Supporting the development of programmes to improve air quality related health in Lambeth and Southwark

The Strategy Unit.

Populations at risk of air quality-related ill health and wellbeing:

Summary of multi-stage analysis for Lambeth & Southwark

30th October 2020

on behalf of Guys and St Thomas Charity

NHS
Midlands and Lancashire
Commissioning Support Unit

Project overview

Guy's and St Thomas' (GStT) are a charitable trust working alongside the equivalent NHS Foundation Trust and other public and third sector agencies to improve the health and wellbeing of people in and around the boroughs of Lambeth and Southwark in London.

One of the trust's long-term work programmes is centred on air quality and improving related health. There are three key groups identified for targeted interventions and support:

1. Children and infants
2. The older population
3. Those with existing heart and lung conditions

Our aim is to support the charity to move forward the focus of their work on air quality by:

1. Defining and quantifying the at-risk populations (including multiple risk) across the boroughs.
2. Identifying longer term and other associated outcomes that are measurable for these groups.

Phase 1

3. Describing the current health service utilisation patterns for these groups and how / where they differ.

Phase 2

4. Profiling the general, at risk and adverse outcome populations according to sociodemographic factors (segmentation).
5. Developing spatial explanatory models in respect of several key outcomes related to air quality and population characteristics of interest.

Phase 3

Brief description of methods

Phase 1:

Descriptive analysis of published datasets on air quality and socio-demographic characteristics. Extracts of routine healthcare data to identify residents that fall into each of the 3 groups of interest.

Phase 2:

Review of hospital records (inpatient and outpatient) to calculate utilisation rates for the areas and sub-groups of interest. Analysis of multiple diagnosis codes to assess nature and extent of co-morbidity. Linkage of hospital patient ID to mental health records to determine cross-morbidity.

Phase 3:

Collection of data at small-area level to build an explanatory model for several key health outcomes. Application of spatial regression technique (GWR) to demonstrate the effects of place on those outcomes and highlight areas where certain types of support may be most effective.

Use of ACORN population segmentation analysis to support communication and engagement activity with target groups.

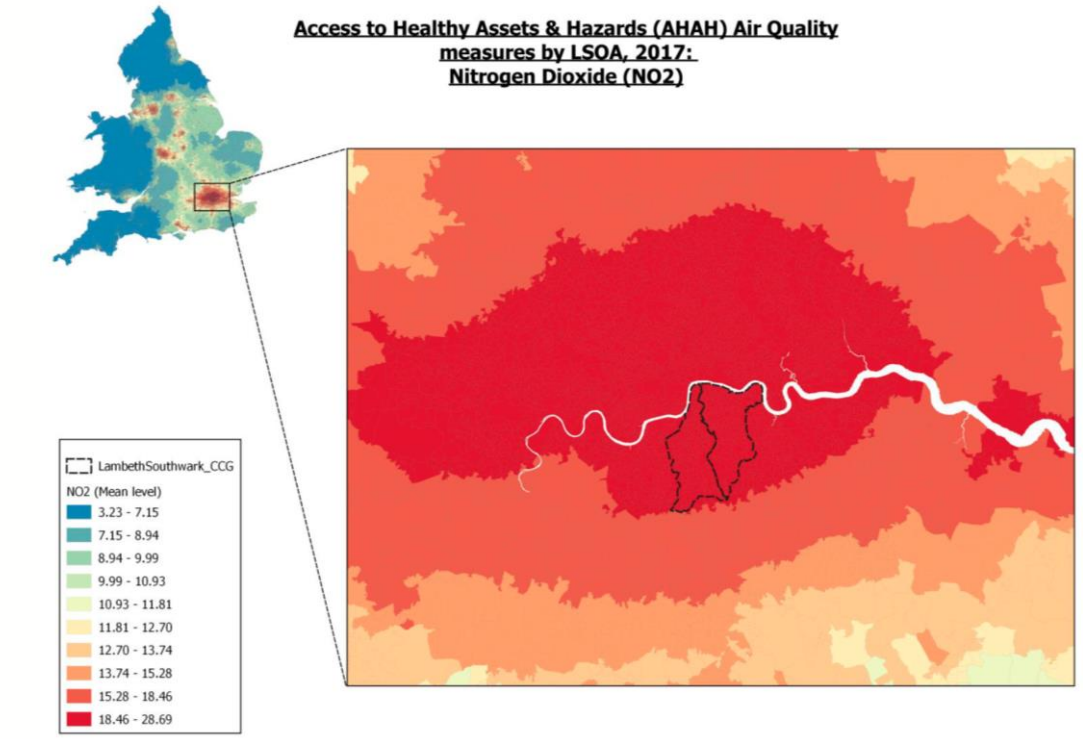
Phase 1 summary – population overview and air quality-related health

Air Quality

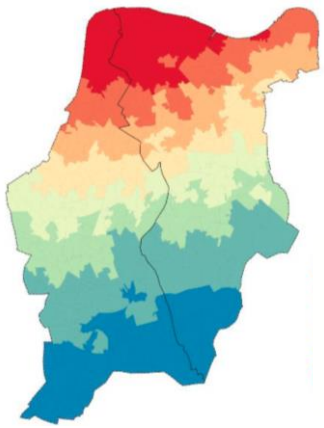
Compared to the rest of the UK, London suffers from high levels of air pollution (NO_2, PM_{10}, $PM_{2.5}$), with poor air quality across both Boroughs.

At a more local resolution, there is some variation in air quality with the north bordering the river Thames showing the highest concentrations.

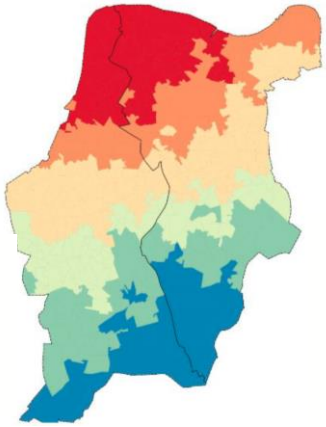
Though pollution levels are high, all three pollutants ($PM_{2.5}$, PM_{10}, NO_2) remain below the mean yearly concentration thresholds set by the World Health Organisation (2005). Due to the relative lack of variation in air pollution it is important to try and measure the combined impacts that other social and environmental factors have on air quality-related health.



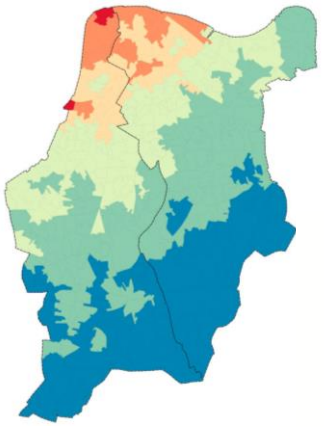
Nitrogen dioxide



Particulate matter (10)



Particulate matter (2.5)



Study Population

Three groups were initially identified by Guys and St Thomas as suffering or particularly vulnerable to the health effects of poor air quality:

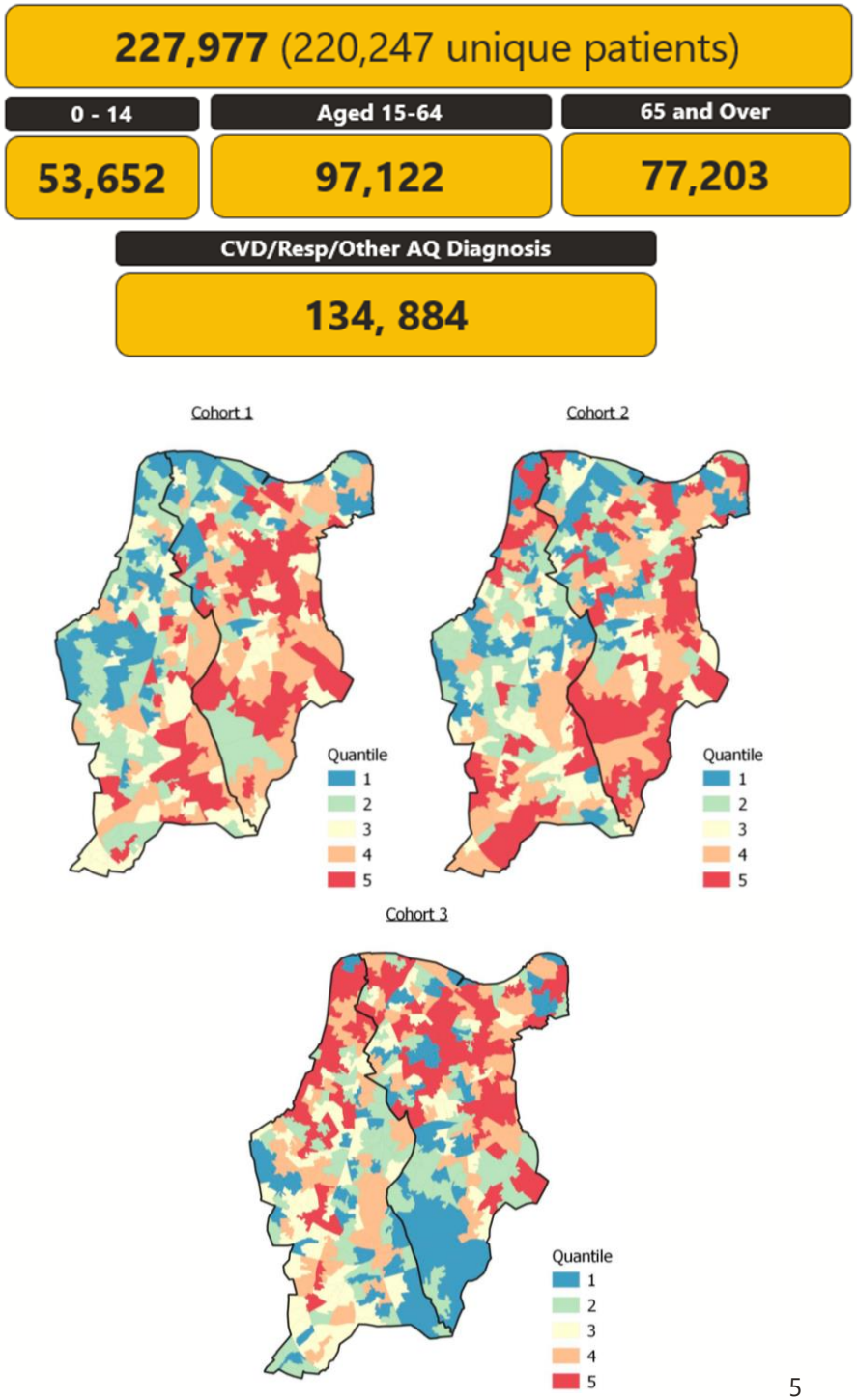
GROUP 1: Children (0-14)

GROUP 2: Older Adults (65+)

GROUP 3: People with Chronic Vascular Disease or Respiratory Disease

A further five conditions were added to GROUP 3 based on findings from a literature review: Type 2 Diabetes, Parkinson's Disease, Cystic Fibrosis, Lung Cancer and Eczema.

Based on any contact with hospital services over a 2-year period, the three groups of interest account for circa 220k (30%) of the Borough population being acutely affected by poor air quality.



Utilisation

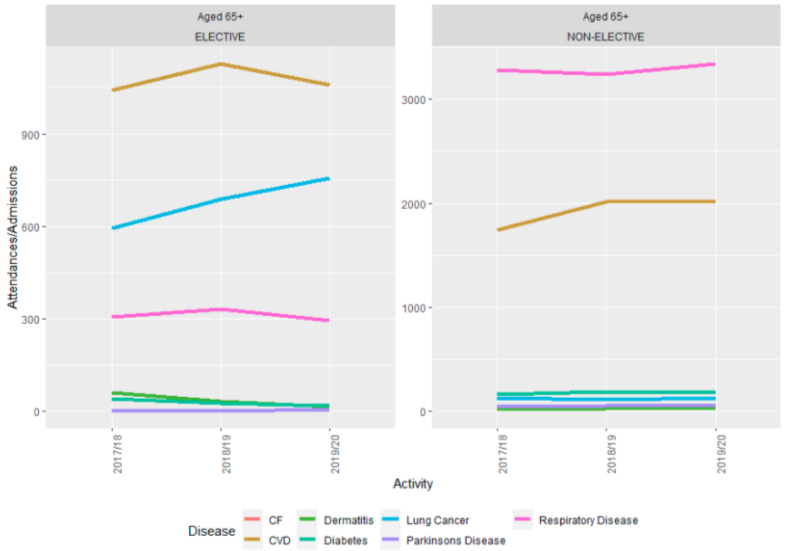
Outpatient activity shows an upward trend for CVD, Respiratory disease and Diabetes across all age groups.

Very little Inpatient and Outpatient activity was recorded against Cystic Fibrosis or Parkinson's Disease - this may be explained by planned admissions being coded under the specific complications arising from these diseases (as the primary diagnosis).

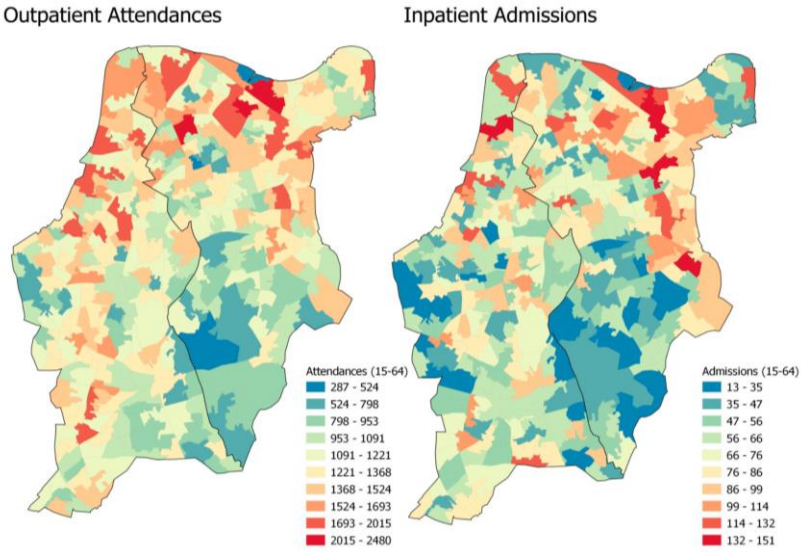
Predictably, there are very few cardiac admissions for children and comparatively high number of admissions for older adults. Respiratory admissions are also highest for older adults.

There are no clear geographical patterns following the north-south variation in air quality markers by age, but a superficial one for those with current health issues.

Elective and Non-Elective Admissions (65+ years)



Outpatient attendances and inpatient admissions, 17/18 to 19/20, age 15-64 with a respiratory or circulatory diagnosis



Phase 2 summary – descriptive analysis of interest groups and their healthcare utilisation

Geographically, in absolute terms more of the study cohorts live in Southwark than in Lambeth.

Ethnic diversity may be a factor in both air quality-related and general health across Lambeth & Southwark.

Each of these 3 cohorts present a complex picture of physical morbidity with Diabetes and digestive diseases common and dental health in children. Many will have **lifestyle issues** as well and air quality-related health may not be a top priority for them.

Co-occurring mental health needs were much greater for patients with respiratory and cardiovascular disease than in the other age-based cohorts.

Some areas in the North of England have similar socio-economic profiles but better air quality markers. They may be useful comparators for outcomes and assessment of programme changes over time.

Inpatient admissions are lower in Lambeth & Southwark for both respiratory and circulatory conditions than the comparator districts despite much worse air quality – are the London Boroughs better at managing admissions or are conditions at the milder end of the spectrum?

Cohort 3 (existing chronic conditions) geographic distribution seems to be markedly denser where there is poorer air quality.

Cohort 1 (0-14)

Key messages

Demographics	Co-morbidities	Health and care demands	Possible inequalities
• Geographically, the majority aged 0-14 live in Southwark • There are consistently more males than females in the 1-6 age bracket, but this evens out from age 7 onwards. • Black and Asian children account for 32% of the 0-14 cohort • Higher proportion of children accessing secondary care relative to the population, in the 2 most deprived deciles (1 and 2).	• 8% of the cohort had a mental health need, which was slightly higher for patients that have respiratory conditions (9%) • Common co-occuring conditions to respiratory health are dental decay, sickle-cell disease and kidney disease.	• Respiratory related illness accounts for 22% of A&E attendances for this cohort, 11% of admissions and 4% of Outpatient referrals to specialist respiratory teams. • Fewer attendances and admissions found amongst the comparison districts • Lambeth and Southwarks have higher rates of respiratory related A&E attendance and outpatient referrals	• Black and Asian children proportionally have the highest rates of Air Quality related disease • Proportion of children accessing secondary care increases disproportionally in the 2 most deprived areas • Deprivation also correlates strongly with ethnicity.

Cohort 2 (65+)

Key messages

Demographics	Co-morbidities	Health and care demands	Possible inequalities
• Geographically, the majority aged 65 and over live in Southwark • Similar picture to the 0-14 cohort although the contrast is smaller between the higher proportion of black patients in this cohort compared to white patients	• Over half of the cohort have a CVD related diagnosis • Digestive related conditions were also very common (43%) • Higher numbers of CVD/Respiratory Disease in more deprived areas	• Although Lambeth and Southwark had higher A&E utilisation for CVD and Respiratory than two of the comparator districts, **Sunderland had the highest number** • Yet proportionally, much more OPD referrals for respiratory compared to the other districts.	• IMD deciles 1-5 account for 80% of the study cohort, compared to 79% of the overall population. • Highest proportions of CVD amongst The Indian community

Cohort 3 (Air Quality Related illness)

Key messages

Demographics	Co-morbidities	Health and care demands	Possible inequalities
• Geographical distribution Highest proportion of patients in the North/North East where there is the poorest Air Quality and Most Deprivation • Unexplained spike in females age 20-30 in cohort – disproportionate to the population structure	• Chronic Kidney Disease, Malignant neoplasm of breast, and Sickle Cell Disorders are most common comorbidities within the cohort	• Lambeth and Southwark have the highest proportion of respiratory related referrals • Lower proportion of admissions compared to Northern comparators - does this mean patients are managed better earlier in the pathway?	• Majority of the cohort are from the most deprived areas in the two Boroughs • Black population and white population mark edly decreasing and increasing respectively as deprivation decreases

Phase 3 summary – Spatial analysis and population segmentation

For patients with acute circulatory disease:

Nitrogen dioxide levels have a detrimental effect on CVD acuity, significantly so around Southwark town.

Education, Skills and Training could improve/reduce CVD acuity particularly so in Walworth and Lambeth town.

Asthma prevalence is also a strong predictor of CVD acuity, most notably in Clapham town.

For patients with acute respiratory disease:

Crime rates may be exacerbating respiratory acuity, significantly so in Lambeth Town.

Co-occurring circulatory ill-health tends to lead to increased respiratory acuity and this relationship is strongest in the North East areas of Southwark.

For patients with other acute air quality related disease:

Having higher proportions of Pakistani and Bangladeshi residents seems to have a protective effect against air quality acuity around Clapham Town

An increase in air quality-related acuity is predicted with increasing CHD and decreasing mental health prevalence.

For patients with admissions for Sickle Cell disease:

Increasing educational attainment and improving access to good housing may reduce sickle cell admissions.

Circulatory disease in the underlying population also appears to have distinct influence on predicted sickle cell illness.

This colour = predictor
This colour = outcome

For people dying of circulatory disease:

The proportion of 71-80 year olds exacerbated the rate of circulatory mortality in a highly localised manner in western LSOA's.

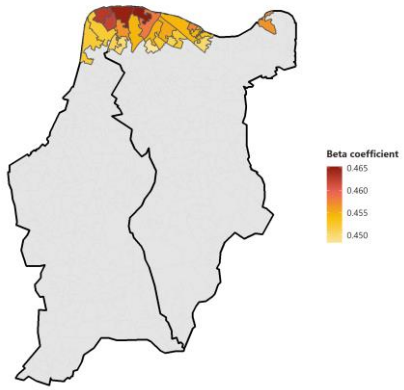
Similarly, the predicted rate of dementia significantly increased the circulatory mortality in and around Newington.

For people dying of respiratory disease:

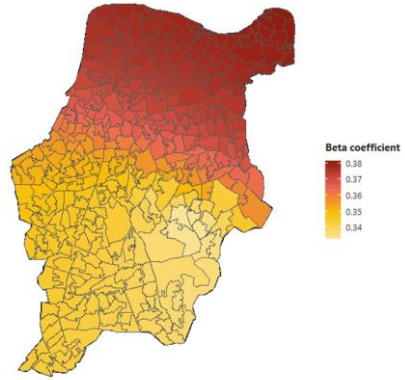
The estimated smoking population of an LSOA was a strong predictor of respiratory mortality across the boroughs but particularly in Southwark.

Similarly, COPD prevalence rates were seen to be drivers of respiratory mortality across all LSOA, and particularly in the norther half of the area.

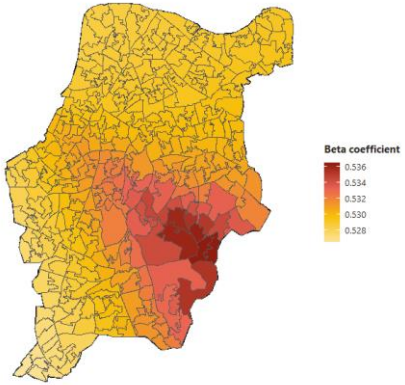
Nitrogen dioxide and Circulatory acuity



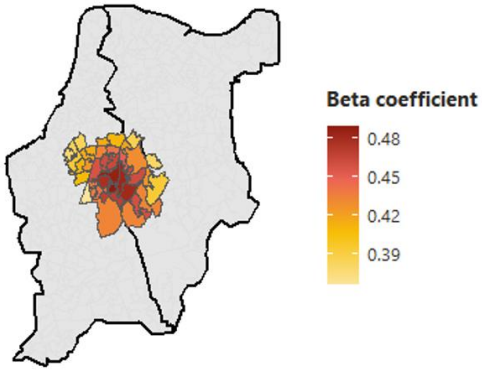
Circulatory acuity and Respiratory acuity



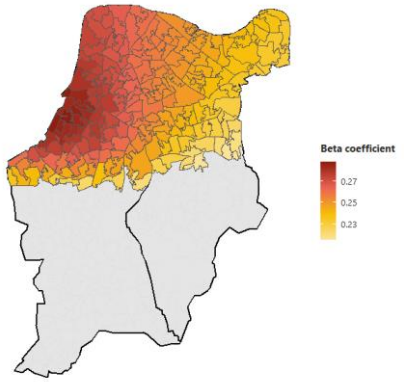
CHD prevalence and Air quality related acuity



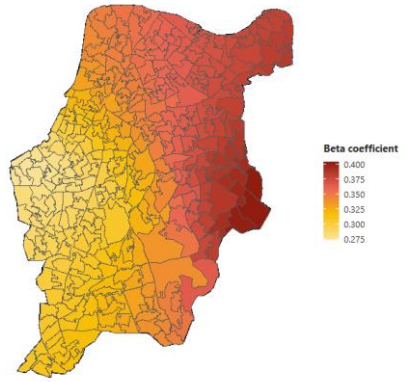
% Indian population and Sickle-cell admissions



Dementia prevalence and Circulatory mortality



Smoking prevalence and Respiratory mortality



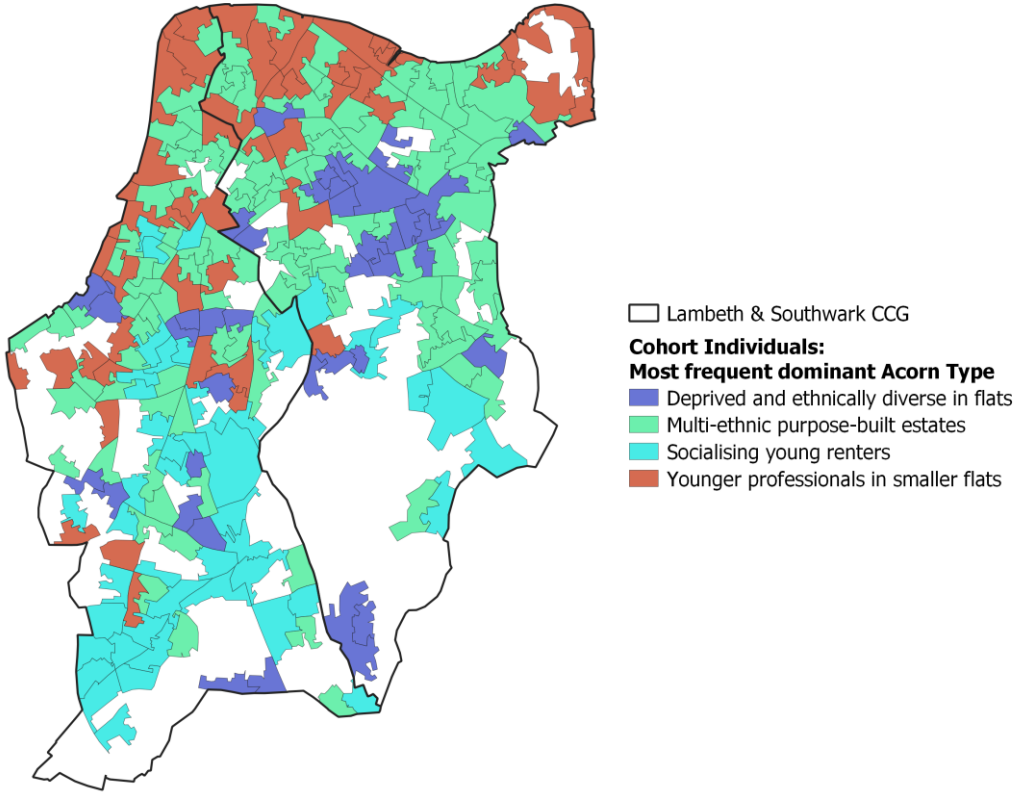
ACORN segmentation:

The profile of the 3 groups of interest (0-14's, 65+'s and those with circulatory or respiratory conditions) are very similar to the underlying population of Lambeth and Southwark as a whole.

The most populous segments, accounting for over 80% of our cohorts are:

- 'Multi-ethnic purpose built estates'
- 'Socialising young renters'
- 'Younger professionals in smaller flats'
- 'Deprived ethnically diverse living in flats'

Each of these groups will require different engagement strategies and different approaches to interventions.



83% of the study cohort are resident in LSOA's with one of the above 4 dominant Acorn Types

A way forward?

This analysis is not an end of itself. It points the focus of air quality improvement or mitigation schemes towards certain population groups in certain areas each of whom have their own needs and priorities as well as social and cultural behaviours.

We suggest that more work is done to understand the levers and mechanisms for change in some groups who carry some of the highest risk / largest inequality in relation to air quality and health in Lambeth & Southwark – Bangladeshi and Pakistani communities particularly those with young families; younger working adults in rented accommodation and small flats; those with existing heart and lung diseases.

Clearly, working alongside other environmental, green space, transport and public health agencies will be key in addressing the causes and impacts of poor air quality so the charity should collaborate with those partners in both designing and implementing new actions and support.

Those support models should be informed by a specific and in-depth review of published and grey literature that accounts for the population, social and environmental factors identified here when determining effectiveness.

The literature, alongside our analysis, may also support the development of an evaluation and outcomes framework for the programme.

Other factors we haven't considered in our models might be exerting influence (e.g. sedentary lifestyles) and some of the data (e.g. smoking prevalence) may not be specific enough to detect significant effects. Local data from other agencies, academia and third sector partners might improve understanding of the complex relationships at play.

There will likely be many people living in the two boroughs that have early stage or minor ailments related to air quality. We have not picked these up in our cohorts due to lack of data (i.e. primary care) but early intervention schemes should be considered.

Our outcomes relate to potential physical consequences of air quality. There are certainly other effects on mental and emotional wellbeing that should be explored further.

Contact

For queries specific to this report please contact:

Andy Hood
Analytics Manager
07720 343930
andrewhood@nhs.net

Alexander Lawless
Healthcare Analyst
07500 881 512
alexander.lawless1@nhs.net

The Strategy Unit.

Stay connected with us!

https://www.strategyunitwm.nhs.uk/

@Strategy_Unit

0121 612 1538

strategy.unit@nhs.net

NHS
Midlands and Lancashire
Commissioning Support Unit