Investigating the Factors Affecting the Occurrence of Clean Air Days in Tehran

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Extended Abstract

1-Introduction

Regarding the importance of the air, it needs to be mentioned that a human being is able to survive some days without food and water yet some seconds without air; thus, the quality of the air we breathe plays an important role in human health which affects all of his activities. In order to inform people of air quality daily and continuously, the Air Quality Index (AQI) is used; this is used to predict daily air quality and helps the society to comprehend the meaning of the effect of local air quality on health. The index classified into six groups indicates whether the air is clean or polluted as well as its relevance to human health.

2-Theoretical Framework

Natural and human factors are the most effective factors in Tehran's air pollution; natural-climatic factors, such as wind and rain, may improve air quality and make it clean. The most important sources of pollution in Tehran are movable resources, or automobiles, whose reduction of activity on holidays could be a reason for air clarity. Regarding the importance of enjoying clean air and its role in regional planning of sensitive tasks prone to contamination, this study surveys the event daily, monthly, and yearly to identify the causes of the occurrence of the days with clean air quality and pave the way to predict the event. Owing to the abundance of the occurrence of polluted days and its harmful damage on all aspects of human lives as well as the environment, most studies related to Tehran air pollution come in different titles. Nevertheless, the reasons for the occurrence of the days with clean air have not been studied so as to predict the occurrence.

3- Methodology

Daily data related to air quality index were obtained from Tehran Air Quality Control Company as well as the climatic data related to downpour, wind direction, and the speed of Meteorological Organization in a 16-year period whose indicator value was between 0 to 50; these days were separated and selected as days with clean air. Thus, monthly and yearly distribution of days with clean air was extracted. The factors were selected and coded based on three factors of holidays, wind direction and speed, and downpour.

Code 1: if wind speed is more than 10 meter/second (m/s)

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Code 2: if wind direction is the West and Northwest
Code 3: if downpour happened the same day (a day with clean air)
Code 4: if there is no downpour the same day yet it happened a day before
Code 5: if there is downpour the same day yet no downpour happened the previous day
Code 6: no downpour happened the same day or the previous one
Code 7: if downpour happened both the same day and the previous one
Code 8: if wind speed was more than 15 m/s the previous day and its direction is from the West or Northwest
Code 9: if the same day is a holiday
Code 10: if the previous day was a holiday
Code 11: if both the same day and the previous one were holidays
Code 12: if neither the same day nor the previous one were holidays
Code 13: if the day with clean air or the previous day was a holiday

After extracting 13 features according to wind, downpour, and holidays, the data were ready to enter the analysis stage; they were divided into two groups of individual data, i.e., wind, downpour, and holidays each presented separately, and combined data, i.e., wind and rain, wind and holidays, rain and wind and holidays, and rain and holidays, so that the effective factors on the event of clean air could be recognized in the order of priority and the possibility to predict a day with clean air in Tehran was determined.

4-Results and Discussions

Natural factors, downpour and wind, as well as human factors are taken as the reasons for the event of clean air. Automobiles are the most important sources of pollution, which constantly transfer pollutants inside the atmosphere every day. Hence, it could be claimed that dominant specific synoptic modes determine air clarity. Studying the days with clean air reveals the fact that wind and rain are effective in improving air quality, however, they are unable to change the conditions into the clean air and there is a possibility for other factors with more influence. Due to severe pollution of the city, one factor cannot merely eradicate massive amount of pollution and lead the air to reach the standard of clean air index. Studying the air quality of the days with clean air shows that a mixture of factors was able to aid cleaning the air.

5-Conclusions and Suggestions

The annual distribution of abundance of the days with clean air shows that the maximum number belongs to 2006 with 36 days while the minimum number goes back to 2000 with 1 day. Monthly distribution shows the maximum abundance in April with the most official and non-official holidays, after which are the months with maximum atmospheric instability. All features of the days with clean air are presented in an algorithm based on three factors of downpour, wind direction, and speed as well as holidays, which are divided into 13 codes; the results showed that in 52% of the cases with clean air and 22% of the cases with a one-day delay, downpour could be effective in air clarity; wind speed in 41.5% of the cases was
more than 10 m/s and its direction in 72% of the cases were the West and Northwest; the days with clean air in 53% of the cases happened in holidays while in another 51% it happened when the previous day was a holiday and clarity happened with one day delay. Compared to two other factors, in 72% of the cases the days with clean air happened when the day, itself, or the day before was a holiday. The event of the day with clean air in a number of cases depended on one factor or multiple factors, simultaneously. The results showed that the factor of holiday, among other individual ones, was the primary one with the highest percentage. The factor of a holiday with downpour, among other combined factors, won the biggest percentage. Eventually, based on individual and combined factors, it could be concluded that the most important factor in the event of the days with clean air is the factor of holiday in spite of the common belief naming wind and downpour as the most highlighted ones.

**Key words:** Clean air, Climatic factors, Holidays.

**References (In Persian)**


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