



The Effect of Particulate Matter on Lung Diseases in People Living in Different Air Quality Index Ratios: A Retrospective Study

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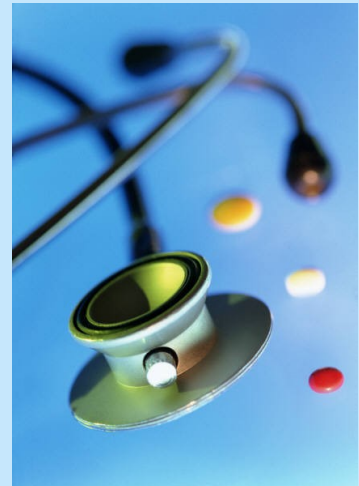
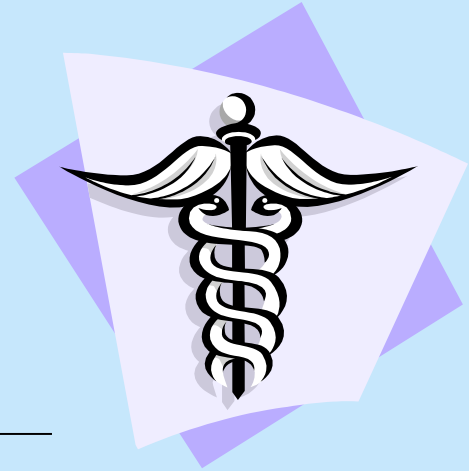
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**WHY ARE
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**WHY ARE
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- Air pollution is when foreign substances in the air reach a level of quantity and density that adversely affects living health.
- Air pollution occurs when substances such as sulfur dioxide, nitrogen oxides and nitrogen dioxide, particulate matter (PM10 and PM2.5), benzene, carbon monoxide and ozone exceed a certain limit. Therefore, these items are measured continuously.

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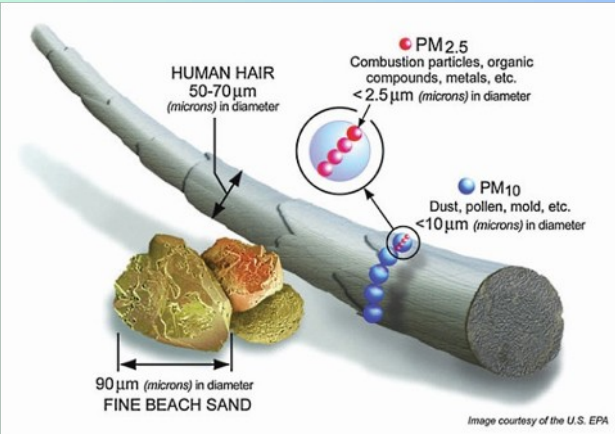
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WHY ARE THEY MORE DANGEROUS?

NEGATIVE EFFECTS ON HEALTH

- Particulate Matter, one of the substances that cause air pollution, briefly PM; they are not visible particles such as dust, dirt, soot or smoke, but rather invisible particles that are small enough to be detected using an electron microscope.
- Particulate matter is a mixture of solid particles and liquid droplets suspended in the atmosphere and consists of acids (such as sulfate, nitrate), organic chemicals, metals, soil or dust particles, bacteria, mold, fungi, salts resulting from the evaporation of sea water, and allergenic pollens.
- PM has two different value ranges and they are expressed as PM 10 and PM 2,5.

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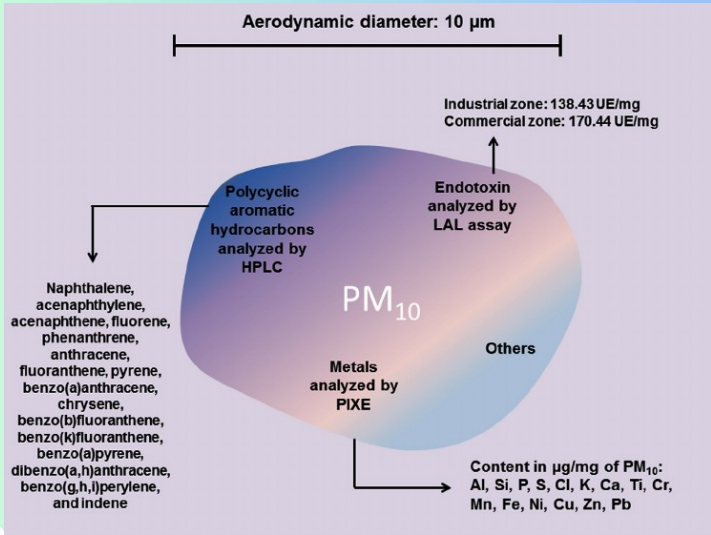
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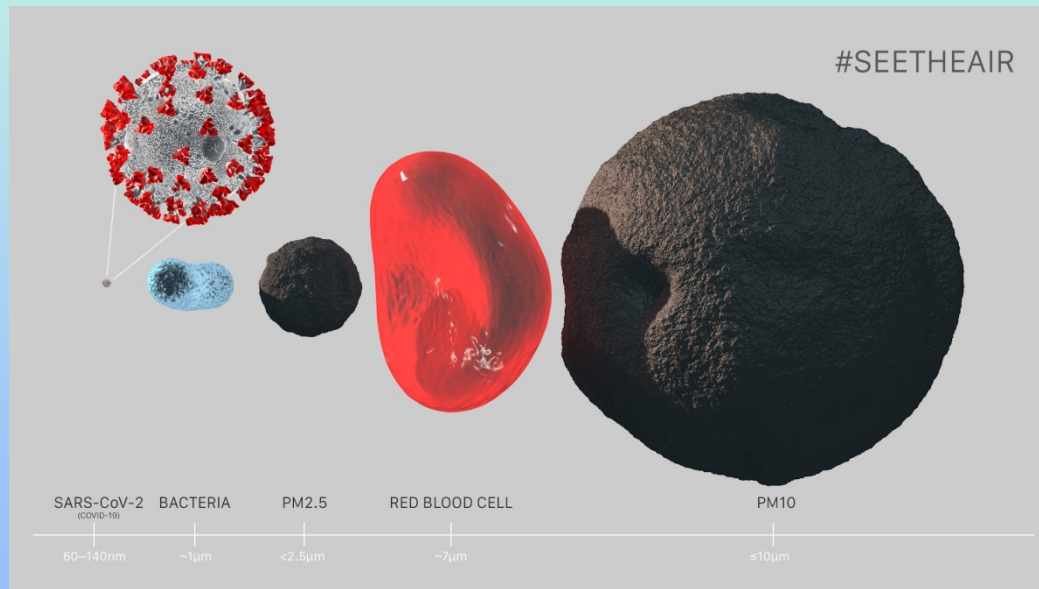


PM 2,5

WHY ARE THEY MORE DANGEROUS?

NEGATIVE EFFECTS ON HEALTH

- PM 10 expression, i.e. coarse particles, is generally used for respirable particles with an aerodynamic diameter between 2.5-10 micrometers.



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- The term fine particles, or particulate matter 2,5 (PM_{2.5}), refers to tiny particles or droplets in the air that are 2,5 microns or less in width. The largest PM 2,5 particles are about 30 times smaller than a human hair.
- Therefore, PM2.5 particles are very smaller than PM10.

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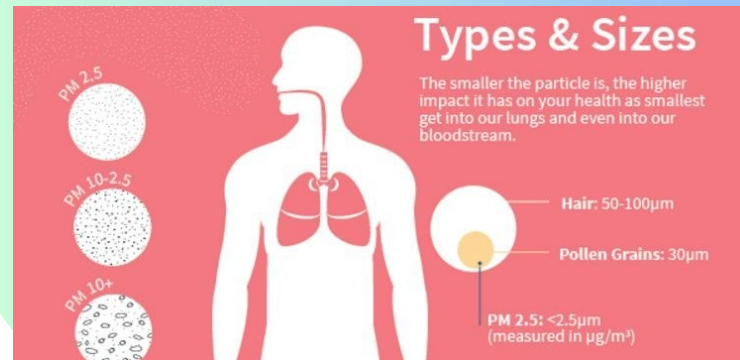
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- The size of the particles has a direct relationship to the potential harm they can cause to health.
- Particles smaller than 10 micrometers in diameter pose the biggest problems because they can penetrate deeply into the alveoli in the lungs and sometimes pass more easily into the bloodstream this way.
- Since fine particles are light and small, they have a high tendency to remain in the air, and this increases the possibility of living things breathing in these particles.
- Fine particles can cause more toxic effects on the cardiopulmonary system because they reach a large surface area.

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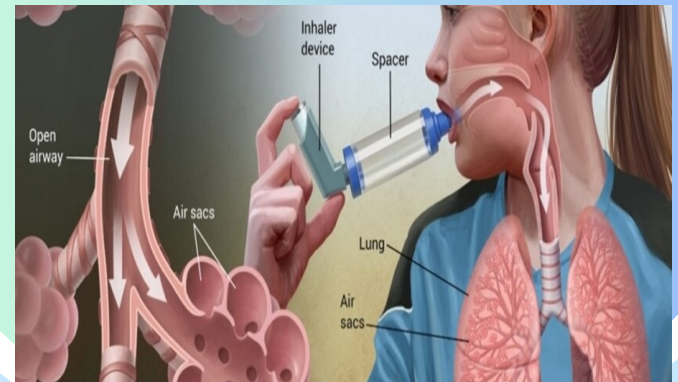
**PARTICULATE
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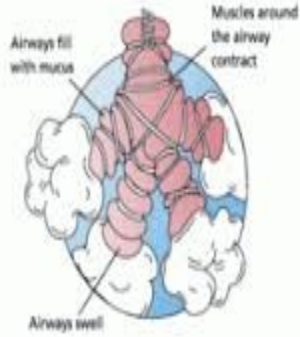
**WHY ARE
THEY MORE
DANGEROUS?**



Before an Asthma Episode



After an Asthma Episode



They can cause respiratory system diseases such as

- Aggravated asthma
- COPD
- Decreased lung function
- Bronchitis
- Irritation to the respiratory tract
- Cough
- Increased respiratory symptoms such as difficulty breathing,

They can also cause cardiovascular problems such as

- Tachycardia
- Arrhythmia
- Cardiovascular problems such as non-fatal heart attack



METHODS

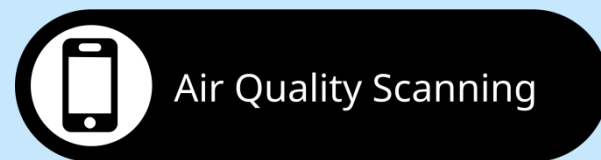
- 1-year air quality data
- asthma and COPD
- Bezmialem Vakıf University Faculty of Medicine Hospital Chest Diseases Polyclinic
- 2023

- Aksaray
- Alibeyköy
- Bağcılar
- Esenler
- Yenibosna

- $p < 0.05$
- correlation coefficient was taken as 0.308 for 80% power at 95% confidence level
- 150 patients

150 PEOPLE

- In our study, 1-year air quality data of Istanbul Metropolitan Municipality have been used and patients diagnosed with asthma and COPD who applied to Bezmialem Vakıf University Faculty of Medicine Hospital Chest Diseases Polyclinic in 2023 have been included in our study.
- Access to the data will be provided from the website havakalitesi.ibb.gov.tr.



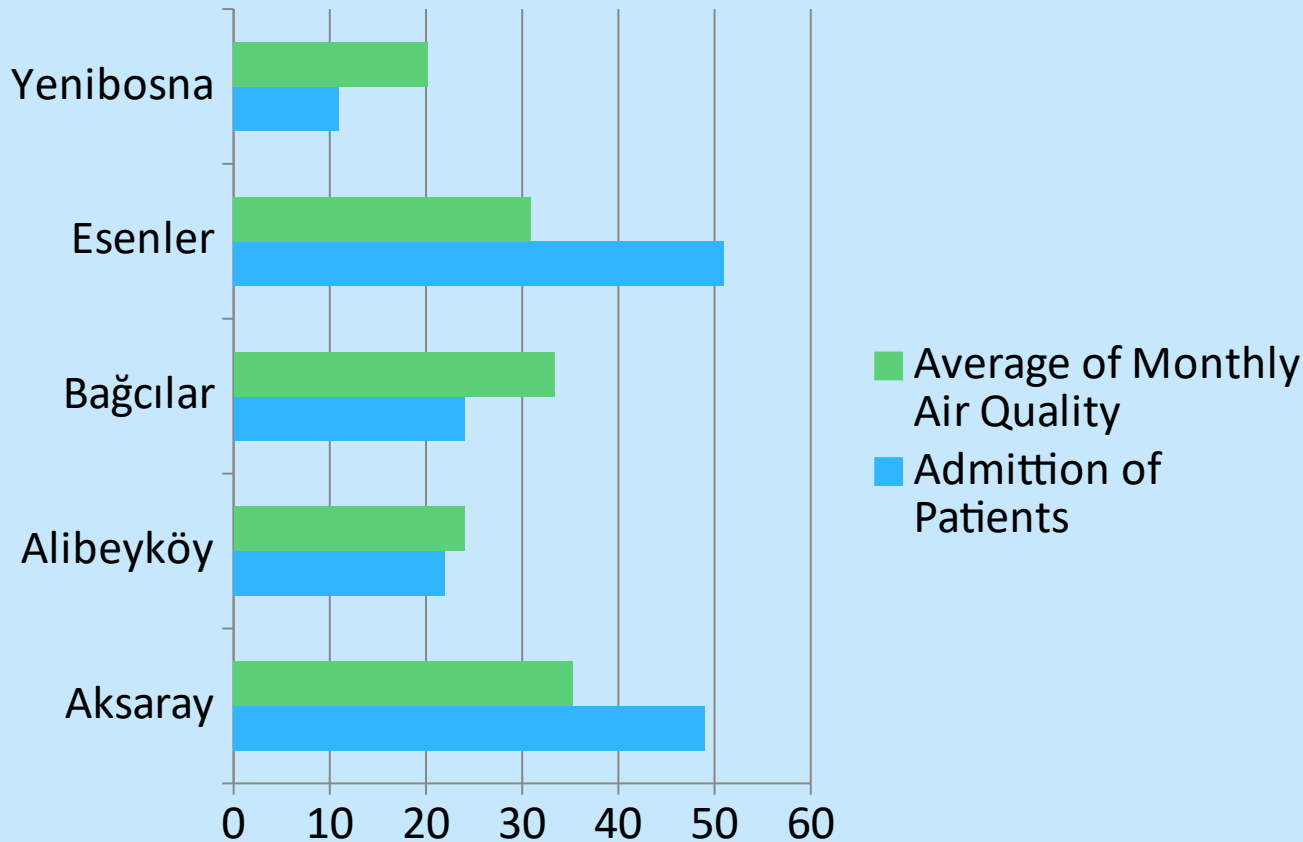
- Our study based on patients residing in 5 air quality measurement stations around our hospital in Istanbul (Aksaray, Alibeyköy, Bağcılar, Esenler and Yenibosna) and surrounding districts and applying to our hospital, and the air quality report will be examined according to where they live. As a result of the comparison of air quality levels, the effect of these values on diseases will be evaluated based on the number of patients admitted.
- We chose 5 different districts that have measurement stations so that we can make measurements. When choosing the districts, we chose living areas close to our hospital where patients can easily apply. We evaluated the number of applications from asthma and COPD patients residing in these 5 districts.



- The minimum sample number to be used for our study was calculated as 150 when the correlation coefficient was taken as 0.308 for 80% power at 95% confidence level with reference to previous studies. Statistical significance level will be taken as $p < 0.05$.
- Based on statistical data, 150 patients included in the study.

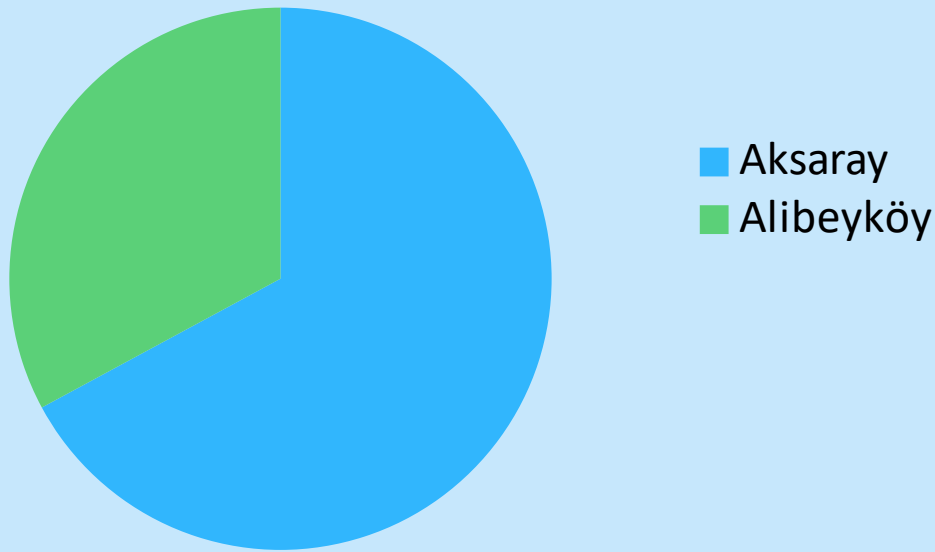
RESULTS

We involved patients with asthma and COPD (chronic obstructive pulmonary disease). In 2023, 49 patients from Aksaray, 22 patients from Alibeyköy, 24 patients from Bağcılar, 51 patients from Esenler and 11 patients from Yenibosna applied our hospital. We evaluated the air quality before the application day by day according to the application date and reached a monthly average result.



We compared the difference between the air quality average values of 5 different districts and the number of applications from those districts.

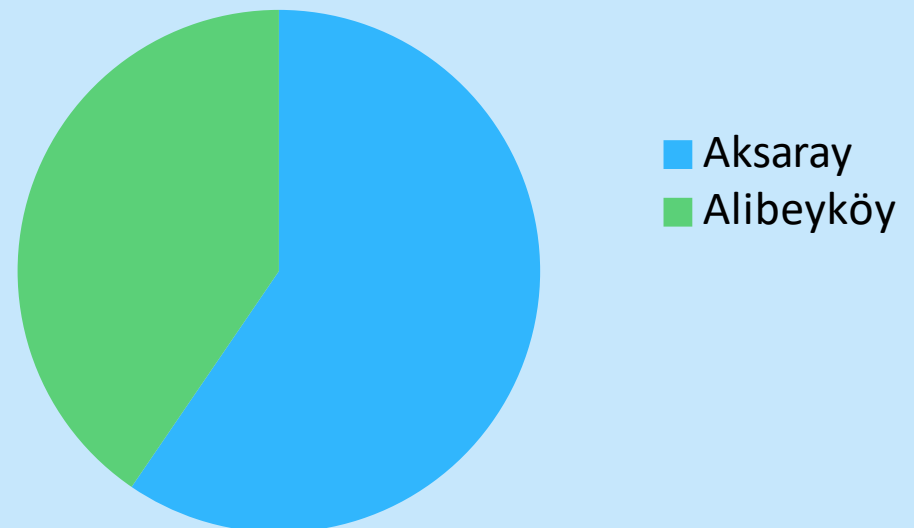
Aksaray-Alibeyköy Admission of Patients



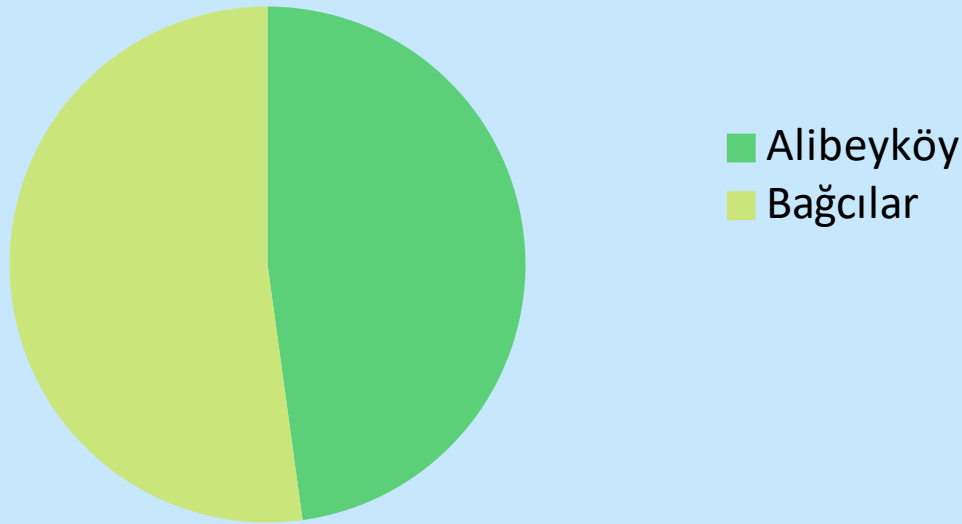
As a result of the comparison, the difference between these two districts was found to be significant ($p = 0.00001$). The number of applications in Aksaray is higher than that in Alibeyköy. (49-22)

At the same time, the average air quality value in Aksaray is higher than that in Alibeyköy. There is a correlation between these values. (35,3-24)

Aksaray-Alibeyköy Average of Air Quality



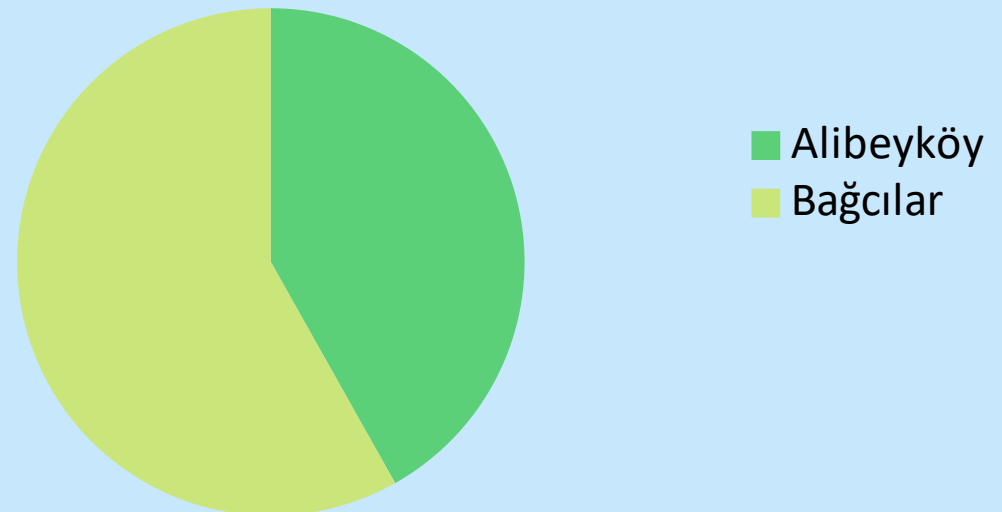
Alibeyköy-Bağcılar Admission of Patients



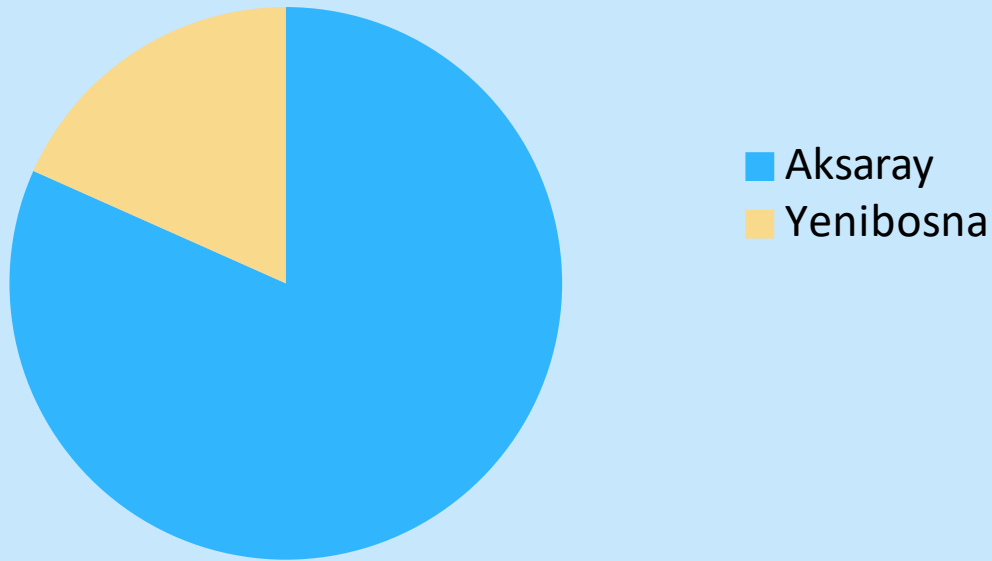
The difference between the application numbers of these two districts was also found to be significant ($p = 0.002$). (22-24)

Alibeyköy-Bağcılar Average of Air Quality

The air quality value of Bağcılar is higher than that of Alibeyköy. There is a correlation between these values. (33,35-24)



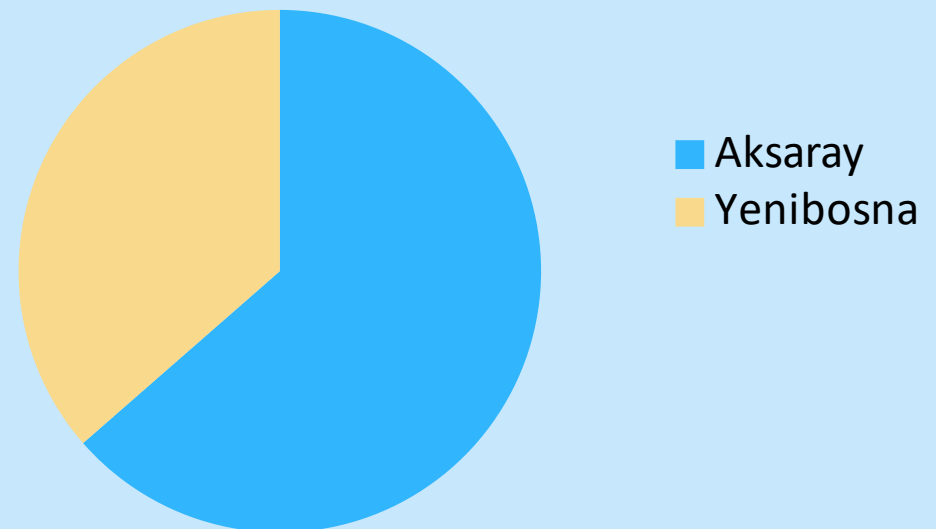
Aksaray-Yenibosna Admission of Patients

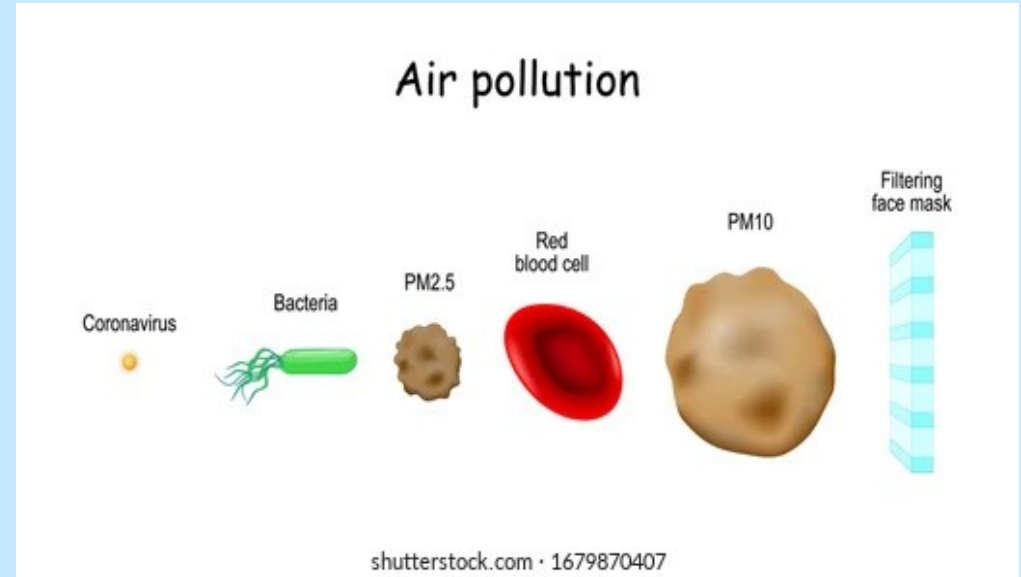
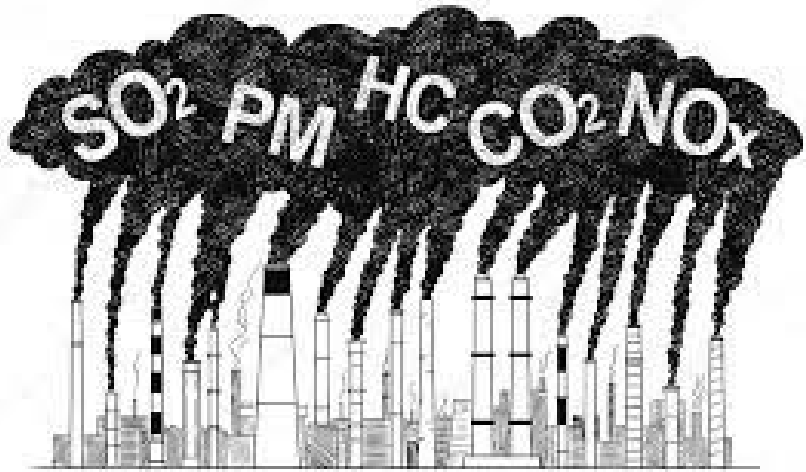


The difference between the application numbers of these two districts was also found to be significant ($p = 0.006$). (49-11)

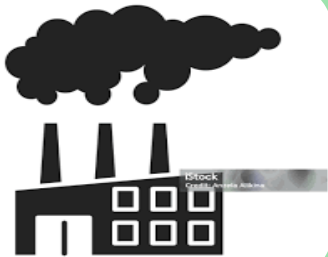
The air quality value of Aksaray is higher than that of Yenibosna. There is a correlation between these values. (35,3-20,2333)

Aksaray-Yenibosna Average of Air Quality





No significant correlation was found between smoking and the disease. I believe that the number of people is not sufficient for this data.



Although the regions are close to each other, it seems that the difference in air quality affects the disease.

CONCLUSION

- Considering the significant results we obtained ($p < 0.05$), there is a correlation between the increase in air pollution based on PM10 and the increase in the number of applications.
- Therefore, the air quality affected by PM values affects asthma and COPD patients. I think that the reason why other results were not significant was due to the insufficient number of samples, but as a result, we achieved the meaningful result that we predicted and targeted at the beginning of the study.

KEY WORDS

Asthma, COPD, particulate matter, air quality, air pollution.

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THANK YOU FOR LISTENING

ANY QUESTIONS?