**INTRODUCTION**

- Overall in the United States, 82 million people live in counties with air quality concentrations above the National Ambient Air Quality Standards (NAAQS). Additionally, despite a decade long decreasing trend, there has been a 5.5% increase in air pollution levels since 2016.
- Many people who study air pollution’s effect on health focus on pulmonary disease processes, especially asthma, as their link is well documented; however, there currently is a gap in data and research on air pollution’s effects on the eye.
- The cornea of the eyes, like the epithelium of the lungs, is a mucous membrane exposed to air and its pollutants, and our team was interested to determine if an underlying link between levels of air pollution and corneal diseases existed.
- Only a few studies have been conducted and mainly involved heavily polluted cities such as Seoul, Taipei, and Sao Paulo, which did find some linkage.
- We decided to conduct a similar analysis of Detroit.

**METHODS**

- An initial literature review was conducted in order to determine which diseases of the cornea have previously been linked with elevated air pollution levels. The purpose of this was two-fold. First, we desired to know which diseases we should select when forming a patient list. Second, we wanted to know exactly what pollutants we should investigate.
- This review resulted in 14 diseases of interest, identified by ICD 10 code. A comprehensive list of all Kresge Eye Institute patients with these diagnoses who had appointments between 1-2-14 and 4-15-20 was compiled.
- Of this list the most recent 50 individuals were selected for preliminary investigation. Date of diagnosis, month of diagnosis, sex, race, past medical history for allergies, past medical history for pulmonary disease processes, especially asthma, as their link is well documented; however, there currently is a gap in data and research on air pollution’s effects on the eye.
- Air pollution data collection is ongoing. Based on literature review it was determined that ozone, PM 10, PM 2.5 SO\(_2\) and NO are the pollutants of interest. Yearly average values for each of the above compounds will be collected from the annual reports and publicly accessible raw data published by the Michigan Department of Environmental Quality: Air Quality Division.
- Once this data is collected pollution levels broken down by zip code will be compared with number of patients with corneal disease who live in each zip code.

**RESULTS**

- While there are early signs that clusters of corneal disease do exist in Detroit, the sample size is too small at this point to have definitive results. Preliminarily, zip codes 48202, 48234 and 48044 have three cases each.
- Early data analysis did provide useful information regarding modifications required in order to suggest a true association. 80% of all patients reviewed had a diagnosis of dry eye. Nearly 50% of these were secondary to some other ophthalmic condition, primarily either post-cataract surgery or as a side effect of timolol being taken for glaucoma.
- Additionally, 10% of patients had a diagnosis of keratoconus. While this has been linked with environmental exposure, the average age of onset is 15. It is therefore unlikely that individuals are still living in the same zip code as they were at the time of their diagnosis, making their zip code data irrelevant. These patients will all have to be excluded.

**CONCLUSION**

- At this point it is too early to conclusively state that the air pollution levels in Detroit are sufficiently elevated to lead to an increased incidence of corneal disease among residents.
- Due to the distribution of diseases seen, this study may be better served focusing specifically on dry eye moving forward, as that not only is the most commonly seen disease by far, but also has the most extensive evidence linking it with increased air pollutant levels.

**REFERENCES**