment, 2024, 15(4):444-51. Doi: 10.5829/ijee.2024.15.04.11

curb the spread of the COVID-19 virus. During this period there were restrictions to personal movements and traffic. The thirteen cities in Jiangsu Province in Mainland China had lockdown periods between January-May 2020 (4). Lockdowns in Jiangsu Province also extended into 2021 during the months of February and July (5). The forced restrictions in vehicle movement and closure of industries worldwide had a significantly positive impact on air pollution (6). Anthropogenic air pollution is a major concern today in the context of health effects and climatic changes. It is related to various ailments such as respiratory diseases, lung cancer, cardiovascular diseases, diabetes, problems related to gastrointestinal system, urinary system, neurologic, and psychiatric system, affects the immune system, and causes premature mortality (7). Air quality study conducted by Filonchyk and Peterson (8) in Shanghai, China has shown that during lockdown in 2020 the air pollutants $PM_{2.5}$, PM_{10}, SO_2, NO_2, and CO decreased by 9 %, 77 %, 31.3 %, 60.4 %, and 3 %. Mahato et al. (9) observed > 50 % reduction in the concentration of $PM_{2.5}$ and PM_{10} in Delhi, India, during the lockdown. Another study conducted in Mexico City showed that during the phase 3 lockdown, NO_2 decreased by 43 %, PM_{10} by 20 %, and $PM_{2.5}$ by 32 % (10). The above researches have shown that air quality in different counties has improved and the air pollutants have decreased in various magnitudes.

The objective of the current study is to quantify the improvement in air quality index (AQI) and decrease in six criteria air pollutants in Jiangsu Province during the period 2018 to 2021, before and during the COVID-19 pandemic periods. The current study connecting COVID-19 and air quality improvement in Jiangsu Province from 2018 to 2021 is relatively new.

MATERIAL AND METHODS

Jiangsu Province is located on the east coast of China with Nanjing as the provincial capital. It has a total area of 102,600 km^2 with the estimated population of 84.7 million (11). There are thirteen cities in Jiangsu Province, and they are Xuzhou (XZ), Lianyungang (LG), Changzhou (CZ), Wuxi (WX), Suzhou (SZ), Yancheng (YC), Nantong (NT), Suqian (SQ), Huai'an (HU), Nanjing (NG), Yangzhou (YZ), Zhenjiang (ZJ), and Taizhou (TZ). Criteria air pollution data were collected for all thirteen cities. The air pollution data of Jiangsu Province cities were obtained from the China air quality online monitoring and analysis platform (aqistudy.cn). The criteria air pollutants considered in the study were particulate matter ($PM_{2.5}$, PM_{10}), ozone (O_3), nitrogen dioxide (NO_2), sulphur dioxide (SO_2), carbon monoxide (CO), and air quality index (AQI) to determine the level of pollution. The mean of everyday data was used to calculate the average monthly mass concentration of atmospheric pollutants. The study focused on understanding the changes in the criteria air pollutants from January 2018 to December 2021. Percentage calculation, data processing and graph generation was performed using Microsoft Excel 2010 and data correlation analysis was performed using the statistical software SPSS 25. Bivariate associations of the air pollution data were performed using Spearman's correlation coefficient. The data were segregated into two periods, pre-COVID (2018 and 2019) and during COVID (2020 and 2021). The average values were used in the analysis. The following criteria were used for the correlation coefficient interpretation: 0.90-1.0 very strong correlation; 0.70-0.89 strong correlation; 0.50-0.69 moderate correlation; 0.30-0.49 weak correlation, and < 0.30 very weak correlation (12). The COVID-19 cases data during 2020 and 2021 in Jiangsu Province were obtained from the website (13).

RESULTS AND DISCUSSION

Monthly variation of AQI and air pollutants

Air pollution is a major problem faced by the world due to its various negative impacts and needs urgent attention. With the spread of the COVID-19 pandemic and implementation of lockdowns, a reasonable reduction in air pollution was achieved globally. The nature of air quality in a region is also influenced by changes in climatic conditions (14). Monthly average values of air pollutant concentrations and AQI across the thirteen cities in Jiangsu Province were systematically studied during pre- and during COVID periods. The AQI values showed a variable trend, although a decrease was observed when compared to the pre-COVID period (see Figure 1). The values fluctuated with sudden increases and decreases over the months. The AQI values decreased by 30.7 % during February and increased by 11.2 % in September during the pandemic. During the pre-COVID period, air quality was good during April and August, when the AQI values were the least. While during COVID, the minimum values occurred during February, July, and October. This is attributed to the lockdown periods that were introduced with the identification of new COVID positive cases. Figure 1 gives evidence for the improvement in air quality during the pandemic period. Lower the AQI values better is the air quality. However, an opposite trend was observed during the months immediately after the lockdowns.

During the pandemic period in January, AQI decreased by 14.5 %. A study by Ai et al. (15) has also shown that AQI values decreased by 21.97 % during the initial pandemic period (25 January-24 February 2020), compared to the pre-pandemic periods in Jiangsu Province. Significant particulate matter ($PM_{2.5}$ and PM_{10}) reductions were observed during the month of February (38.6 % and 38.2 %). These reductions are predominantly

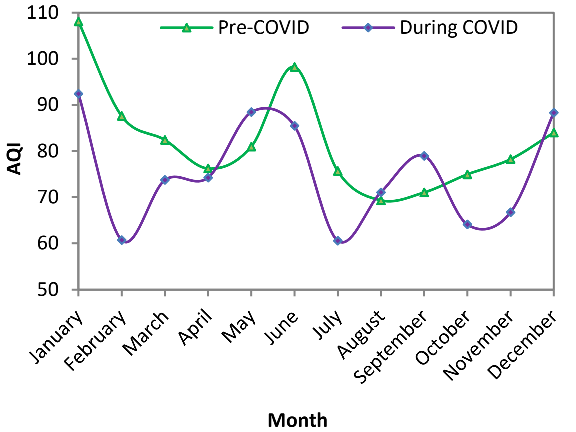

Figure 1. Monthly variation of AQI in Jiangsu Province pre-COVID (2018-2019) and during COVID (2020-2021) lockdown periods

due to the travel restrictions resulting from an increase in the number of COVID cases, as roads are an important source of PMs. However, this decline changed during August to 1.1 % ($PM_{2.5}$) and 4.2 % (PM_{10}) and started to increase during December. SO_2 concentration changes during the months are presented in Figure 2. Maximum reduction was evidenced during February (41.1 %) and minimum was observed during December (0.7 %). Similarly, plausible reductions were observed for CO (26 %) and NO_2 (36.5 %) during the month of February. On the contrary, O_3 reductions were maximum during July (15 %), while an opposite trend was observed during February and December (increased by 11.8 % and 11.6 %).

Comparing the pre-COVID period, maximum reductions in AQI values and other air pollutants ($PM_{2.5}$, PM_{10}, SO_2, CO, and NO_2) were during the month of February, and for O_3 it was during July. This is attributed to the lockdowns and restrictions in movement in various cities in Jiangsu Province. The reduction of O_3 is because of the reduction in precursors (NO_x and VOCs). Similar observations have been made by other researchers, however, during different periods of study (4, 15, 16). During the months of February and July, there was a significant reduction in the AQI and air pollutant concentration values. However, in August, the reduction decreased and some of the pollutant concentrations started increasing. This change can be linked to a return to normalcy (post-lockdown period in the regions). This change in air quality based on the COVID-19 cases has also been observed by Xu et al. (17) in cities in China.

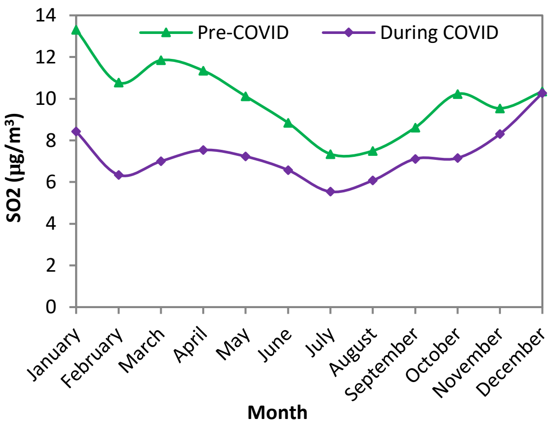

Figure 2. Monthly variation of SO_2 in Jiangsu Province pre-COVID (2018-2019) and during COVID (2020-2021) lockdown periods

Yearly variation of AQI and air pollutants

Annual average AQI and air pollutant values across the region were analyzed and data are presented in Figure 3. The AQI values increased by 5.7 % from 2018 to 2019 during the pre-COVID year. Following COVID pandemic AQI decreased by 10.5 % in 2020 and by 11 % during 2021. The AQI and air pollutant concentration reductions are evident from different studies considering the pre-COVID and during COVID pandemic periods (4, 18–20). The levels of $PM_{2.5}$ and PM_{10} fluctuated, with gradually decreasing (2.3 %) and increasing (3.3 %) from 2018 to 2019. During the COVID pandemic, $PM_{2.5}$ and PM_{10} levels decreased by 13.3 % and 18.5 % in 2020 and further in 2021 decreased by 27.6 % and 25.2 % compared to the pre-pandemic year 2019. Even though the $PM_{2.5}$ and PM_{10} concentrations decreased considerably during the pandemic years, when compared to the 2021 annual WHO air quality guidelines (AQGs, Table 1 (21)) the concentrations were 86.8 % and 74.8 % higher in 2020, and 84.2 % and 72.6 % in 2021. This is because of the high background levels of air pollutants.

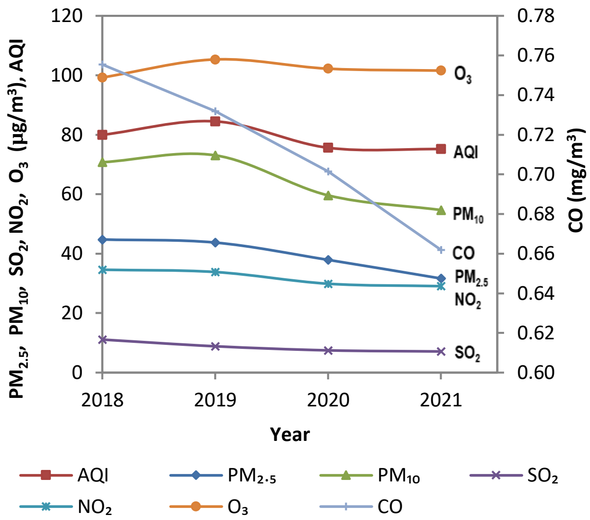

Figure 3. Yearly variation of AQI and air pollutants in Jiangsu Province from 2018-2021

Table 1. WHO Air quality guidelines (AQGs) for criteria air pollutants

Air Pollutant	Averaging Time	2021 AQGs
$PM_{2.5}$ (µg/m^3)	24-hour/Annual	15/5
PM_{10} (µg/m^3)	24-hour/Annual	45/15
SO_2 (µg/m^3)	24-hour	40
NO_2 (µg/m^3)	24-hour/Annual	25/10
O_3 (µg/m^3)	8-hour	100
CO (mg/m^3)	24-hour	4

Study of $PM_{2.5}$ and PM_{10} in five European countries (UK, Spain, France, Sweden, and Northern Italy) by Skirienė and Stasiškienė (20) indicated changes in the air pollutant concentration reduction varied among the countries. In the UK, Spain, Northern Italy and Sweden, $PM_{2.5}$ values were within 15, 15, 25 and 10 µg/m^3 during the COVID period studied in 2020. Similarly, the concentration of PM_{10} was within 20 µg/m^3 in Spain, France and Sweden and within 25 and 35 µg/m^3 in the UK and Northern Italy. The values recorded in European countries were about 50 % lower than those found in Jiangsu Province of China. This indicates a much cleaner environment in European countries compared to Jiangsu Province in China. A significant reduction (20.3 %) in SO_2 concentration was achieved in 2019; further reductions (15.6 % and 19.7 %) were observed during the pandemic years. The annual Jiangsu Province SO_2 values were significantly lower (82.2 %) compared to the 24-hour WHO AQGs. The decrease is predominantly because of the closure or limited operation of industrial facilities, in addition to the use of desulphurization technologies in coal-fired power plants (22). Study by Shakoor et al. (23) in selected provinces of China has shown that the SO_2 concentration decreased by 18.36 % during the pandemic. CO reduction was less pronounced, 4.4 % during 2019 and 9.6 % in 2021 and it was 83.4 % lower than the 24-hour WHO AQGs. Considerable reduction (11.6 % and 14 %) in NO_2 was observed in 2020 and 2021 during the pandemic. Overall the NO_2 concentration in Jiangsu Province decreased by 12.9 % during the pandemic period while it was 65.6 % higher than annual WHO AQGs. The NO_2 reduction can be attributed to the decrease of gasoline powered vehicles on the road. Compared to the five European countries average values, it was 28.8 % higher. NO_2 reduction of 22.7 % was reported by Hasnain et al. (16) in Nanjing city in Jiangsu Province of China. A similar type of study conducted by Kumari and Toshniwal (24) has shown a reduction of NO_2 by 60 % and 78 % in Delhi and Mumbai in India. The concentration of O_3 increased (6.1 %) in 2019 and its reduction during the COVID-19 pandemic years (2020 and 2021) was not significant (3 % and 3.6 %). The O_3 reduction during the pandemic was very minimal (3.3 %) and the concentration was marginally (1.9 %) higher than the 8-hour WHO AQGs. The increasing trend of O_3 has also been reported by other studies. Air quality studies in Ji'nan city in China showed an increase of 37.42 % (18). Similarly, in Nanjing city in China, O_3 increased by 25.45 % (16). An increase of 20.65 % was also observed by Kumari and Toshniwal (24) in Mumbai, India. This spike in O_3 values can be attributed to studies conducted in specific areas under limited timescales regulated by the VOC-controlled regime, while an opposite trend was observed globally (25, 26).

Changes in AQI and air pollutants across cities in Jiangsu Province

The background pollutant concentrations across cities in Jiangsu Province varied according to the various restrictions in the cities caused by the COVID-19 pandemic, industrial activities, topographical location, and meteorological conditions. The concentration of air pollutants decreased across Jiangsu Province (Figure 4). However, the changes were pronounced in certain cities rather than others. The average values during the COVID and pre-COVID periods show the distinction. The AQI values decreased across the cities during the COVID period, on average by 8.2 %. Peak and minimum values of AQI pre- and during COVID occurred in Xuzhou and Nantong. The $PM_{2.5}$ values during pre-COVID were highest in Xuzhou (57 µg/m^3) and lowest in Nantong, whereas the low values during COVID were in Nanjing and Yancheng cities, with the maximum in Xuzhou (45.2 µg/m^3). The percentage decrease during the pandemic was highest in Nanjing (26.7 %). Peak and low PM_{10}

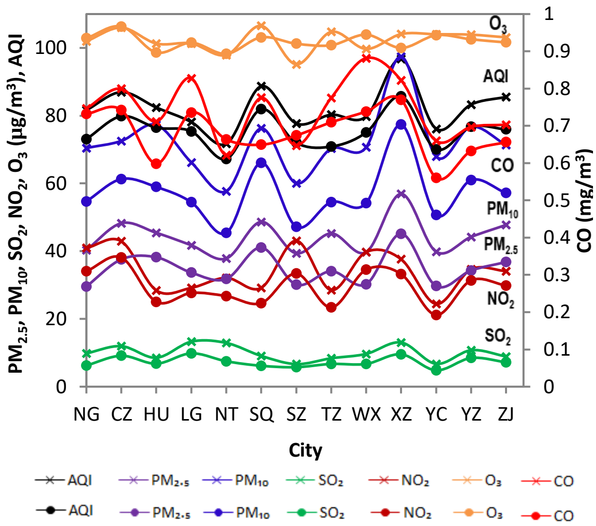

Figure 4. Variation of AQI and air pollutants across cities of the Jiangsu Province pre- (×) and during COVID (•) lockdown periods

values pre- and during COVID occurred in Xuzhou and Nantong. Overall, PM_{10} reductions were about 20.6 % considering all cities in the province during the pandemic period. During Pre-COVID period, Xuzhou registered maximum values for AQI, $PM_{2.5}$, and PM_{10}. This is because Xuzhou produces large quantities of steel and also houses many large scale industries and power plants (27). During COVID, AQI and PMs improved by 11.5 % and 21 % in Xuzhou. However, $PM_{2.5}$ and PM_{10} were still about nine and five times higher than the annual 2021 AQGs.

Peak values of SO_2 occurred in Lianyungang and Xuzhou pre- and during COVID, while minimum values were at Suzhou and Yancheng during pre-COVID and during COVID in Yancheng. Overall, an average of 26.2 % reduction in SO_2 was observed during the pandemic. High concentration of SO_2 occurred in Lianyungang and Xuzhou. This is because of increased industrial activities and use of high sulphur coals (28). When compared to pre-COVID conditions, it decreased by about 27 % during COVID in Lianyungang and Xuzhou. This was four times lower than the 24-hour average 2021 AQGs. The NO_2 reduction was not substantial (13.6 %) as compared to the particulate matter and SO_2 pollutants. Pre-COVID NO_2 values were high in Changzhou and Suzhou, while low in Yancheng city. Similarly, during the pandemic, high values occurred in Changzhou, while low values were observed in Yancheng (21.2 $\mu g/m^3$). High values (43 $\mu g/m^3$) of NO_2 in Changzhou and Suzhou pre-pandemic is because of the exhaust from a large number of motor vehicles (27, 29). The decline in NO_2 in Changzhou during COVID was 11.2 %, which also had the maximum value among the other cities during the period, and the maximum reduction was in Suzhou (22.4 %). The difference is attributed to the precautionary measures adopted by the local authorities in the respective regions based on the active COVID cases. The NO_2 values during the pandemic in Changzhou were about four times higher than the annual 2021 AQGs. O_3 values were higher (106 $\mu g/m^3$) in Changzhou and Suqian before the pandemic, and minimum (95.2 $\mu g/m^3$) in Suzhou. Even during the pandemic, Changzhou had high O_3 values comparable to pre-pandemic levels, and the low values (about 98 $\mu g/m^3$) were observed in Huai'an and Nantong. This minor variation in O_3 is because of changes in the volatile organic compounds to NO_x ratio and chemical regime followed, VOC-limited regime or NO_x-limited regime. Changes in insolation can also be a contributing factor to increases in O_3 (30–32). The O_3 values, in contrast to other air pollutants and AQI, showed an increasing and decreasing trend, but were not substantial. On an average, it increased by about 2.1 % and decreased by 2.4 %. Similarly, the decrease in CO concentration was also not substantial and showed an increasing and decreasing trend. Prior to the pandemic, CO concentrations were maximum in Wuxi and minimum in Nantong, while during the pandemic maximum and minimum values occurred in Xuzhou and Yancheng. The maximum value during the pandemic was about five times lower than the 24-hour 2021 AQGs. The overall reduction in CO was about 10.4 % during the pandemic. A study by Bhatti et al. (4) has shown that CO concentration decreased by 28 % during the first week of lockdown. CO is directly linked to transportation and coal-based industries (4). Low background values indicate effective vehicle monitoring systems and air pollution abatement technologies used by industries.

Relationship between COVID-19, AQI and air pollutants

The COVID-19 cases data (Table 2) during 2020 and 2021 in Jiangsu Province indicates three months with high numbers of COVID-19 positive cases. Peak values were during the months of February 2020, and July, August 2021. All air pollutants and AQI values significantly decreased (35.4 %) during February 2020, except for O_3 which increased by 11.8 %. Plausible reasons for this increase of O_3 during this period in the urban regions are because of the VOC-limited chemical regime. Its increase can also be linked to the increased insolation caused because of the decrease in particulate matter (38.4 %) concentration in the atmosphere during the restricted travel in the lockdown period (33). In July 2021, COVID cases again began to increase, which resulted in regional lockdowns, during which AQI and all pollutants, including O_3, decreased by 18.6 %. It can be seen from Figure 5 that the percentage decrease in AQI

Table 2. Number of COVID-19 positive cases in Jiangsu Province of China during 2020-2021

Month	COVID-19 Cases in Jiangsu Province	
	2020	2021
January	30	6
February	325	6
March	10	6
April	2	5
May	0	5
June	0	9
July	0	153
August	9	411
September	1	9
October	2	1
November	7	16
December	3	5

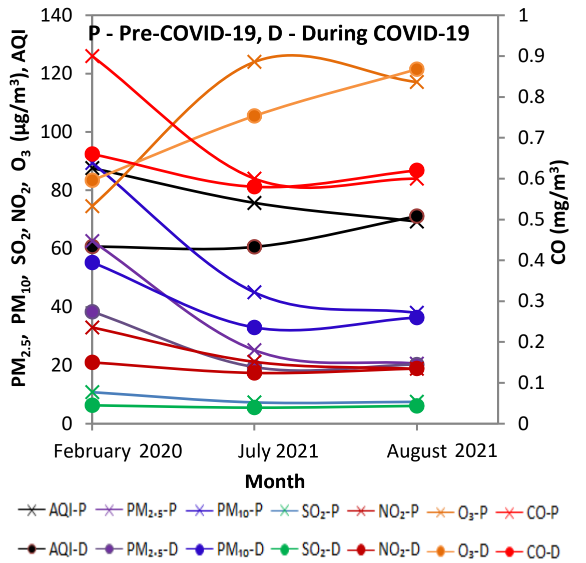

Figure 5. Average AQI and air pollutant values during the months of February 2020, and July, August 2021 pre- (×) and during COVID (•) in Jiangsu Province of China

and other air pollutants has receded in July 2021, which further recedes (8.1 %) in August 2021, while AQI, NO_2, O_3 and CO showed a small increase (2.5 %). Though COVID cases increased during August 2021, regional lockdowns and relaxation of lockdowns in other regions have resulted in increases in air pollutants on par with pre-pandemic levels.

Correlation between AQI and criteria air pollutants

The Spearman's correlation between AQI and all air pollutants is presented in Table 3. The correlation was calculated for pre-COVID (2018-19) and during COVID (2020-21) periods. AQI was predominantly positively correlated with all air pollutants. Pre-COVID, AQI was moderately correlated (0.5-0.6) with particulate matter ($PM_{2.5}$ and PM_{10}), while correlation with SO_2, NO_2, and CO were either weak or very weak, and with no appreciable correlation with O_3. During the pandemic, the AQI correlation with all air pollutants was in the zone of weak to very weak. Strong positive correlation was observed between $PM_{2.5}$ and PM_{10}, NO_2, CO and O_3 pre-pandemic, and during pandemic except for PM_{10}, the relationships with other pollutants were moderate. However, pre-pandemic O_3 had a strong negative correlation, which indicates that the increase in PMs concentrations affects the formation of urban ozone. While during the pandemic, the value decreased marginally. PM_{10} was strongly correlated with NO_2 pre- and during the pandemic. The relationship between other pollutants pre- and during the pandemic was mostly moderate. The correlation coefficient trends observed were similar to the study conducted in Jiangsu Province in China by Bhatti et al. (4); however, the values were lower.

Table 3. Correlation coefficient between AQI and criteria air pollutants in Jiangsu Province (2018-19/2020-21)

Pollutant Parameters	AQI	$PM_{2.5}$	PM_{10}	SO_2	NO_2	O_3	CO
				(2018-19/2020-21)			
AQI	1	0.565**	0.540**	0.236**	0.302**	−0.045	0.425**
		0.361**	0.420**	0.356**	0.313**	0.175**	0.391**
$PM_{2.5}$	0.565**	1	**0.905****	0.441**	**0.709****	**−0.693****	**0.708****
	0.361**		**0.924****	0.496**	0.648**	−0.648**	0.568**
PM_{10}	0.540**	**0.905****	1	0.477**	**0.701****	−0.595**	0.648**
	0.420**	**0.924****		0.546**	**0.725****	−0.565**	0.540**
SO_2	0.236**	0.441**	0.477**	1	0.461**	−0.215**	0.371**
	0.356**	0.496**	0.546**		0.612**	−0.225**	0.498**
NO_2	0.302**	**0.709****	**0.701****	0.461**	1	−0.616**	0.591**
	0.313**	0.648**	**0.725****	0.612**		−0.498**	0.639**
O_3	−0.045	**−0.693****	−0.595**	−0.215**	−0.616**	1	−0.580**
	0.175**	−0.648**	−0.565**	−0.225**	−0.498**		−0.425**
CO	0.425**	**0.708****	0.648**	0.371**	0.591**	−0.580**	1
	0.391**	0.568**	0.540**	0.498**	0.639**	−0.425**	

*Correlation significant at the 0.05 level (2-tailed).
**Correlation significant at the 0.01 level (2-tailed).

CONCLUSION

The comprehensive study on the effect of COVID-19 pandemic on the air pollution situation across the cities in Jiangsu Province revealed a moderate decrease in the criteria air pollutants. Maximum reduction of air pollutants and improvement in AQI was during the month of February, except for O_3 which was in July. Maximum reduction (≈ 26 %) was achieved for particulate matter ($PM_{2.5}$ and PM_{10}) in 2021. Xuzhou city had the highest values of AQI, $PM_{2.5}$, PM_{10} and SO_2, while Changzhou had maximum values of NO_2 and O_3 pre-and during the pandemic periods. Yancheng city had low values for $PM_{2.5}$, SO_2, NO_2, and CO. COVID-19 cases peaked during the months of February 2020, and July, August 2021, but all air pollutants and AQI values significantly decreased during February 2020, except for O_3. The correlation between air pollutants and AQI was predominantly positive, except for O_3. A significant correlation existed between particulate matter and all criteria air pollutants. The study has shown that air quality improvement in Jiangsu Province was evident; however, local prevailing pandemic control measures had a prominent influence on the air quality. The improvement in air quality in cities with high background pollution levels was minimal.

CONFLICT OF INTEREST

The author declares that there is no conflict of interest for the present study.

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Persian Abstract

چکیده

همه‌گیری کووید-۱۹، که در اوایل سال ۲۰۲۰ آغاز شد، یک مشکل جهانی بود که منجر به تلفات قابل توجهی شد. در چین، همه‌گیری منجر به قرنطینه شدید، محدودیت رفت و آمد و کاهش حمل‌ونقل شد. این منجر به بهبود کیفیت هوا در بسیاری از شهرهای چین شد. هدف از این مطالعه مقایسه ماهیت کیفیت هوا در دوره قبل از(2018-19) COVID و در دوره(2020-21) COVID است. پارامترهای کیفیت هوای زیر، شاخص کیفیت هوا (AQI)، ذرات معلق (PM_{10} و $PM_{2.5}$)، دی اکسید گوگرد (SO_2)، دی اکسید نیتروژن (NO_2)، ازن (O_3)، و مونوکسید کربن (CO) مورد بررسی قرار گرفتند. نتایج تحقیق حاضر به درک فعلی در مورد وضعیت آلودگی هوا در طول همه‌گیری COVID-19 در استان جیانگ سو در چین کمک می‌کند. این مطالعه نشان داد که کیفیت هوا در استان جیانگ سو طی ماه‌هایی که موارد مثبت COVID-19 افزایش یافت، بهبود یافت. کاهش غلظت آلاینده های هوا از سال ۲۰۲۰ شروع شد و در طول سال ۲۰۲۱ به حداکثر رسید. به طور کلی شاخص کیفیت هوا (AQI) ٪8.2 بهبود یافت و کاهش آلاینده‌های هوا با مقادیر PMs (≈ 21٪)، SO_2 (26.2٪)، NO_2 (13.6٪)، O_3 (2.4٪) و CO (10.4٪) به دست آمد. شهرهای استان جیانگ سو با غلظت بالای آلاینده هوا به کاهش متوسطی دست یافتند. همبستگی بین آلاینده‌های هوا و AQI به جز O_3 مثبت بود. پیامدهای این مطالعه این است که کاهش وسایل نقلیه با سوخت فسیلی و فعالیت‌های صنعتی می‌تواند تأثیر مثبت قابل توجهی بر کیفیت هوای منطقه داشته باشد.