Study on Air Pollution Status of "2+26" Cities in Beijing-Tianjin-Hebei and Its Surrounding Areas from 2016 to 2020

Jiaxin Lin
Huazhong University of Science and Technology, Wuhan, Hubei, 430000, China

Keywords: Air Quality in 338 Cities, Beijing-Tianjin-Hebei Urban Air Pollution, Consultation Management.

Abstract: This paper compares the air pollution control status of 338 prefecture-level and above cities in China with. "2+26" cities in Beijing-Tianjin-Hebei and surrounding areas during 2016-2020, and finds that the air pollution control level of "2+26" cities in Beijing-Tianjin-Hebei and surrounding areas is significantly lower than the national average level. On the one hand, cities with good air quality accounted for 81.9% of the 338 cities, rising from 78.6% in 2016 to 84.7% in 2020, while cities in the Beijing-Tianjin-Hebei region and the surrounding "2+26" cities with good air quality on average accounted for 33.5% of the cities with less than 50% of the days, from 34.4% in 2016 to 22% in 2020;On the other hand, the average concentration values of major pollutants in 338 cities were lower than those in the Beijing-Tianjin-Hebei region, and 0_3 concentration values showed an increasing trend during the treatment period. Thus, we should adhere to the policy orientation in the future, continue to promote air pollution control for major pollutants, especially for 0_3 scientific and effective consultation treatment.

1 INTRODUCTION

The report to the 19th National Congress of the Communist Party of China (CPC) in October 2017 clearly identified pollution prevention and control as one of the three critical battles, stressing the need to solve prominent environmental problems (Xi, 2017). In June 2018 issued by the central committee of the communist party of China, the State Council "Strengthening ecological environment protection are firmly lay the pollution prevention and control of battle opinions, put forward the implementation of winning blue sky battle battle plan, three years is given priority to with Beijing-Tianjin-Hebei key area and around the battlefield, adjusting and optimizing industrial structure, energy structure, the structure of the transportation and land use structure. Win at the same time, the blue sky battle action plan for three years after 3 years hard work, greatly reduce the major air pollutants emissions, synergy to reduce greenhouse gas emissions, to further reduce the concentration of fine particles ($PM_{2.5}$) obviously, significantly reduce the heavy pollution days, significantly improve the air environmental quality, significantly improve the people's happiness in the blue sky.

In August 2018, the state and local governments jointly issued the 2018-2019 Autumn and Winter Action Plan for Comprehensive Air Pollution Control in the Beijing-Tianjin-Hebei Region and its Neighboring Areas (hereinafter referred to as the Beijing-Tianjin-Hebei Action Plan). The Action Plan defines the specific scope of implementation and proposes to adhere to the problem-oriented approach. Based on the industrial structure, energy structure, transport structure and land structure adjustment and optimization (MEE,2018). However, due to the significant increase in the emission of air pollutants due to the demand for heating and relatively unfavorable meteorological conditions, heavy pollution weather in autumn and winter occurs frequently in cities (Li, 2021). Under the premise of a series of national policies and actions, this paper aims to compare the changes of air quality between 338 cities in China and the Beijing-Tianjin-Hebei region.

2 MATERIALS AND METHODS

In this paper, based on statistical methods, ecological environmental protection for China urban air quality in 2016-2020 published monthly data analysis (MEE,

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2020), The average value is obtained to compare the air quality with the main pollutants in the city.

3 RESULTS AND DISCUSSION

3.1 Air Quality Has Been Continuously Improved in 338 Cities Across the Country

Figure 1. shows that ,according to the assessment of the Environmental Air Quality Standard (GB3095-2012)in 2020, the average number of days with good air quality in 338 cities at or above the prefecture level is 87.1%, the number of days with mild pollution is 9.8%, the number of days with moderate pollution is 1.9%, and the number of days with severe or above pollution is 1.2%.Compared with last year, the proportion of days with good quality increased by 5 percentage points, and the proportion of days with heavy pollution or above decreased by 0.5 percentage points. Compared with 2016, the proportion of days with good quality increased by 8.5 percentage points, and the proportion of days with heavy pollution or above decreased by 1.5 percentage points. The proportion of good days is increasing while that of polluted days is decreasing.

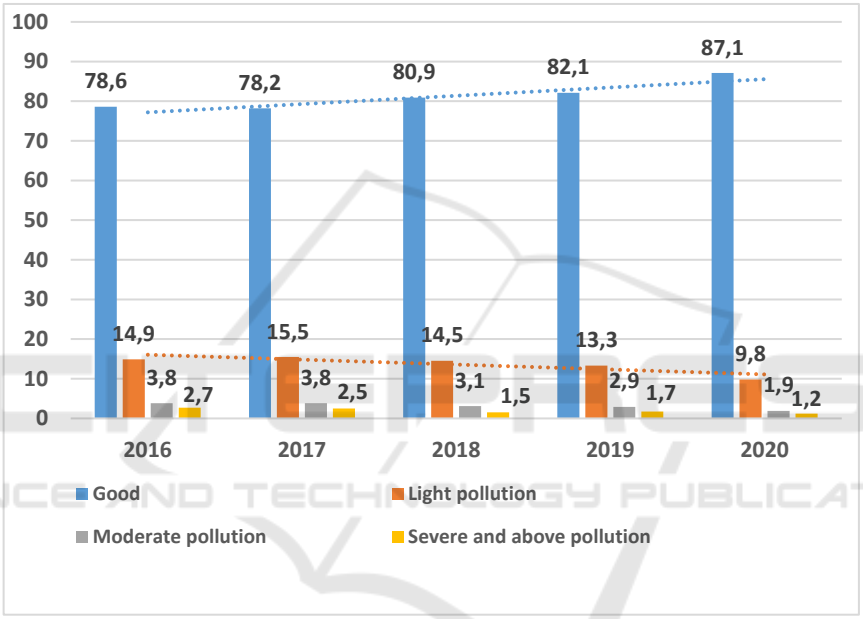

Figure 1: Percentage of average air quality days in 338 cities from 2016 to 2020 (%)..

Table 1. shows that in 2020, the average concentration of $PM_{2.5}$, PM_{10}, SO_2 and NO_2 is 32.6μg/m$_3$, 55.9μg/m$_3$, 10.1μg/m$_3$ and 24.3μg/m$_3$, respectively, in 338 cities at or above the prefecture level. Compared with 2016, there are different degrees of decline. However, O_3 daily maximum 8-hour average 90th percentile concentration averaged 120.1μg/m$_3$, an increase of 3.1% compared to 2016.Therefore, there are prominent problems in O_3 treatment.

Table 1: Average concentration of major pollutants in338 cities from 2016 to 2020.

Year	$PM_{2.5}$ (μg/m^3)	PM_{10} (μg/m^3)	SO_2 (μg/m^3)	NO_2 (μg/m^3)	O_3 (μg/m^3)
2016	46.8	82.4	22.3	30.2	116.9
2017	44.1	78.9	18.4	30.9	126.9
2018	39.5	71.8	14.4	29.2	130.1
2019	36.3	63.8	11.3	27.1	123.9
2020	32.6	55.9	10.1	24.3	120.1

3.2 The Air Pollution Control Situation in Beijing-Tianjin-Hebei and Its Surrounding "2+26" Cities Is Not Optimistic

3.2.1 The Average Number of Days with Good Air Quality in "2+26" Cities in Beijing-Tianjin-Hebei and Surrounding Areas Was Fewer from 2016 to 2020

Statistics show that, the average number of days with good air quality in "2+26" cities in the Beijing-Tianjin-Hebei region and surrounding areas was 63.5%in 2020, an increase of 10.4% year on year and That was an increase of 6.3% compared with 2016, and air quality continued to improve.

Figure 1. shows that the "less than 50%" proportion of "2+26" cities in Beijing-Tianjin-Hebei and its surrounding areas has the highest value of 42.6% in 2019, and the "80%~100%" proportion of cities has the highest value of 9.2%. In 2020, the proportion of "22%" and "24%" respectively. In 2020, the average air quality in the "2+26" cities in the Beijing-Tianjin-Hebei region and its surrounding areas will reach a record high. It can be seen from Figure 2 that the change of average air quality in "2+26" cities in Beijing-Tianjin-Hebei and surrounding areas mainly depends on the fluctuating changes of "less than 50%" and "between 80% and 100%". Only 25 percent of the cities had good days on more than 80 percent of the days, while only 25 percent had good weather, reflecting the severe air pollution in the "2+26" cities in the Beijing-Tianjin-Hebei region and surrounding areas.

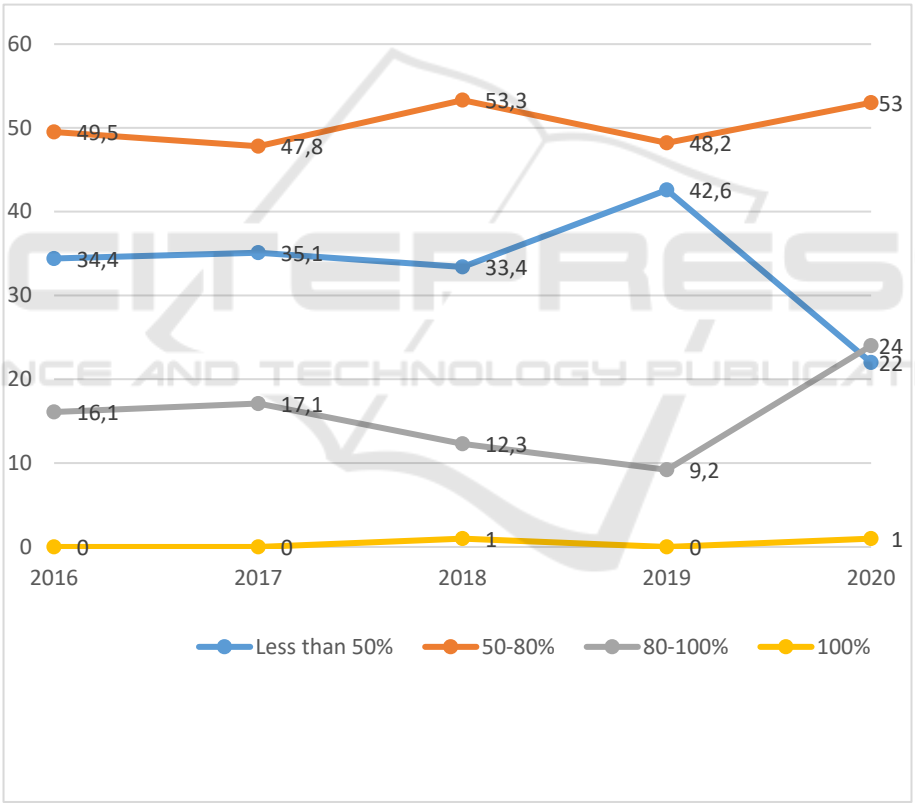

Figure 2: Percentage of average days of “2+26”urban air quality in Beijing-Tianjin-Hebei region from 2016 to 2020

3.2.2 Emission Status of Major Air Pollutantsin "2+26" Cities in Beijing-Tianjin-Hebei and Surrounding Areas

By comparing Fig. 3 with Fig. 4, it can be found that, firstly, the average concentration of major air pollutants in 338 cities decreased by 144%, SO_2, and O_3 increased by 2.6%. Second, the largest decrease in the average concentration of major air pollutants in Beijing-Tianjin-Hebei and surrounding "2+26" cities was SO_2, which decreased by 121%, while O_3 increased by 2.7 percent. Finally, on the whole, the average concentration of major air pollutants in Beijing-Tianjin-Hebei and surrounding "2+26" cities

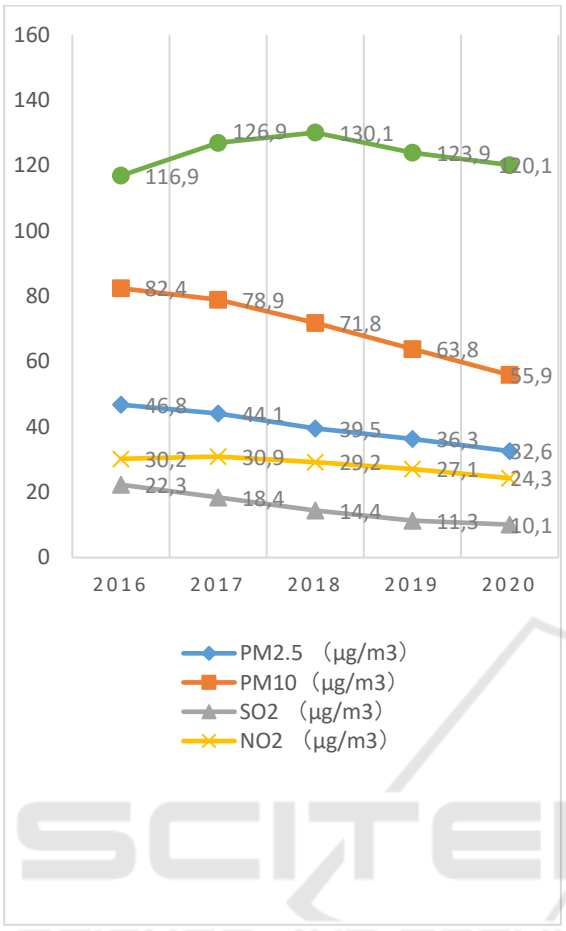

Figure 3: Average concentration of major pollutants in 338 cities from 2016 to 2020

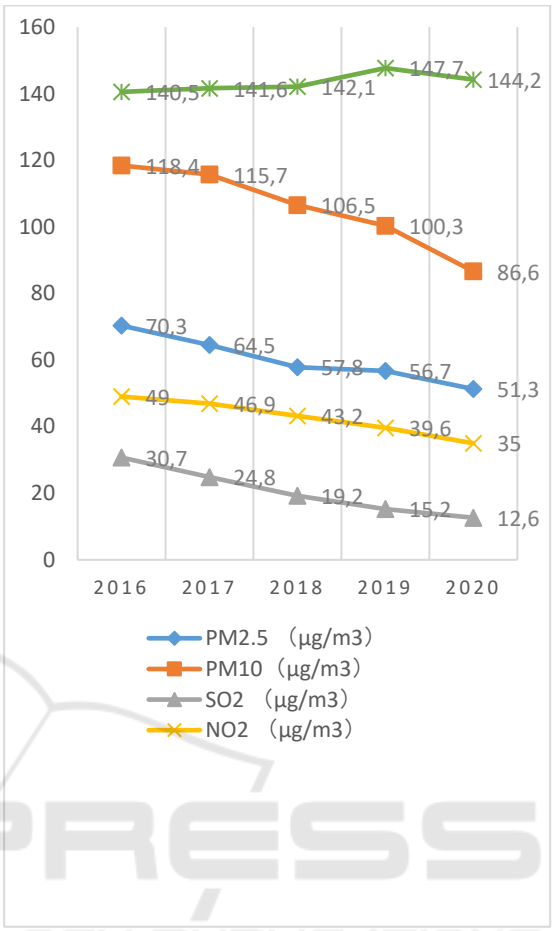

Figure 4: Average concentration of major pollutants in “2+26”cities of Beijing-Tianjin-Hebei region from 2016 to 2020.

was higher than the average level of 338 cities, and the average decrease rate of major air pollutants was lower than that of 338 cities.

It is worth noting that the average concentration of O_3, a major air pollutant, dropped in 338 cities after reaching a high value in 2018, while the cities in the Beijing-Tianjin-Hebei region and surrounding areas peaked in 2019 in the"2+26"region. This change should be closely related to the implementation of “the Beijing-Tianjin-Hebei Action Plan”.

3.3 Factors of O_3 Pollution Control in "2+26" Cities in Beijing-Tianjin-Hebei and Surrounding Areas

The generation of ozone is mainly affected by the synergistic effects of its precursors VOCs and NOx emissions. However, different regions in China are sensitive to different levels of ozone precursors, so it is necessary to carry out regional prevention and control of ozone pollution areas (Zhang, 2021). The concentration of "2+26" O_3 in Beijing-Tianjin-Hebei and its surrounding areas showed a trend of high in the south and low in the north. The geographical location difference and its distance had a great influence on the uniformity distribution of ozone concentration in different cities (Yao, 2020). The "2+26" cities in the Beijing-Tianjin-Hebei region and its surrounding areas are the transport channels for air pollution in the region, with the most severe air pollution. Geographic location, meteorological conditions, industrial structure, energy consumption and emission reduction policies are the most important factors affecting the air quality change of "2+26" cities in Beijing-Tianjin-Hebei region and its surrounding areas from 2016 to 2020.

4 CONCLUSION

The study shows that O_3 is the most prominent and typical pollutant in "2+26" urban air in Beijing-Tianjin-Hebei and its surrounding areas. O_3 emission control will become the core task of pollution control in the future. On the one hand, ozone generation mechanism, distribution characteristics and influence factors should be analyzed and identified from their own laws, identification and understanding of O_3 risk areas, influence factors, influence characteristics and control effects, to further alleviate urban air pollution is of vital importance (Zhao, 2021).The spatiotemporal distribution characteristics and influencing factors of urban air pollution are mainly studied from a single pollutant or a single perspective, while the overall understanding of urban air pollution is a complex and dynamic ecosystem combining human and nature. On the other hand, we will continue to promote air pollution prevention and reduction measures and efforts, and give full play to the most important role of good policies in ensuring the continuous improvement of air quality in "2+26" cities in Beijing-Tianjin-Hebei and its surrounding areas (Li, 2021). We will uphold the belief that man and nature are a community of life, and improve a multi-faceted air pollution control system with the government playing the leading role, the market playing the main role and the public participating.

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REFERENCES

Li H., Wang S.L., Zhang W.J., Wang H., Wang H., Wang S.B., Li H.S. (2021) Characteristics and influencing factors of "2+26" urban air quality in Beijing-Tianjin-Hebei and surrounding areas [J]. Research of Environmental Sciences,34(01):172-184.

Li. Y., Tang W., Du J.H, Zhang Z.Z., Du X.H., Xue Z.G., Meng F., Chai F.H., (2021) Effect evaluation of air pollution control measures in autumn and winter in Beijing-Tianjin-Hebei and its surrounding "2+26" cities, https://doi.org/10.19674/j.cnki.issn1000-6923.20210608.009.

The State Council of China, (2018) Guidelines on Comprehensively Strengthening Ecological and Environmental Protection and Firstly Fighting the Battle of Pollution Prevention and Control, http://www.xinhuanet.com/politics/2018-06/24/c_1123028598.htm.

The State Council of China, (2018) A three-year action plan to win the battle to protect our blue skies, http://www.gov.cn/zhengce/content/2018-07/03/content_5303158.htm.

The Ministry of Ecology and Environmental Protection, (2018) 2018-2019 Autumn and Winter Comprehensive Air Pollution Control Action Plan for Beijing, Tianjin, Hebei and its Neighboring Areas, which clarified the specific implementation scope.Beijing-tianjin-hebei and around 2 + 26 cities, including Beijing, tianjin, shijiazhuang, hebei province, tangshan, langfang, baoding, cangzhou, hengshui, xingtai, handan city, Shanxi Province, taiyuan, yangquan, changzhi, jincheng, jinan, zibo, jining, Texas, liaocheng in shandong province, binzhou, heze city, henan province zhengzhou, kaifeng, anyang, hebi, xinxiang, jiaozuo, puyang city.

The Ministry of Ecology and Environmental Protection, (2020) National Urban Air Quality Report, http://www.mee.gov.cn/hjzl/dqhj/cskqzlzkyb/.

Xi J.P, (2017) Decisive Victory in Building a Moderately Prosperous Society in All Respects and Achieving the Great Victory of Socialism with Chinese Characteristics for a New Era: Report to the 19th National Congress of the Communist Party of China.

Yao Q., Ma Z.Q., Hao T.Y., Fan W.Y, Yang X., Tang Y.X, Cai Z.Y, Han S.Q., (2021) Spatiotemporal distribution of ozone and estimation of background concentration in Beijing-Tianjin-Hebei region. https://doi.org/10.19674/j.cnki.issn1000-6923.20210706.007.

Zhang H.Y., Wang Y., Lu Y.L., Wang Y.W., Yu C., Wang. J.X, Cao D., Jiang H.Q., (2021), Identification of ozone pollution control zones and control types in China. https://doi.org/10.19674/j.cnki.issn1000-6923.20210630.001.

Zhao X.L. (2021) Spatial and temporal distribution. characteristics and influencing factors of typical air pollutants in Chinese cities [D]. University of Science and Technology of China, p. 1.