Webinar Q&A: London's air pollution, why it matters and what can we all do about it?

On 21 July 2020 the Clean Air Parents' Network hosted a webinar looking at air pollution in London and what can be done about it. It was a very informative event but the speaker were not able to answer all the questions posed by attendees. This document therefore seeks to answer those remaining questions.

Speakers included:

- Dr Ian Mudway, Senior Lecturer, Imperial College London
- Andrea Lee, Campaign and Policy Manager, Clean Air, ClientEarth
- Jane Dutton, Mums for Lungs
- Jeremy Leach, London Living Streets

You can also watch a recording of the webinar and look at some of the presentation using the following links:

- Catch up on the webinar here - https://us02web.zoom.us/rec/share/6MNlI4vP-lpOf4nJ81DiC_J9JaHYeaa803AW8vZcxB3EuWi9bDpQWtY3a0ZXGcTm
- Presentation by Dr Ian Mudway - https://www.documents.clientearth.org/library/download-info/clean-air-parents-network-london-webinar-july-2020-dr-ian-mudway-presentation/
- Presentation by Jane Dutton - https://www.documents.clientearth.org/library/download-info/clean-air-parents-network-london-webinar-july-2020-mums-for-lungs-presentation/
- Presentation by Jeremy Leach - https://www.documents.clientearth.org/library/download-info/clean-air-parents-network-london-webinar-july-2020-london-living-streets-presentation/

Q&A

Dr Ian Mudway, Senior Lecturer, Imperial College

Question: *I live near lots of A roads and try to keep away from them. Have you any guidance on how far one should be from a busy road before the air returns to close to background pollution levels? I have recently often found myself wondering about this, both in terms of how far away to keep in the park (a playground 100m from South Circular?) and in choosing nurseries. I appreciate it will depend on screens/barriers, wind direction etc – but even some rough rules of thumb would be very appreciated*

Answer: Because air pollution is complex, there is not a simple answer to this question, as the concentrations of different pollutants fall away at different rates from their point of origin. So, for example, if you were to consider exhaust emissions from a diesel vehicle, the primary emissions of the very smallest particles, often summarised as black or element carbon, ultrafine particles or particle number concentration (also nitrogen dioxide) fall off quite rapidly, so that distance from the road is an incredibly useful indicator of potential exposures.

If we consider $PM_{2.5}$ however, which as I indicated in my presentation is made up of many different components, with only a relatively minor fraction derived directly from traffic exhausts, then the gradient is much less. We often say that pollutants such as NO_2 vary dramatically spatially, whereas city-wide concentrations of $PM_{2.5}$ are much more consistent or homogenous. I have highlighted this in the figure below.
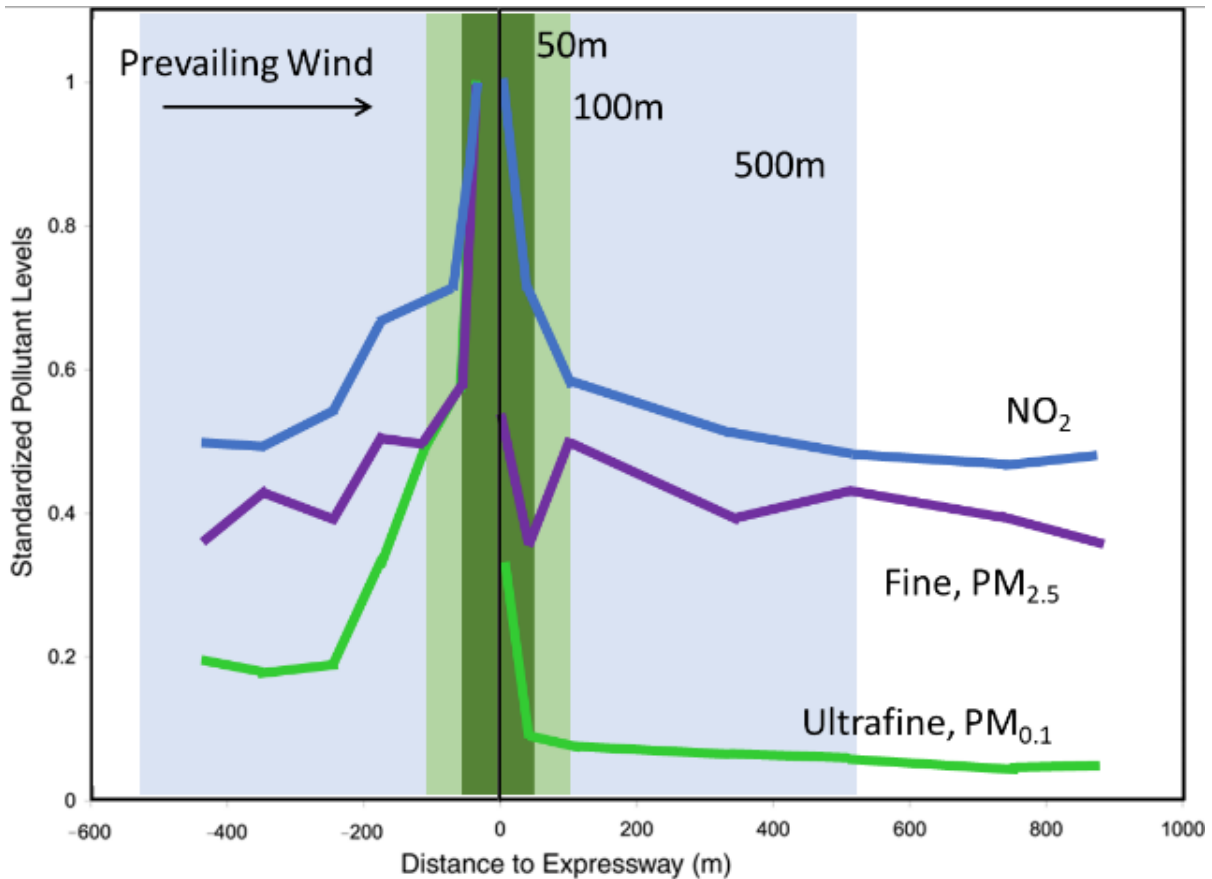
Now the caveats: The architecture of our urban landscape can prevent the dispersion of pollutants, such as a road sandwiched between two rows of tall buildings, often referred to as a street canyon. In fact, even trees planted near roads can contribute to this effect is the canopy hangs over the road and the foliage is dense. The second caveat is the weather. Pollution is suppressed by rain and the prevailing wind direction effects the rate at which pollutant concentrations fall away from the source – I've tried to illustrate this in the figure above. Finally, and this is incredibly important, most health-based studies that have used measurement data have derived this from background sites (defined as being away from major sources and meant to reflect residential exposures), so they don't really capture exposures near roads. So, and this is my personal view, strategies that aim to reduce populations exposures to pollution by rerouting them away from roads, are effectively protecting them against health impacts that have never been adequately quantified. Are the important strategies: yes, because there is a wealth of data on the harmful effects of traffic derived pollution, but do they protect against the detrimental effects of long-term exposures to $PM_{2.5}$, absolutely not. You only achieve the later by targeting a range of sources.

There is often discussion in these forums on the relative value of measured versus modelled data and the issue raised here allows us to explore this issue further. Clearly, we can't measure everywhere, so modelling approaches attempt to fill in the gaps, but their capacity

to reflect likely exposures to pollutants that vary markedly from their source depends on their resolution (effectively the scale of their output, from metres to kilometres) and their validity, based on actually testing to ensure they predict accurately, both between different areas and across time. Many models that have been used in heath studies, and very often for the setting of policy decisions, have a very low resolution (1km), which means whilst they are useful for $PM_{2.5}$, they are effectively hopeless for pollutants whose concentrations fall off rapidly from the source, such as NO_2. This is why you always need to check what type of model was used when an official states that project A, will have no meaningful effect on NO_2 concentrations, as 1 km models effectively dilute out the contribution of roads and underestimate near road concentrations. Now, a bit of self-advertisement for the Environmental Research Groups model. Our modelling team, has a high resolution (20x20m) model for the UK that can be outputted at fine temporal scales and performs well against measurements. Because this model now includes atmospheric chemistry, in addition to information on emissions, urban architecture and the impacts of meteorology, it can begin to drill down into the components of particulate matter. This is the model we used for our health studies, which is why we are confident we can capture the effects of traffic related pollutants in our studies.

Question: *What is background NO2? Zero?*

Answer: Never zero, because there are multiple sources other than diesel exhausts, including gas boilers/cookers and industry. Even at the most rural sites within the UK, away from major sources concentrations of NO_2 are still detectable, though concentrations are often in single digits. You can find the data from rural sites by following this link: https://uk-air.defra.gov.uk/latest/currentlevels?view=region

Question: *I am also interested in your view on the (early days) research into the impact of air pollution on Covid death rate. There have been various papers published. Do you have any views on them to date?*

Answer: I suspect you shouldn't get me started on this one, but for the record many of us within the scientific community have been dismayed by the effective suspension of standard academic practice in the rush to get out publications on COVID. This has resulted in a lack of proper scrutiny and we are already seeing retractions as it becomes clear corners have been cut, or in some very notable cases, where 'borderline' fraudulent behaviour has been identified. That said a great deal of very valuable work has been published, or is ongoing, but at this time it is best the view these as providing partial evidence, that under normal circumstance would still be undergoing various rounds of revision and review.

Regarding the link between poor air quality and COVID there were a number of papers straight out of the blocks that seemed to indicate that death rates were elevated in regions with high pollution, but these were very hard to interpret as no real attempt was made to adequately deal what we refer to as confounders. For example, cities are more polluted than rural areas, but they also have high rates of deprivation, multi-ethnic communities, higher density living etc., all of which could contribute to a greater death rate, completely unrelated to air pollution. Also, it was not clear how COVID deaths in these high pollution areas were being related to the pollution itself. Were the authors saying that pollution right now was resulting in poorer outcomes for individuals infected with SARS-CoV-2, or was it simply that these areas had higher rates of chronic lung and heart disease that had been promoted over decades by the high pollution levels in these cities. I think this later issue is key, as aged

individuals with existing chronic disease are clearly more vulnerable and we know that long-term air pollution contributes to the development of these diseases. One could almost argue that air pollution, along with poor diets had effectively stored up vulnerabilities within the aged population, that were exposed cruelly during the pandemic. The best data on this issue is from the Harvard School of Public Health who found, that someone who had lived for decades in a county with high levels of $PM_{2.5}$ was 8% more likely to die from COVID-19 than someone who had lived in a region that has just one unit (one microgram per cubic meter) less pollution. In this study attempts were made to deal with other factors that could contribute to this effect, but again this was really focused on the long-term impact of air pollution resulting in an increased pool of vulnerable individuals within the population.

So, what about short term effects of air pollution? Here the population level science is much less certain, but there are some experimental and clinical studies that are worth considering. To enter certain cells within the respiratory tract the SARS-CoV-2 virus binds to a receptor on their surface, or rather highjacks it and uses it almost like a Trojan horse; the angiotensin converting enzyme 2 (ACE2). There has been much interest in this mechanism as children have lower levels of ACE2 and so it has been speculated that this may explain why they have such mild symptoms compared to older adults. Also, the ACE2 receptor has been shown to be increased in smokers and individuals with smoking related illness. Experimental studies have now shown that lung cells treated with $PM_{2.5}$ and PM_{10} samples increased their production of this protein and if one joins the dots this would appear to support the view that short-term $PM_{2.5}$ exposures could increase the entry of the virus into lung cells and therefore cause worst symptoms and outcomes. It is very plausible, but more work needs to be done to confirm this effect.

Question: *The 'distant sources of chemistry in the atmosphere' you spoke of that contribute to the PM2.5, is there a clear idea of what is the source could be? Are we experiencing the effects of pollution from Air quality as far as Asia?*

Answer: There are major contributions to UK $PM_{2.5}$ pollution in the early Spring from Europe, but in truth with the UKs prevailing winds mostly coming from the West, we probably dump more pollution on them than vice versa. There will undoubtedly be some hemispheric contribution to $PM_{2.5}$ from further afield but you would probably need a 'real' atmospheric chemist to comment on that. But there is an alternative way to think about this problem, not about whether the high levels of pollution in China, India and the Tiger economies contribute to our poor air quality, but the extent to which the pollution in these countries is driven by consumer demand in the West. Europe and America should be taking some ownership of the air quality problems in these countries.

[Andrea Lee](#)**, Campaigns and Policy Manager, Clean Air, ClientEarth**

Question: *What do you think are that most effective and up-to-date headline facts and findings to help more people understand the issues of air pollution and take action? Could it be, the number of premature deaths compared to coronavirus or that children in cars have the highest exposure to air pollution?*

Answer: That is a great question but a difficult one to answer. The key thing is to think about who your audience is and to try to put yourself in their shoes to think about what will resonate with them. This is what organisations and the even the government pay a lot of money to find out through focus groups.

We've found that while the shocking numbers for impacts like premature deaths can grab people's attention you also need to make it relevant to their daily lives. Because of the way that air pollution contributes to bringing forward deaths and, as yet, does not appear on death certificates it can be easier for people to understand how air pollution can trigger heart or asthma attacks – as most people will know somebody that suffers from heart of lung conditions, for example.

Air pollution is still very much an invisible health risk to many people so having your own stories about how air pollution affects you or people you know can help make it real to others. That's why for us it's really helpful when people can help us share their opinions and stories in the media. It's so much more valuable for us to be able to show politicians and journalists that real people care and are affected than simply having a campaigner speaking to them. If anybody is interested in finding out how you can help then get in touch: cleanairparents@clientearth.org.

You also need to think about the tone and context of your message. Something that sounds important to you may not go down well with your audience if the tone, the timing or context isn't right for them.

Making sure your facts a robust is also important for us and we take our lead from experts, including academics and our health partners. You might want to look at some research commissioned by the Clean Air Fund set out some personalised health impact statements that you might be able to use.

Lastly, while it's important to make the case for action, it's good to highlight that we can do something about it now. Dirty air does not have to be part of urban living or anywhere else. The solutions already exist so we just need our politicians to be bold and take action to help make our towns and cities better places to live.

Question: *I have a question about living in a greener London.*
We live in a very polluted area of West London not far from the A4. I wrote to the Mayor last summer to ask permission to plant more around our street. We were put in touch with TFL but they are making all sorts of excuses for not acting and for not letting us plant ourselves. We wanted to plant shrubs (rosemary, lavender, ivy..) and are willing to self finance. What can we do now to get things moving after a year of unfruitful messages with TfL and H&F council? Shall we launch a legal challenge? Many thanks!

Answer: At this point I have to say that, as a charity, ClientEarth isn't able to give legal advice. I would point out, however, that legal challenges are really the last resort and can take a long time and a lot of resources.

I'm sure that you have done your best at lobbying your councillors and TfL, but it might be useful to look for other groups who have been successful in doing what you want to do or something similar and see what you can learn from their experience. ClientEarth doesn't have all the answers, which is why we set up the Clean Air Parents' Network to help people share information and experiences. The Facebook group can be particularly good for this if you are not already involved.

It's also worth thinking about other groups in your area who may support your project, helping to demonstrate wider interest to your council and sharing their experiences with you.

I would say, however, that while I'm a big fan of greening up the city, it's not really the most effective measure for tackling air pollution and, depending on the plants and the planting

scheme used, can even make the problem worse in some cases (you can read this report from the government's independent [Air Quality Expert Group](#) for more information). Saying that you might find that the Low Traffic Neighbourhood projects that many councils are taking up may be a way of introducing more greenery as planters make a very effective traffic barrier.

[Jeremy Leach](#), Chair London Living Streets

Question: *What characteristics should we look for when identifying a street that is ripe for becoming a traffic free zone?*

Answer: I would suggest that there are two parts to this question.

Firstly there is what you and your neighbours think about where you live and your aspirations for it. If through traffic is removed are there opportunities for life to be improved with traffic playing less of a dominant role then it does at present. Is there a significant groundswell of people who have liked what they saw and experienced in the lockdown of safer streets that were less intimidating to walk and cycle along, did people benefit from the opportunities for greater interaction with their neighbours, was it easier and more pleasant to reach local destinations and amenities (shops, parks and open spacesetc). Would you like to retain that as we move forward?

Secondly there are indicators of the above and that is where the TfL analysis (http://content.tfl.gov.uk/lsp-app-six-b-strategic-neighbourhoods-analysis-v1.pdf) cuts lots of corners and can come in handy. TfL have given a sense of the key indicators (but obviously you can choose additional ones for your area) and created heat/intensity maps for each indicator for each of the potential LTNs areas across London (again you might want to propose different areas but these are a useful start). They have suggested indicator issues such as population density, levels of deprivation, car ownership levels, levels of through traffic, the potential for cycling, the numbers of people who are walking and cycling and the numbers that are injured on local roads, the number of schools and, significantly for now, the challenge that is faced in relation to social distancing.

Putting together these elements should give you a sense of whether there is the potential for an LTN.