What is in the Air in Newington Green?

Investigating Local Sources of Air Pollution

Leila Perret — Environmental Research Group, Imperial College

1 Introduction

Air pollution is the single **largest environmental health risk** in Europe[1], causing thousands of deaths in the UK each year[2]. This project focuses on **$PM_{2.5}$**† and **NO_2**‡, small harmful particles, see *glossary.*

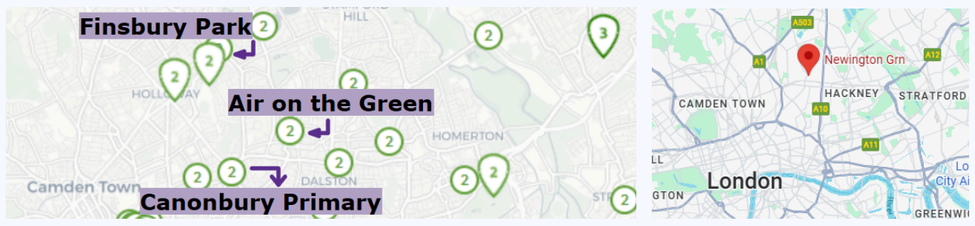

Fig. 1: Map of Breathe London nodes[1] and Newington Green[3]

Air on the Green is a community-run **node**§ in Newington Green. A local pollution source is being investigated, likely from charcoal-burning in restaurants - known contributors of harmful indoor **particulate matter air pollution**[4].

2 Methods

Air quality data from Newington Green and neighbouring nodes[5] and, meteorological (wind) data from London City Airport[6] were used with OpenAir[7] in R.

Fig. 2: Satellite map of node (red cross)[3]

Clean and scale data

Plot time variations

Plot bivariate polar plots (wind-direction graphs)

Analyse neighbouring nodes

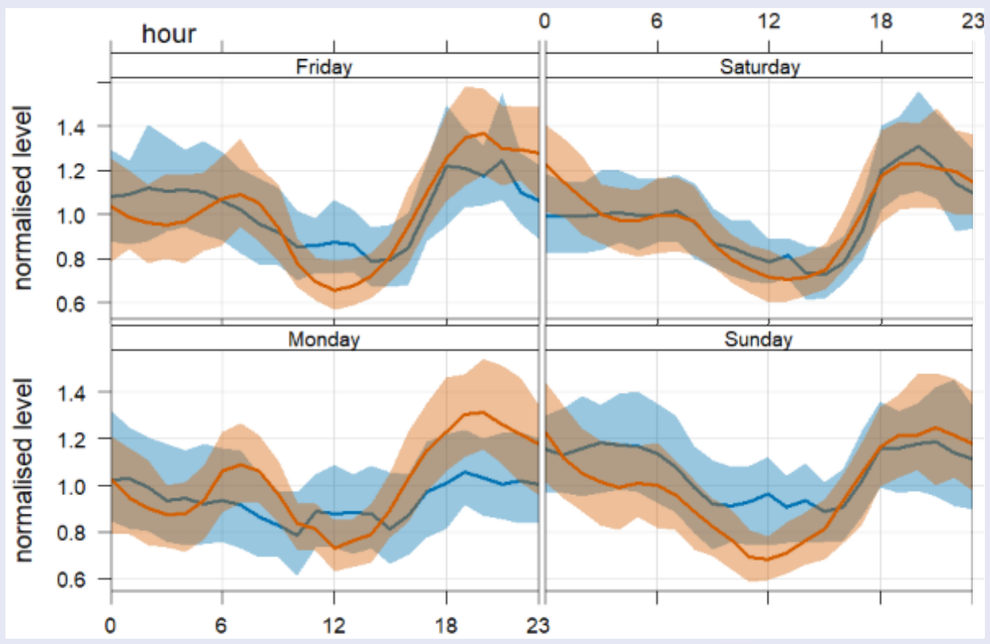

Fig. 3: Time variations - Fri to Mon (2024) NO_2 $PM_{2.5}$

3 Results

$PM_{2.5}$ peak times with low NO_2:

- Mon: 00-06, 10-13
- Fri: 00-06, 11-14
- Sat: 05-08, 11-14, 18-19
- Sun: 11-15, 18-22

Combining with wind data:

- Southwestern (SW) source
- Northwestern (NW) source
- Minor northeastern (NE)

4 Discussion

Restaurants are the likely source of pollution. Sources appear early morning, midday and evening. Early morning pattern was unclear and excluded from analysis - unlikely to be a constant source. Low wind speeds and regional analysis suggest **local origin**. Major peaks occur SW and NW, minor in NE, where restaurants are located. Peak strength varies by type - stronger near kebab shops in NW. Air pollution patterns match restaurants' busiest hours and days, lack of Friday evening peak is unusual.

5 Conclusion

The analysis identified three sources of pollution: major ones from SW and NW and a minor source from NE.

Although restaurants cannot be confirmed as the pollution source, peak pollution levels correspond with their busiest hours and days. The locality of the sources was confirmed by examining wind patterns and regional data.

Future analysis could remove seasonal weather effects and use additional emission maps. Reducing restaurant-related pollution is straightforward. Simple measures, like switching to induction hobs, could significantly improve air quality and protect the health of local residents.

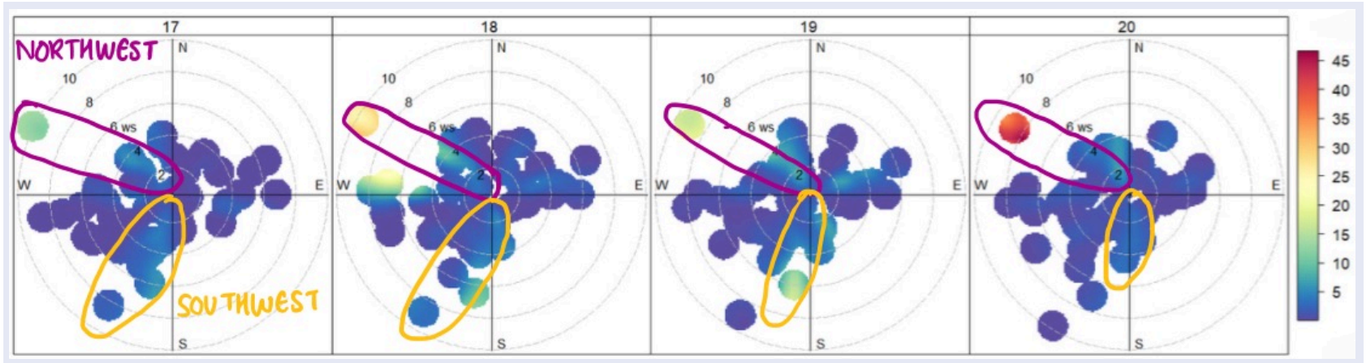

Fig. 4: Bivariate polar plots for Saturday evening (2024), sources identified NW and SW

6 Impact

Newington Green residents are constantly exposed to the effects of charcoal burning but the local council has not acted on complaints. Hopefully these findings will help to:

- **Raise awareness** of the effect of charcoal burning on public health
- Help residents **campaign more effectively** to their council
- **Set a precedent** for other communities who are similarly affected

7 Glossary

† **Particulate matter** size 2.5 microns, from e.g. cooking
‡ **Nitrogen dioxide -** mainly originates from road transport
§ **Air quality sensor** - measures pollutant concentration

Full references available via QR code

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Contacts
leilaperret@gmail.com
Leila Perret on LinkedIn
m.mead@imperial.ac.uk
timothy.baker@imperial.ac.uk
ergcomms@imperial.ac.uk

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