



England

# New and old inhaled toxins and children with asthma

#AskAboutAsthma 2023

Chaired by:

**Jonathan Grigg**, Professor of Paediatric Respiratory and Environmental  
Medicine, Queen Mary University of London

# Housekeeping



Attendees are automatically muted with camera switched off during the webinar.



Use the group chat feature to ask questions and please like any questions that you would like answered.



This session is being recorded. A link will be available after the webinar with the slides.

# Agenda

#AskAboutAsthma webinar: New and old inhaled toxins and children with asthma

Friday 15 September 2023 1:00 – 2:00pm

[Click here to join the meeting](#)

Topic	Speaker
	<b>Chair: Jonathan Grigg</b> Professor of Paediatric Respiratory and Environmental Medicine Queen Mary University of London
<b>Air pollution and children's respiratory health</b>	<b>Jonathan Grigg</b> Professor of Paediatric Respiratory and Environmental Medicine, Queen Mary University of London
<b>Improving air quality in schools and healthcare settings</b>	<b>Joe Harrison</b> Programme Manager, Global Action Plan
<b>Health Effects of Air Pollution on Children</b>	<b>Ian Mudway</b> Senior Lecturer in Environmental Toxicology Gresham College Visiting Professor for Environmental Health
<b>Q &amp; A</b>	<b>All</b>

# Air pollution and children's respiratory health

Jonathan Grigg

Queen Mary University of London

# Air pollution mix

## Traffic-Related Air Pollution (TRAP)

ozone

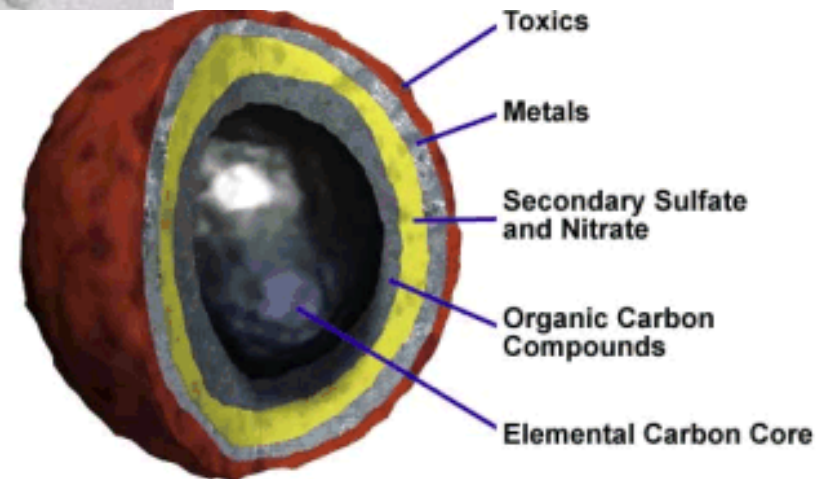
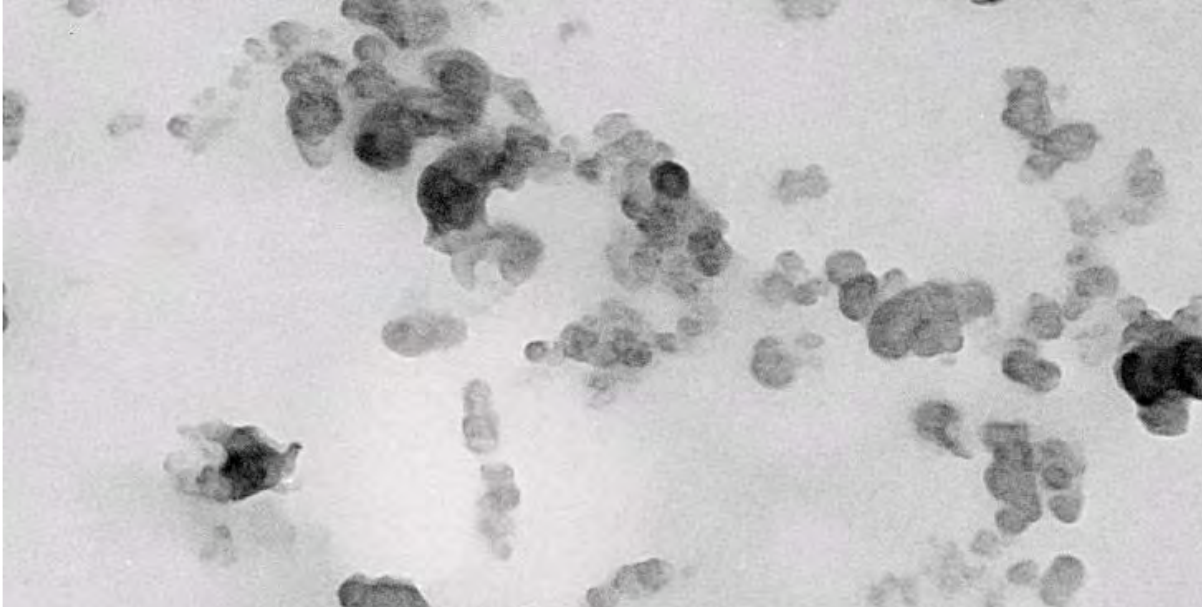
Particulate  
Matter (PM)

Nitrogen  
dioxide



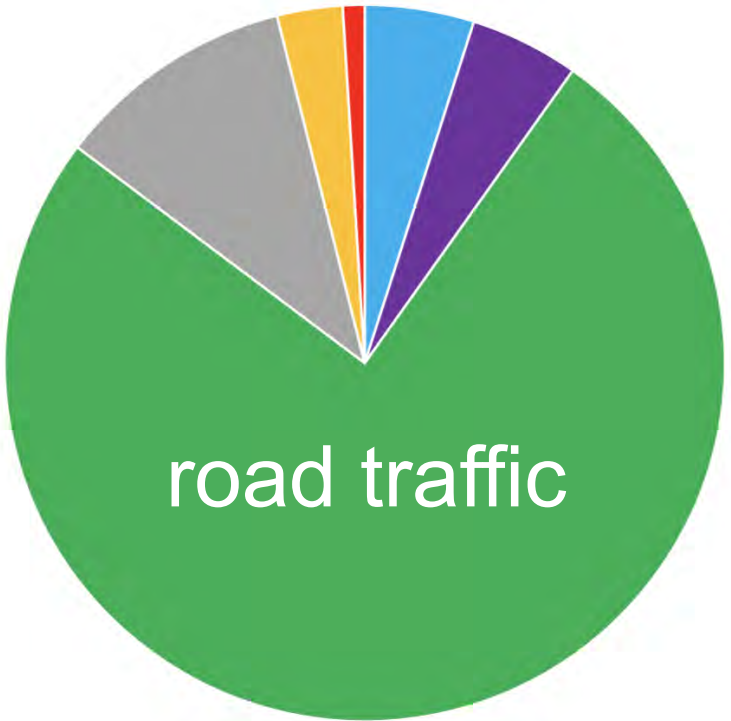


$PM_{10}$  = less than  $10\mu m$





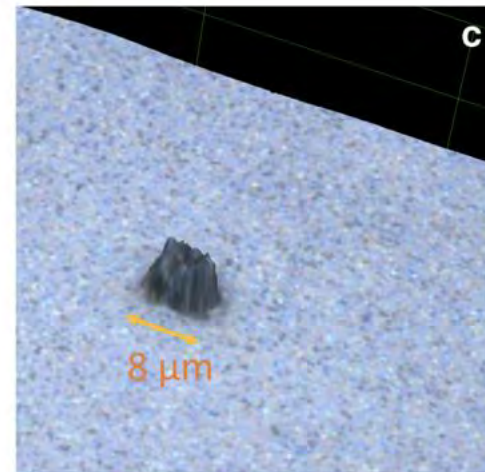
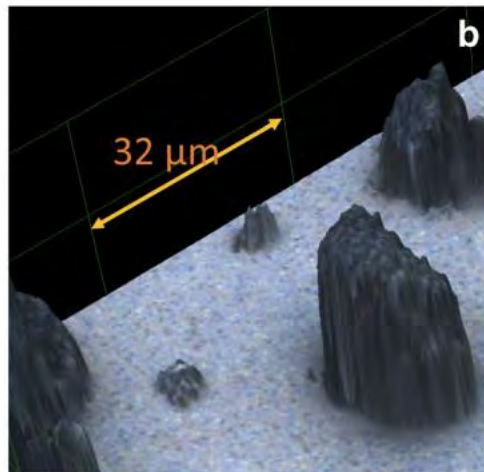
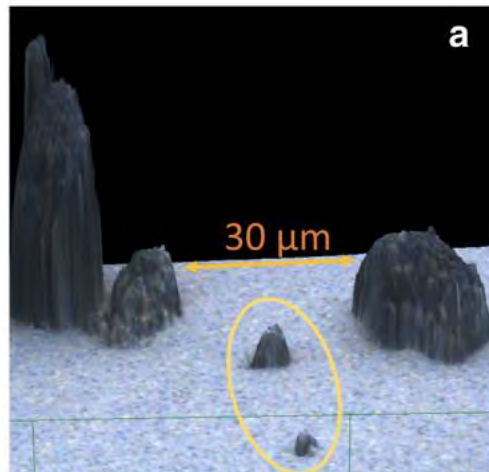
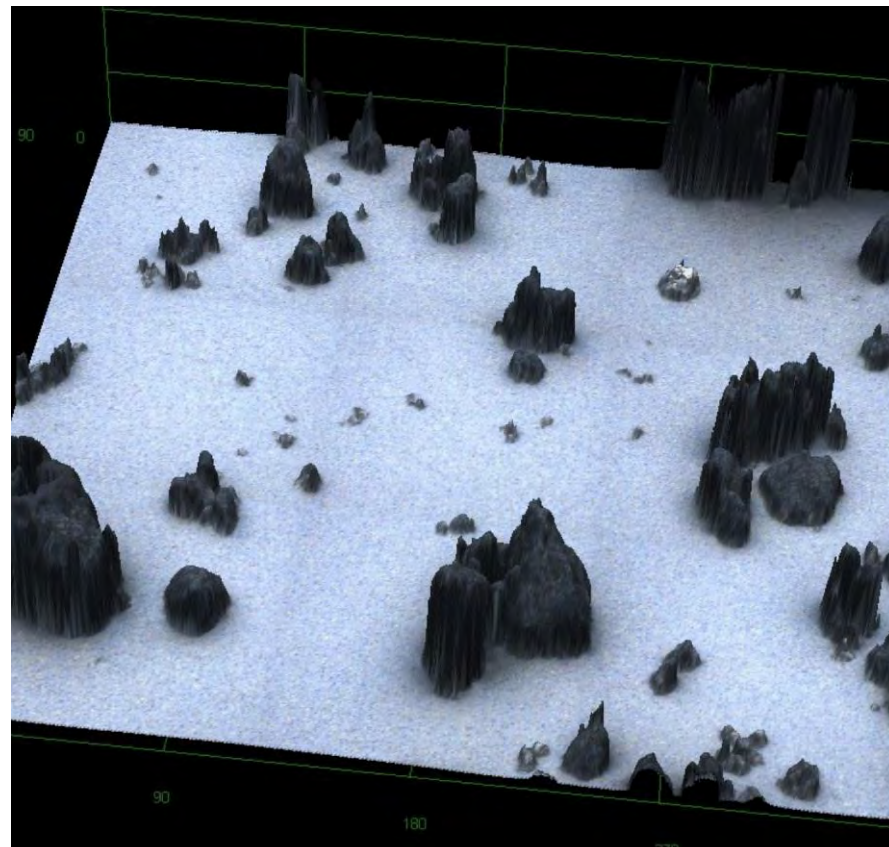
# PM sources; UK urban



- Industry
- Domestic
- Road Transport
- Road Transport & Industry
- Road Transport, Industry & Domestic
- Other/unspecified

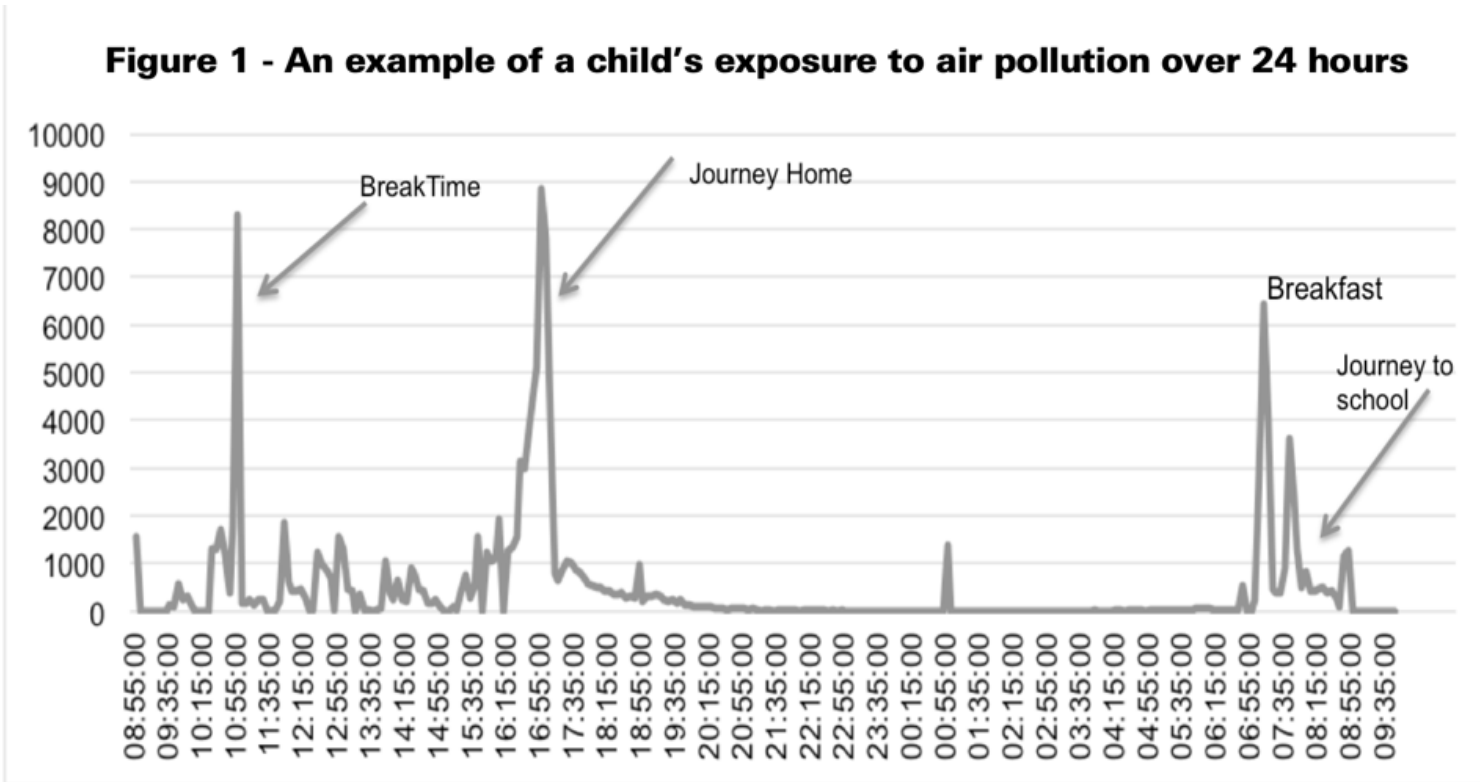
# Collecting kerbside-PM<sub>10</sub>

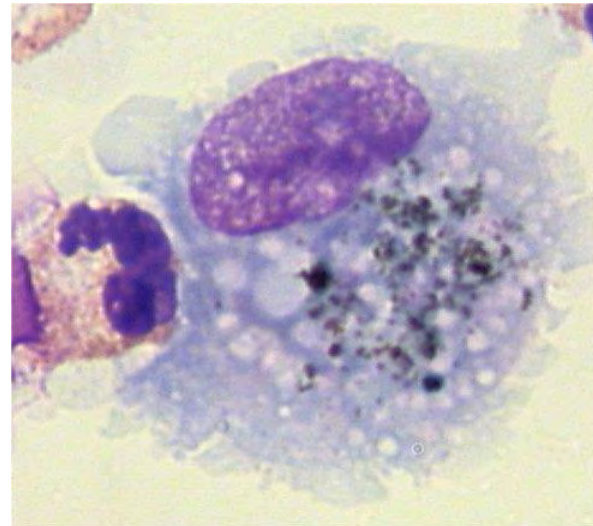
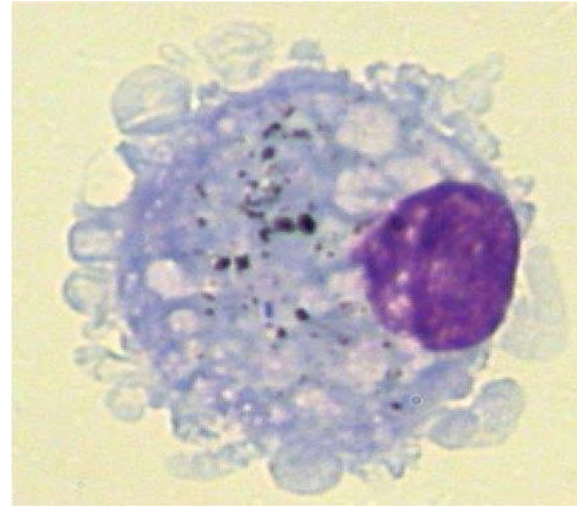


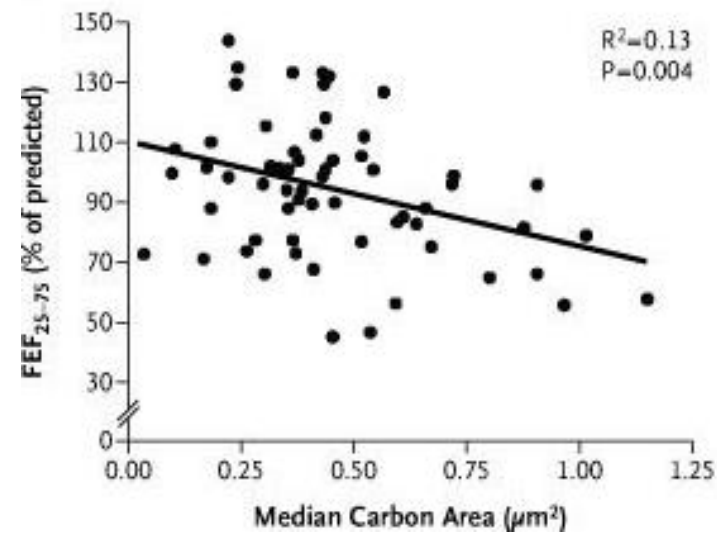
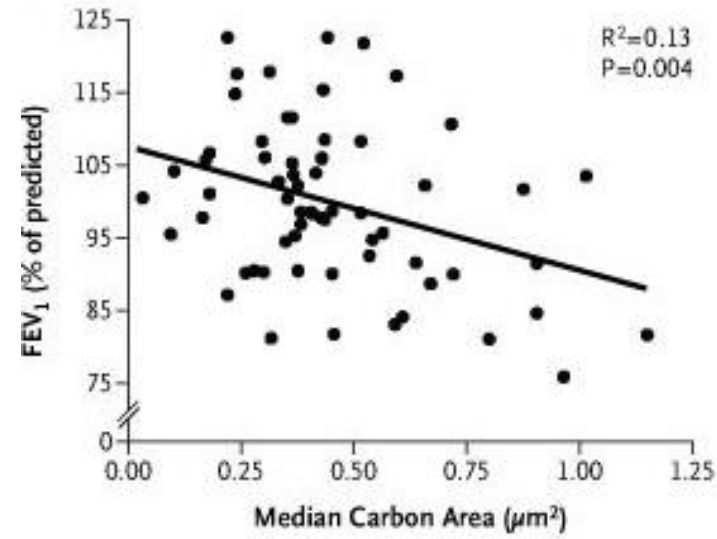
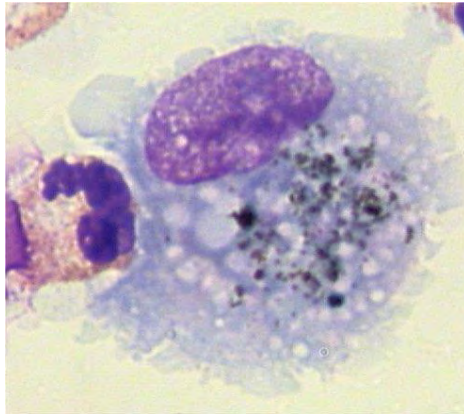




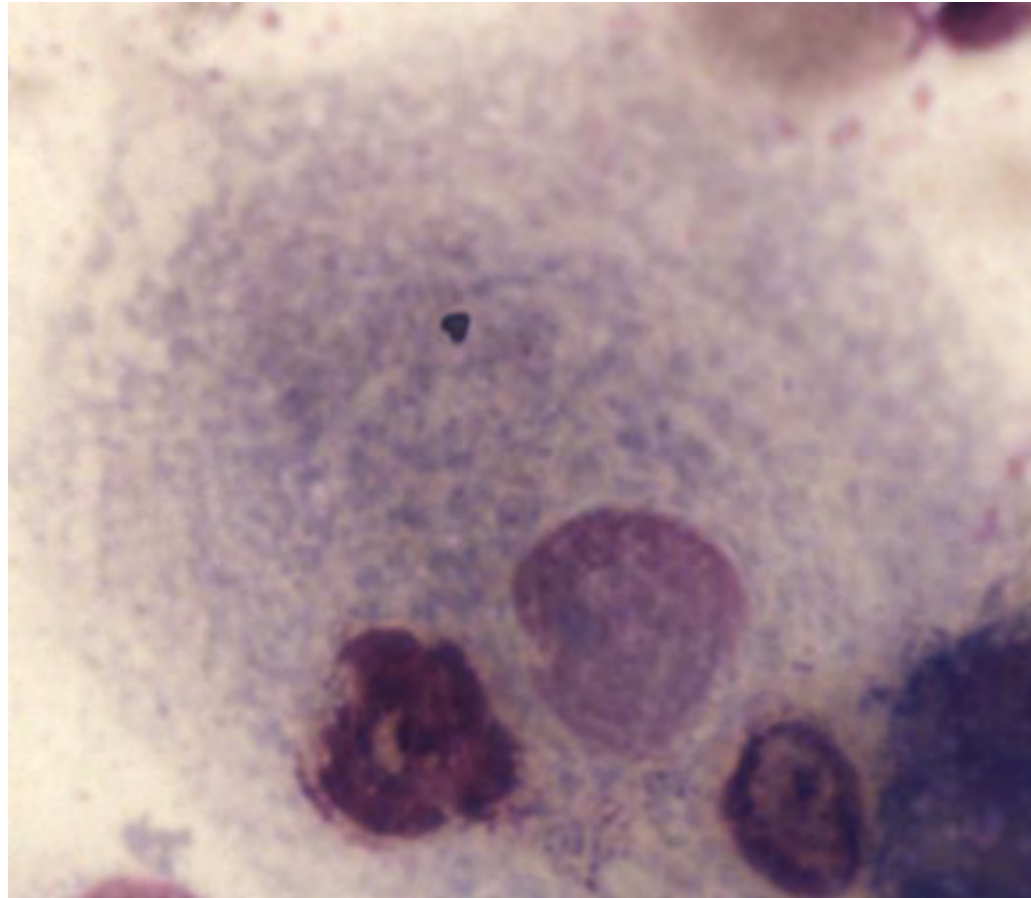
**Figure 1 - An example of a child's exposure to air pollution over 24 hours**

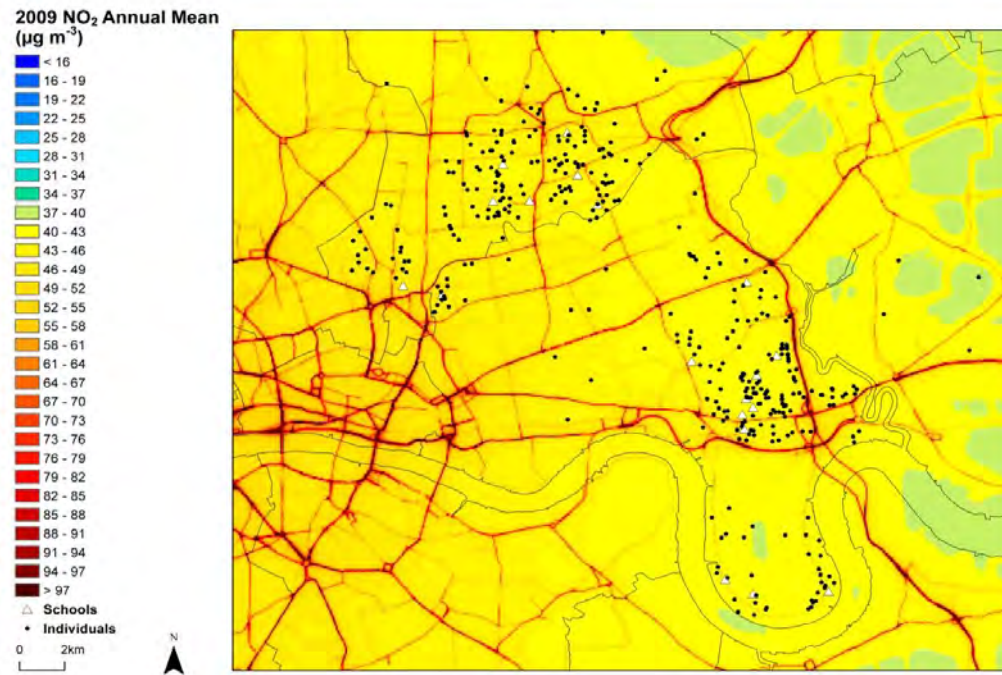






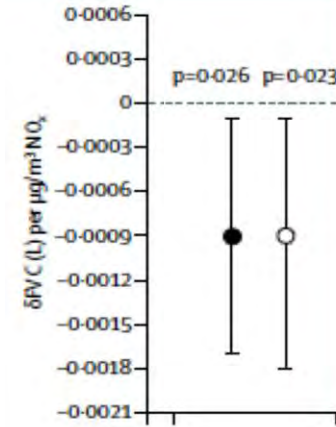
# Placental cells





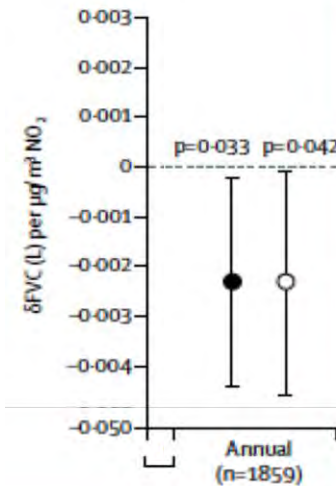


NO<sub>x</sub>



- FVC loss
- 5% over 5 yr.

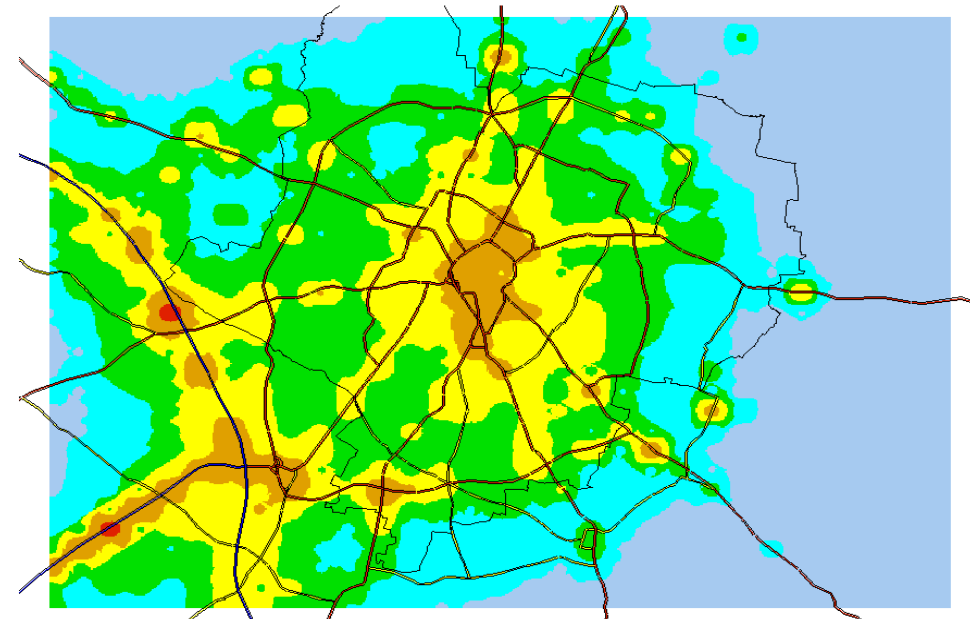
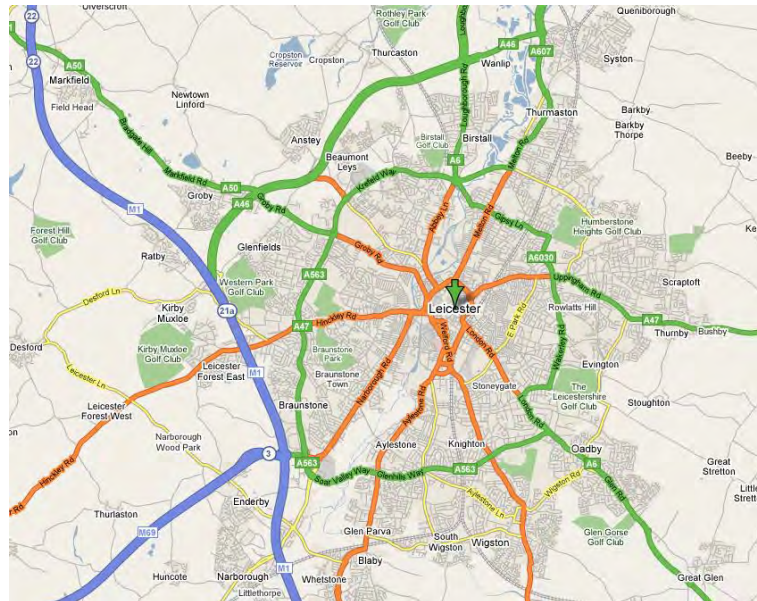
NO<sub>2</sub>



# New cases of preschool wheeze

- 4,400 preschool children
- 1 to 5 yrs
- Surveyed in 1998 and 2001

# New cases of preschool wheeze



# New cases of preschool wheeze

	Adjusted*		
	OR†	95% CI	n‡
Cough without a cold	1.62	1.31 to 2.00	1287
Night time cough	1.19	0.96 to 1.47	1191
Wheeze	1.42	1.02 to 1.97	1319

# New cases of school age asthma

- 4 million new asthma cases in children per year attributable to traffic-related pollution

Global, national, and urban burdens of paediatric asthma incidence attributable to ambient NO<sub>2</sub> pollution: estimates from global datasets

*Pattanut Achakulwisut, Michael Brauer, Perry Hystad, Susan C Anenberg*

*Achakulwisut Lancet Planet Health. 2019 Apr;3(4):e166-e178.*



# Record of Inquest

Following an Inquest opened on the 17 December 2019, And an inquest hearing at Main on the 30 November 2020 heard before Philip Barlow in the coroner's area for London Inner South ,

The following is the record of the inquest ( including the statutory determination and, where required, findings).

1. Name of Deceased (if known)

**Ella Roberta ADOO KISSI-DEBRAH**

2. Medical cause of death

**1a Acute Respiratory Failure**

**1b Severe Asthma**

**1c Air Pollution exposure**



**Brain:** Stroke, Dementia, Parkinson's Disease

**Eye:** Conjunctivitis, Dry Eye Disease, Blepharitis, Cataracts



**Heart:** Ischemic Heart Disease, Hypertension, Congestive Heart Failure, Arrhythmias

**Lung:** Chronic Obstructive Pulmonary Disease Asthma, Lung Cancer, Chronic Laryngitis, Acute and Chronic Bronchitis



**Liver:** Hepatic Steatosis, Hepatocellular carcinoma

**Blood:** Leukemia, Intravascular Coagulation, Anemia, Sickle Cell Pain Crises



**Fat:** Metabolic Syndrome, Obesity

**Pancreas:** Type I and II Diabetes



**Gastrointestinal:** Gastric Cancer, Colorectal Cancer, Inflammatory Bowel Disease, Crohn's Disease, Appendicitis



**Urogenital:** Bladder Cancer, Kidney Cancer, Prostate Hyperplasia



**Joints:** Rheumatic Diseases

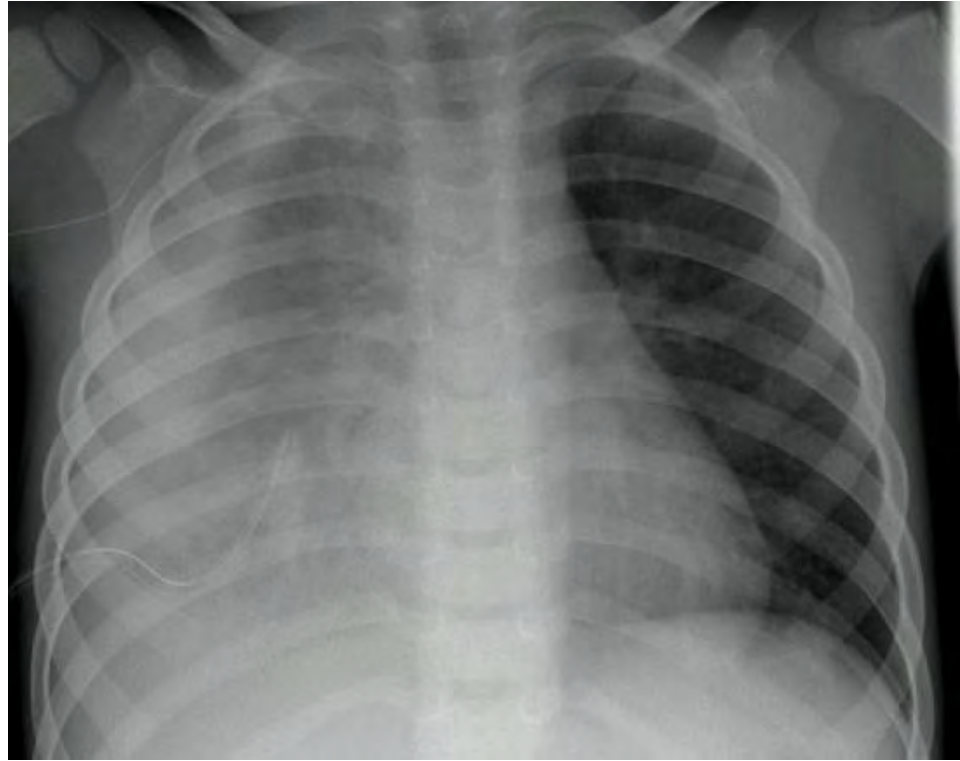
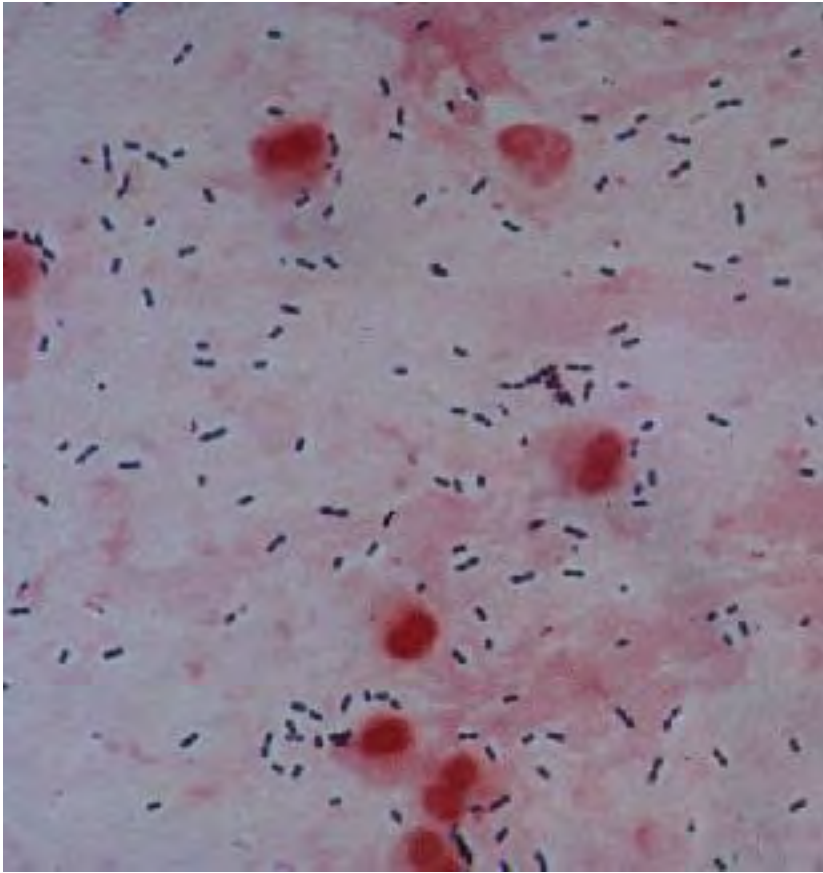
**Bone:** Osteoporosis, Fractures



**Nose:** Allergic Rhinitis

**Skin:** Atopic Skin Disease, Skin Aging, Urticaria, Dermographism, Seborrhea, Acne

# *S. pneumoniae*









# London Underground



# Advice

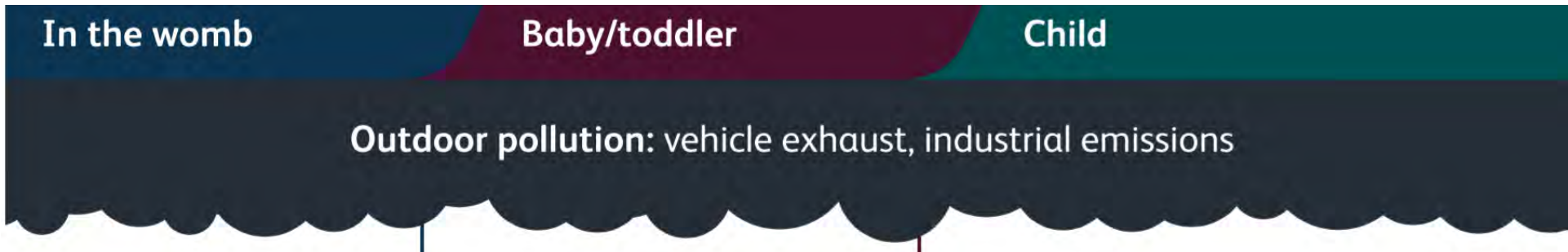
- low pollution routes
- indoor air
- advice to patients and public



# Every breath we take: the lifelong impact of air pollution

Report of a working party  
February 2016





**Harms from high pollution**

Smaller head

Lower birth weight at term





**The inside story:**  
Health effects of indoor air quality  
on children and young people

Published January 2020



ODOURS

VOLATILE CHEMICALS  
FROM FURNITURE AND  
CONSTRUCTION  
MATERIALS

# WHY DOES INDOOR AIR MAKE US SICK?

NANOSIZED  
POLLUTION  
PARTICLES  
FROM  
OUTDOORS

FIBERS

FINE PARTICLES  
AND CHEMICALS  
FROM HUMANS  
AND  
PROCESSES

MOULD  
TOXINS





## The inside story: Health effects of indoor air quality on children and young people

Published January 2020



### Birth and infancy

- Respiratory problems - wheeze, rhinitis, atopic asthma, respiratory infections
- Low birthweight and pre-term birth



### Pre-school

- Respiratory problems - wheeze, allergies, asthma, risk of respiratory diseases and pneumonia
- Eczema and atopic dermatitis
- Greater hyperactivity, impulsivity and inattention



### School age

- Respiratory problems - wheeze, rhinitis, asthma, throat irritation, nasal congestion, dry cough
- Eczema, dermatitis, conjunctivitis, skin and eye irritation
- Reduced cognitive performance, difficulty sleeping

# Advice for high pollution days?

- ▷ **Reduce strenuous, outdoor exercise.** if possible, keep doing your exercise indoors in a well-ventilated room or gym.
- ▷ **Stay away from pollution hotspots** such as main roads and busy road junctions.
- ▷ If you cycle, run or walk as part of your commute, **use back streets** away from the bulk of vehicle congestion.
- ▷ Make sure you **carry your reliever inhaler with you** if you use one.
- ▷ If you have asthma, **use your preventer inhaler regularly.**

<https://www.blf.org.uk/support-for-you/air-pollution/tips>





## Air pollution can worsen asthma symptoms – take action today



Check the air pollution forecast

# My air pollution plan:

*Plan out the actions that you and your family can take to reduce the impact of air pollution on your health*

	<b>On all days</b>	<b>On high pollution days</b>
I will use my inhaler as recommended by my GP or asthma nurse	<input type="checkbox"/>	<input type="checkbox"/>
I will treat air pollution the same way I treat other asthma triggers	<input type="checkbox"/>	<input type="checkbox"/>
We will walk, cycle or scoot to school	<input type="checkbox"/>	<input type="checkbox"/>
We will look up quieter routes to avoid roads with heavy traffic	<input type="checkbox"/>	<input type="checkbox"/>
We will turn on the extractor fan when cooking	<input type="checkbox"/>	<input type="checkbox"/>
We will swap our cleaning products to low chemical options	<input type="checkbox"/>	<input type="checkbox"/>
We will open the window when cooking	<input type="checkbox"/>	<input type="checkbox"/>
We will open the windows when cleaning	<input type="checkbox"/>	<input type="checkbox"/>
We will always turn the engine off when our car is stationary	<input type="checkbox"/>	<input type="checkbox"/>
If we paint, we will check it is labelled "low VOC"	<input type="checkbox"/>	<input type="checkbox"/>
We will leave the car at home when we can	<input type="checkbox"/>	<input type="checkbox"/>
We will ask people not to smoke in our home	<input type="checkbox"/>	<input type="checkbox"/>

This leaflet was designed in collaboration with:  
children with asthma, their families, GPs and clinicians.  
Thank you to Tower Hamlets Together and Global Action Plan as the original creators.



## First clinic to look at dirty air's impact on children to open in London

 VIEW 1 COMMENTS



By [Ross Lydal](#) [@RossLydal](#) 18 March 2022

# Advocacy





**DOCTORS  
AGAINST  
DIESEL**

[About](#)

[Why Diesel?](#)

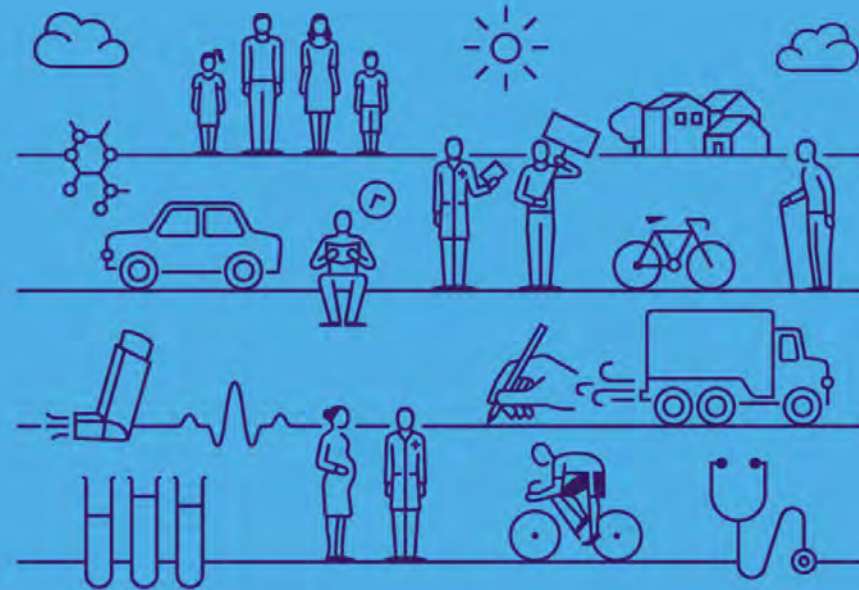
[How you can help](#)

[Contact](#)

[Sign Up!](#)

**Doctors Against Diesel is an evidence-based campaign led by doctors, nurses and health professionals.**

**Our mission is to reduce the impacts of air pollution on children's health.**



# Conclusions

- major effects of air pollution on asthma and other childhood diseases
  - long- and short-term exposure
  - outdoors and indoors
- need to detoxify the breathed environment



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# Thank you



Barts and The London  
School of Medicine and Dentistry

[www.smd.qmul.ac.uk](http://www.smd.qmul.ac.uk)



# Improving air quality in schools and healthcare settings

**Hannah Battram, Senior Manager Clean Air for Children**  
15 September 2023

Notcutt House, 36 Southwark Bridge Road, London, SE1 9EU, Telephone 0204 566 9904  
Charity registered in England and Wales No. 1026148, in Scotland No. SC041260, Registered company in England and Wales No. 2838296, VAT No. 625 994 009



**Air pollution causes upwards of 36,000 deaths each year in the UK**

**Air pollution causes over 6 million sick days a year in the UK**

**Air pollution has an estimated total social cost of £22.6 billion per year in the UK**

**Air pollution causes over 20,200 respiratory and cardiovascular hospital admissions a year in the UK**

# Royal Colleges Round Table Discussions:



# NHS commitments on air pollution: Chief Medical Officer

Halve contribution to poor air quality within a decade, while reducing health inequalities.

Healthcare staff training to include the health effects of air pollution, how to minimise these, and communicate this with patients.

Include air pollution in your Green Plan.



# Integrated Care System Clean Air Framework



Boehringer  
Ingelheim

# Integrated Care for Cleaner Air



<https://youtu.be/wXdv-vdDoMc>

# Local authorities have commitments on air pollution

They must regularly review and assess air quality in every district and unitary authority.

Where standards are not being met, authorities must produce action plans to improve air quality.





# Schools' commitments on air pollution

Asthma Friendly Schools Guide:

“In relation to children with asthma, this means that an ICS should, within reason, make sure support and health care is in place to improve their health or at least keep them healthy.”

Recognises air pollution at school as an asthma trigger that needs to be managed



# ICS Clean Air Framework

[www.actionforcleanair.org.uk/health](http://www.actionforcleanair.org.uk/health)

Clinical Commissioning Groups  
Acute Trusts  
Mental Health Trusts  
Ambulance Trusts  
Hospitals  
Primary Care Networks  
Community Providers  
GP Practices  
Local Authorities  
Cities  
Population

#

	Not started	In progress	Complete	Total
Digitalisation	3	0	0	3
Educating Staff	7	0	0	7
Infrastructure	10	0	0	10
Local Authority Collaboration	5	0	0	5
Strategic Decision Making	9	0	0	9
Supply Chain	8	0	0	8
Transport	15	0	0	15
Whole Health Care Approach	5	0	0	5
<b>Total</b>	<b>62</b>	<b>0</b>	<b>0</b>	<b>62</b>



Home

Framework

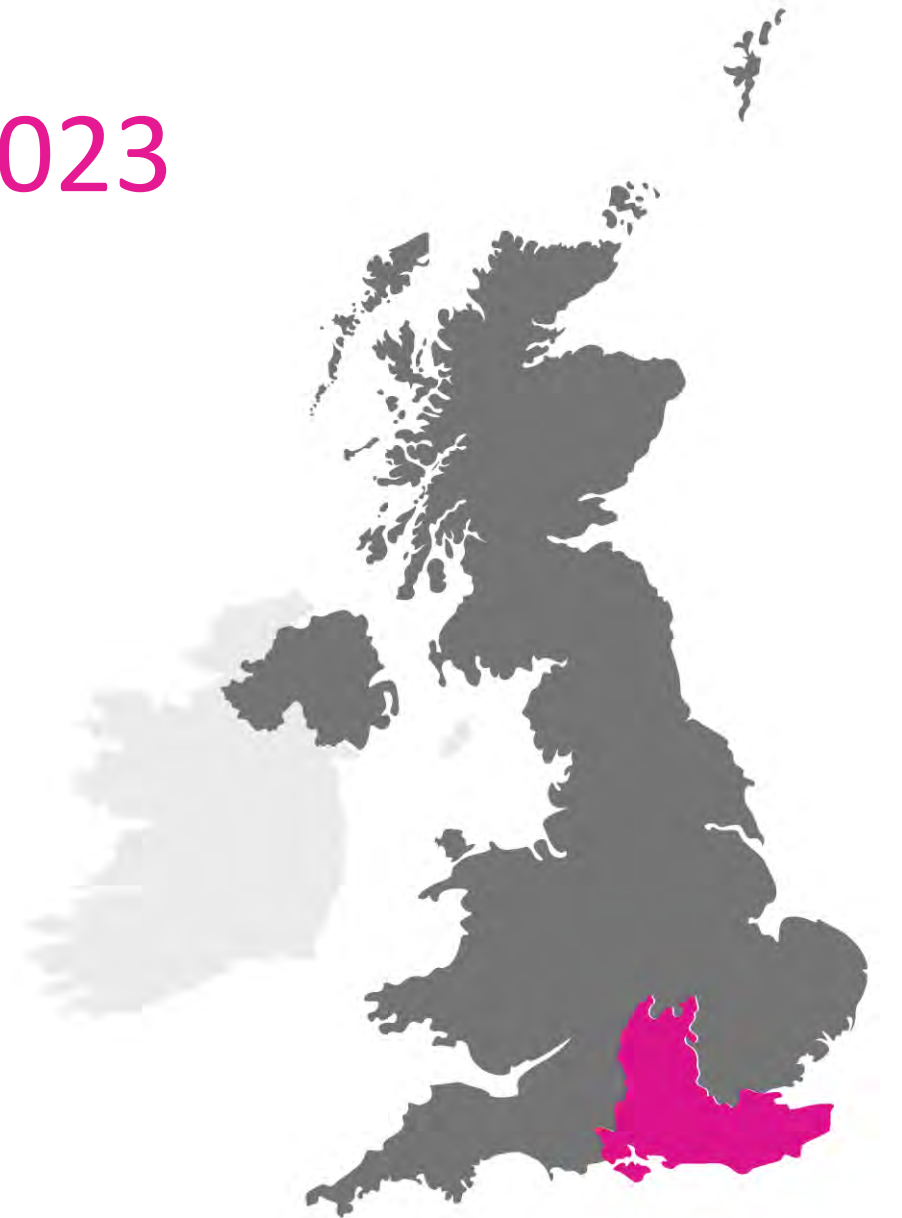
Trust Tracker

Glossary

Useful resources

# South-East ICS Cluster Pilot - 2023

- Surrey
- Kent & Medway
- Hampshire & Isle Of Wight
- Frimley
- Berkshire, Oxford & Buckinghamshire



Case studies and impact modelling to be shared in autumn 2023.



## ICS Clean Air Framework

The **ICS Clean Air Framework** is freely available for an ICS to use to enable healthcare leaders to pursue action on cleaner air and secure a healthier future for their region. The Framework can be used as the basis of a Clean Air Strategy for an ICS working to improve their own emissions and reduce the effects of air pollution on the population.

[FIND OUT MORE](#)



## Clean Air Hospital Framework

The Clean Air Hospital Framework is a free resource being used by hospitals across the UK to clean up their air. It is a self-assessment tool designed to improve air quality across the hospital site, and in the local community.

[FIND OUT MORE](#)



## The Islington Primary Care for Clean Air Project

We're working with health professionals in GP surgeries across Islington to help them share information on air pollution with their patients.

[FIND OUT MORE](#)

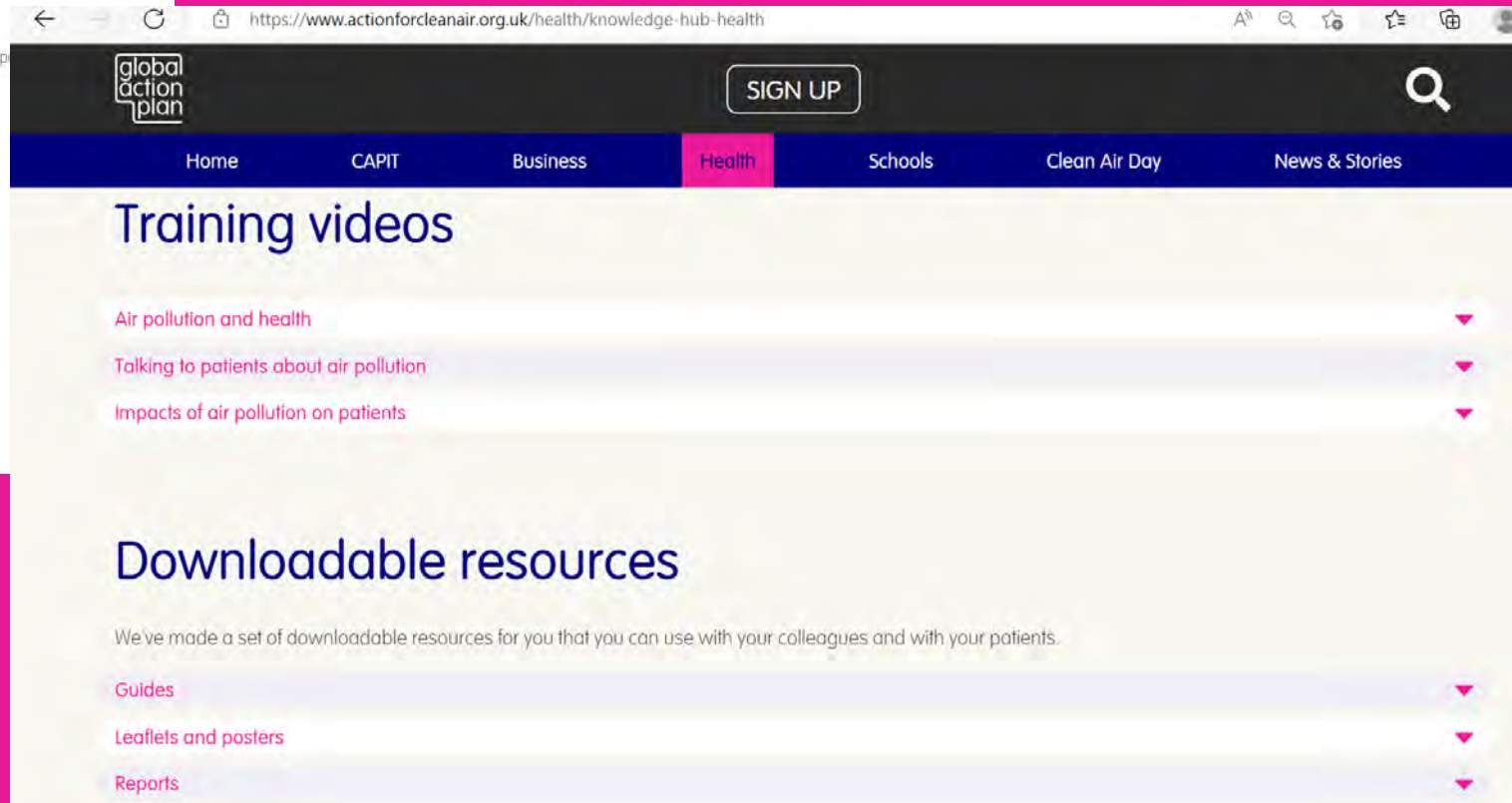


## Knowledge Hub - Health

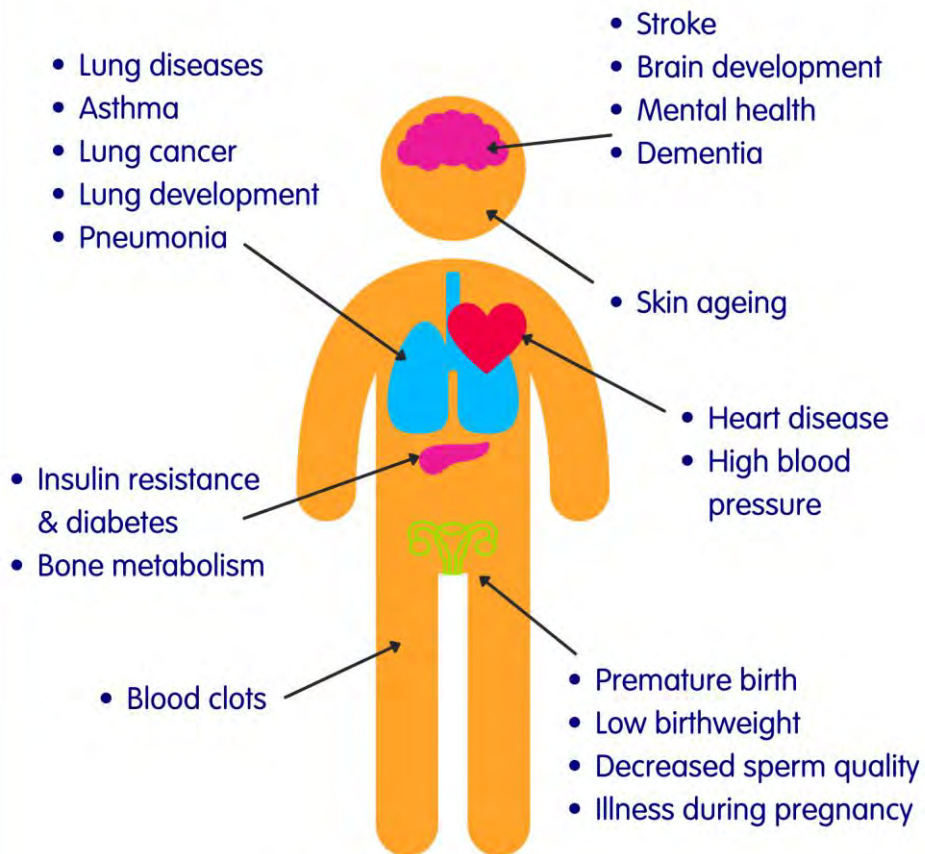
Browse the knowledge hub for information and resources on clean air for health professionals.

[GO TO THE HUB](#)

[www.actionforcleanair.org.uk/health](https://www.actionforcleanair.org.uk/health)



# How air pollution impacts the body



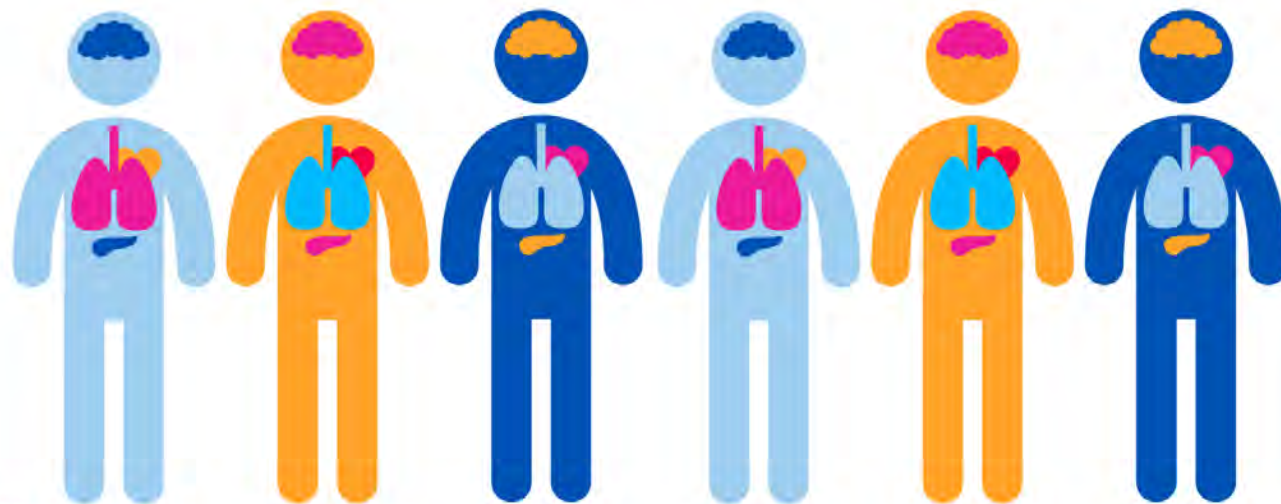
[cleanairhub.org.uk](http://cleanairhub.org.uk)



Department  
for Environment  
Food & Rural Affairs



# Air pollution impacts us all



[cleanairhub.org.uk](http://cleanairhub.org.uk)

Department  
for Environment  
Food & Rural Affairs

# Air Pollution & Child Health

## How does air pollution damage your child's health?

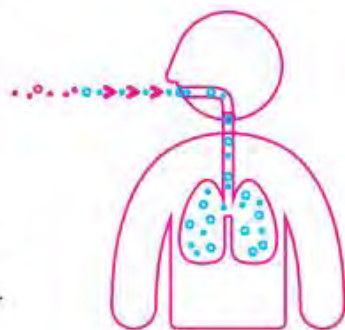


○ Air pollution is generally invisible but affects our health from before birth right through to old age. It enters our lungs when we breathe and gets into our blood, leading to effects throughout the body. There is no safe level of air pollution and there are many causes, inside and outside the home.

○ Children are especially sensitive to dirty air because their bodies are still growing. Their lungs, immune systems and brains are impacted by air pollution, and it also affects their ability to learn.

○ We are all affected by air pollution whether we live in the town or countryside. It is generally worse near main roads because of traffic and, because children are small, they often are closer to sources of air pollution such as car exhausts.

○ Air pollution can play a part in causing asthma and can make symptoms worse.



**But there are things we can all do to help.**

You can learn more about air pollution and find some simple ways to tackle it and protect your health at

[cleanairhub.org.uk](http://cleanairhub.org.uk)

## Simple steps can have a big impact on the air your family breathes

### Make travel choices for cleaner air



**Use people power** – Walk, scoot or cycle to school as often as you can.



**Discover the side streets** – Use quieter streets when you're walking or on a bike to avoid the higher levels of air pollution on main roads.



**Don't idle** – If you have to drive, turn off the engine when you are not moving, and it is safe to do so. Consider switching to an electric vehicle. Air quality can be worse inside the vehicle than outside.

### Make cleaner air decisions in the home



**Use fragrance-free, milder cleaning products and avoid plug-in fragrances.**



**When decorating, choose safer paints and varnishes labelled 'low VOC'** (volatile organic compounds).



**Ask people not to smoke in your home.**



**Reduce home burning as much as possible** (e.g. log burners, coal fires or candles).



**Ventilate your home** - Open windows and use extractor fans when cooking or using cleaning products, but close windows near busy roads during rush hours.

# Air Pollution and Children

Air pollution can worsen asthma symptoms including coughing, wheezing and breathlessness. The actions below can help:

## 1. Discover the side streets



Use quieter roads and paths to keep away from heavy polluting traffic.

## 2. Leave the car behind



Encourage your whole family to walk, cycle and scoot more - air pollution can be higher inside a car than outside.

## 3. Turn the engine off



If you do need to use a car, ask the driver to turn the engine off when the car isn't moving.

## 4. Check the pollution forecast



Check air pollution levels in your local area at [uk-air.defra.gov.uk](http://uk-air.defra.gov.uk) - this site provides hourly measurements and forecasts. Remember that air pollution increases significantly near busy roads, especially during rush hour.

## 5. Keep the air clean inside too



Use fragrance free and low-chemical cleaning products. Stop air pollution collecting in your home by using extractor fans and opening windows away from busy roads.

You can learn more about air pollution and find some simple ways to tackle it and protect your health at [cleanairhub.org.uk](http://cleanairhub.org.uk)

## My air pollution plan:

Choose the actions that you and your family are going to do, when you can, to protect your health from air pollution:

Please tick all that apply

We will walk, cycle or scoot to school



We will use quieter routes to avoid roads with heavy traffic

We will turn the engine off when the car is stationary and it is safe

We will leave the car at home whenever we can



I will use my inhaler as recommended by my GP or asthma nurse

I will treat air pollution the same way I treat other asthma triggers

We will buy fragrance-free, milder cleaning products and avoid plug-in fragrances

When decorating, we will choose paints and varnishes labelled "low VOC"

We will ask people not to smoke in our home



We will avoid home burning as much as possible (e.g. log burners, coal fires or candles)

We will turn on the extractor fan when cooking



We will open a window when cooking and cleaning



# Clean air schools

How can we support asthmatic children and benefit all children?





Almost all schools in the UK are in areas with air pollution above safe levels, exposing young people to dangerously high levels in their daily lives.

(based on WHO limits, 2021)

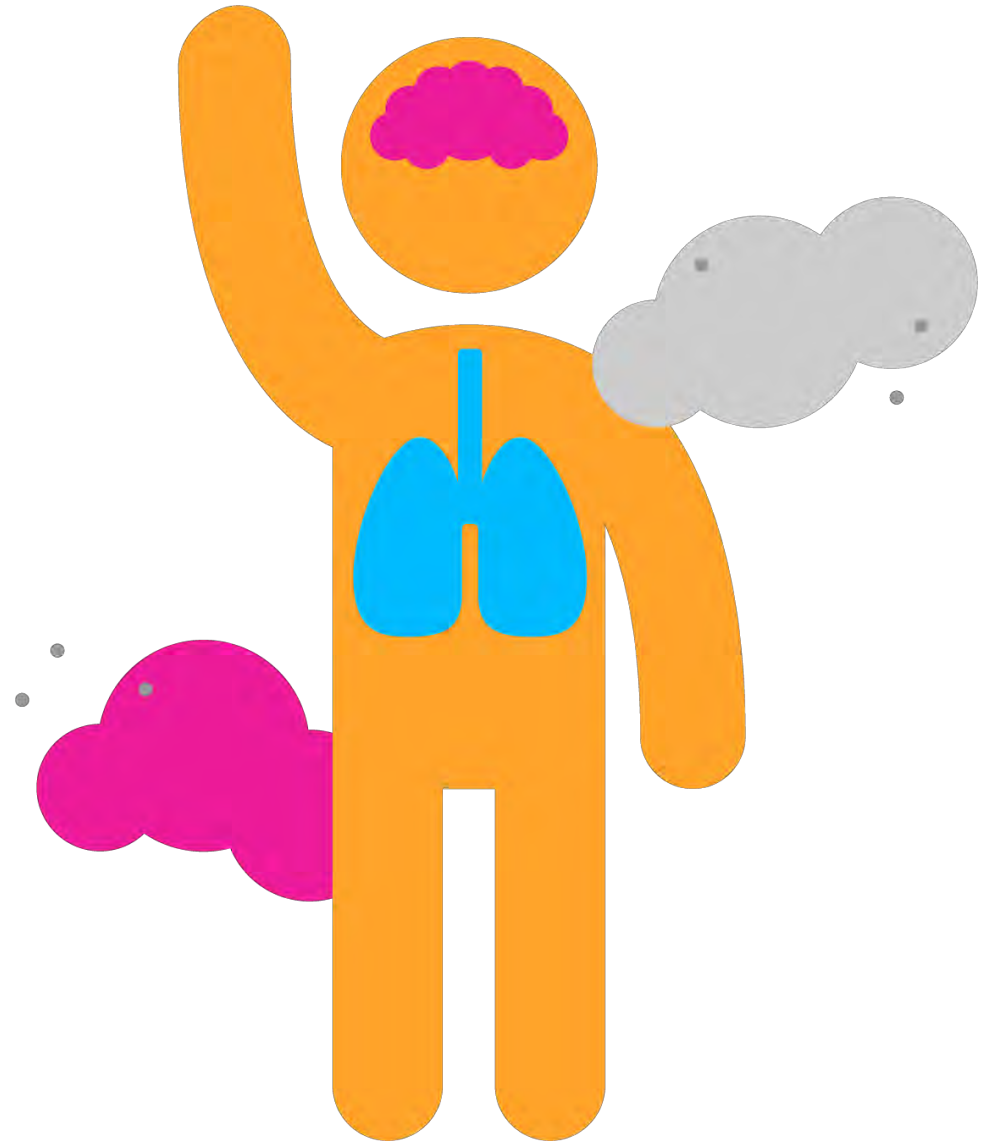
# Children are particularly at risk from air pollution

Children's **immune systems, lungs and brains** are still developing.

Air pollution can affect their:

- Physical health
- Mental health
- Ability to learn

Children with **health conditions** are more vulnerable to the impacts of air pollution





**Clean air schools benefit asthmatic children  
and all other children!**

3

ACKBIRD

2

# Co-benefits of improving air quality in schools



Supports climate change mitigation.



Improves children's ability to learn. Protects their physical/mental health & wellbeing.



Reduces strain on healthcare systems.

# Co-benefits of improving air quality in schools



Increases sense of community and provides spaces for children to play.



Reduces vehicle usage, lowers emissions and improves air quality.



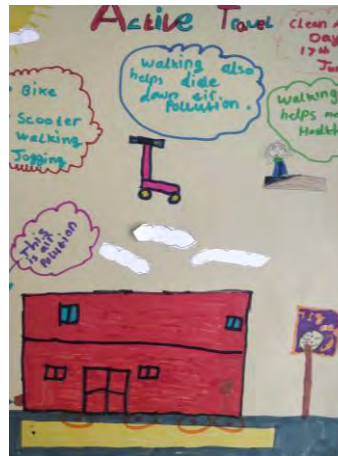
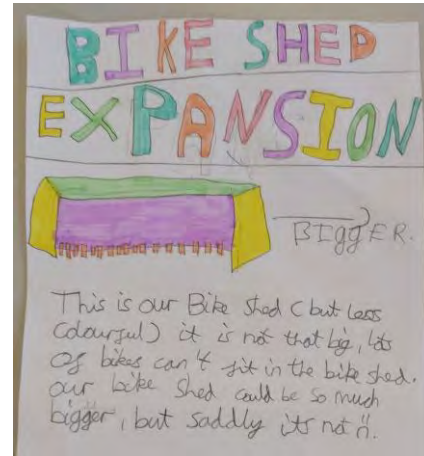
Creates safer streets & reduces traffic casualties.

**Source reduction is key**  
but it needs policy and legislative  
support or change



# Exposure reduction:

# within school control, minimal cost



Free or low-cost options and  
supporting resources





# Clean Air for Schools Framework



**TRANSFORM OUR WORLD** A community of educators empowering students to take climate action

[TEAM HOME](#) [LOG OUT](#)

Transform Our World > Tools > Clean Air for Schools Framework

## Clean Air for Schools Framework

Welcome to the Clean Air for Schools framework!

Create your own bespoke clean air plan by choosing from the recommended air pollution tackling actions and using the suggested advice and resources to help your school become a clean air school.

The Framework will support you to:

- 1) Reduce air pollution from your own operations.
- 2) Tackle air pollution at the school gate, including the school run next generation to help them and their families make cleaner air choices.
- 3) Educate the next generation to help them and their families make cleaner air choices.
- 4) Become a local leader on air pollution, working with local partners to improve air quality in the local area.

How does it work?

Create your bespoke clean air action plan in three simple steps. We estimate it will take about 25 minutes to complete.



Philips  
Foundation

MANCHESTER  
1824

The University of Manchester



# Step 1: enter the school name, postcode & number of pupils

The screenshot shows a web browser window with the URL `transform-our-world.org/tools/clean-air-for-schools-framework#actionplan`. The page features a navigation bar with the 'Transform Our World' logo and the tagline 'A community of educators empowering students to take climate action'. On the right, there are links for 'TEAM HOME', 'LOG OUT', and a search icon. Below the navigation bar, a breadcrumb trail reads 'Transform Our World > Tools > Clean Air for Schools Framework'. A progress indicator at the top shows four steps: 'ABOUT YOUR SCHOOL', 'AIR POLLUTION SURVEY', 'SELECT ACTIONS', and 'YOUR CLEAN AIR PLAN'. The 'ABOUT YOUR SCHOOL' step is currently active and highlighted in pink. The form contains the following fields and options:

- About Your School** (with a 'CLOSE' button)
- School Name**: A text input field with the placeholder 'School Name'.
- Postcode**: A text input field with the placeholder 'Postcode'.
- Number of pupils**: A text input field with the placeholder 'Number of pupils'.
- Are you happy for us to contact you about this programme?**: A question with a 'Yes' radio button option.
- SAVE**: A button to save the information.

Below the 'About Your School' form, there are two more sections visible in the progress indicator:

- School Air Pollution Survey** (with an 'OPEN' button)
- Select Actions** (with an 'OPEN' button)

# Step 2: Complete a short 'school air pollution survey'

The screenshot shows a web browser window with the URL [transform-our-world.org/tools/clean-air-for-schools-framework#actionplan](https://transform-our-world.org/tools/clean-air-for-schools-framework#actionplan). The page title is "School Air Pollution Survey" and it includes a "CLOSE" button in the top right corner. The survey text explains that air pollution at schools comes from various sources and asks users to answer "Yes" or "No" to a series of questions. A "SAVE" button is located at the bottom of the form.

**School Air Pollution Survey** CLOSE

Air pollution in and around schools comes from a range of sources including road transport, heating systems and the products used in the classroom. Every school therefore faces their own unique set of air pollution challenges. By answering the following questions as best as you can, you will help us to identify the air pollution solutions that work best for your school.

Please answer 'Yes' or 'No'. You will be able to change your answers at any point.

Question	Yes/No	Not sure how to find out?
Is there a major source of air pollution near the school?	<input checked="" type="radio"/> Yes	For example, industrial sites, busy A roads, motorways, petrol stations or construction sites that are within walking distance (150m) of the school.
Is there a busy A road next to your school?	<input checked="" type="radio"/> Yes	If unsure, take a look on <a href="#">Google Maps</a> for road labels.
Do most staff, students and their families drive to school?	<input checked="" type="radio"/> Yes	<a href="#">Complete a hands up survey</a>
Are you able to open windows in the majority of classrooms to let fresh air in?	<input checked="" type="radio"/> Yes	Consider if the windows in your school can be opened. If so, are they facing a polluted main road?
Do you receive deliveries to the school site more than once per week?	<input checked="" type="radio"/> Yes	Ask at your school reception.
Does your school engage and educate students about air quality?	<input checked="" type="radio"/> Yes	For example, incorporate air quality into school lessons, assemblies, eco-teams and join UK wide campaigns such as <a href="#">Clean Air Day</a>
Does your school engage with the wider school community, local decision makers and local businesses to tackle air pollution?	<input type="radio"/> No	For example, via newsletters, attending community meetings or on social media

SAVE

# Step 3: select 6 of your recommended actions

(you can add more later if you want to)

transform-our-world.org/tools/clean-air-for-schools-framework#actionplan

How to do practical... Action for clean air... Climate Visuals, a p... Charity Worker Disc... Resourcing planner... Action Learning pptv EPurchase - Login Schools Database... Clean Air Resource... Clean Global Actio... Clean Air Day 2022... OFFICE USE BOOKIE...

TRANSFORM OUR WORLD A community of educators empowering students to take climate action

TEAM HOME LOG OUT

Transform Our World > Tools > Clean Air for Schools Framework

## School Air Pollution Survey

### Select Actions

Now it's time to build your clean air action plan. **We suggest you pick up to six of the recommended actions to get going.** Once you have completed them, you can return to the Framework to add more to your action plan.

Your recommended actions have been selected based on their relevance to your school (in response to your answers in the survey above) and are ranked by their effectiveness, based on their impact on air quality in and around the school, cost, effort and co-benefits such as community engagement and educational value. If you are after more detail, each action displays symbols that represent the predicted effort, cost and impact on air quality to help you decide if this action is right for your school.

The actions that first appear at the top of each pathway are those we recommend your school starts with and we suggest you select at least one from each pathway. You can choose these actions to implement by clicking 'Add to action plan'. Or if you would rather select a different action in the pathway simply pick another one or select 'We already do this' or 'Not applicable'.

You can discover more about each action, and the important resources to help you implement your actions, by selecting 'Read more'. There will then be links to relevant toolkits, guidance and materials to help you do each action, as well as case studies from other schools to provide inspiration.

[View all actions](#)

PATH 1	PATH 2	PATH 3	PATH 4
<b>Traffic at the School Gate</b>	<b>School Operations</b>	<b>Education</b>	<b>Voice</b>
Goal: Streets free of all non-essential traffic	Goal: Addressing pollution sources, within control of the school	Goal: The school community are aware of and act on the issue of air pollution	Goal: Influence communities, businesses and decision makers to help tackle air pollution

[COMPLETE](#)

# Step 4: use your bespoke action plan to help your school become a cleaner air school

Review different options of how the selected action could work best at your school.

The screenshot shows the 'Your Clean Air Plan' page on the Transform Our World website. The page title is 'Your Clean Air Plan'. Below the title, there is a congratulatory message: 'Congratulations, you have now created your clean air action plan! You can download a PDF copy of your action plan, to share with others for example with your senior management team or governing body.' Below this, there is a paragraph explaining how to use the plan: 'As you work through the actions come back to the Framework to update your progress. You can 'Tick' actions that you have completed (these will then move to the bottom of the table), 'Share' an update on how you are implementing each action, and 'Delete' an action from your action plan that you no longer intend to implement. Actions that you have marked as 'We already do this' will be listed below the table. You can then add more actions to your clean air action plan as you become a clean air school.' Below this, there is a contact email: 'If you have any questions, please get in contact with us at [cleanerair@globalactionplan.org.uk](mailto:cleanerair@globalactionplan.org.uk)'. The main content is a table with four columns: 'Your action', 'In a bit more detail', 'Looking for inspiration', and 'Actions'. The first row of the table has the following content:

Your action	In a bit more detail	Looking for inspiration	Actions
Improve the facilities at school to encourage more people to walk, scoot or cycle	<p>1) Provide showers and locker facilities for staff to encourage active travel</p> <p>2) Offer a cycle to work scheme to your staff to encourage active travel</p> <p>The Cycle to Work scheme is designed to help your staff save money on a new bike and spread the cost of the bike over monthly tax-free instalments throughout the year.</p> <p>3) Improve cycle and scooter parking to encourage active travel</p> <p>The recommended minimum levels of scooter and cycle parking are:</p> <p>Primary schools: 1 scooter space per 10 pupils and 1 cycle space per 20 pupils</p> <p>Secondary schools: 1 cycle space per 10 pupils. In Scotland, funding is available to help implement cycle/scooter parking through Sustrans.</p> <p>All schools: 1 cycle space per 20 staff in a non-pupil area</p> <p><b>Co-benefits</b></p> <p>Physical activity improves physical and mental health.</p>	<p>Take a look at Global Action Plan's <a href="#">Cycle to work schemes guide</a>.</p> <p><a href="#">Cycle UK</a> provides useful guidance on cycle-friendly employers and cycle-commuting.</p> <p><a href="#">Check out Sustrans' helpful guidance</a> called 'The Cycle to Work scheme explained'. Plus, they have lots of <b>excellent ideas and actions</b> that you can use to change your workplace.</p> <p>Take a look at p.9-11 the <a href="#">Air Quality in Schools Intervention Toolkit</a> to find out more about providing shower and locker facilities for staff and improving cycle and scooter parking.</p> <p>Have a look at our case study about <a href="#">promoting active travel at Henry Fawcett Primary School</a>.</p>	

Download a PDF copy of your action plan or use the online version.

Use the resources to help implement your chosen action e.g. curriculum linked education materials, case studies, toolkits and guides.



**Everything you need to know about air pollution in one place**  
**[www.actionforcleanair.org.uk](http://www.actionforcleanair.org.uk)**

# Free resources for schools – collated in one place:

<https://www.actionforcleanair.org.uk/schools>



### Clean Air for Schools Resources

A range of articles, links, educational resources and practical tools, all made accessible at your school.

[FIND OUT MORE](#)



### Clean Air for Schools Vision

The Clean Air for Schools Vision is the vision we all need to happen. Both inside the school and outside in our communities for people and the planet.

[FIND OUT MORE](#)



### Clean Air for Schools Framework

The Clean Air for Schools Framework is a free online tool to help every school create a bespoke plan for action to tackle air pollution in and around the school.

[FIND OUT MORE](#)



### Air Pollution Calculator

Ask your students to consider a series of questions with their parents or guardians to find out their household pollution footprint and how they can take action to reduce it.

[FIND OUT MORE](#)



### London Schools Pollution Helpdesk

A free online service to help tackle air pollution for all London schools. Funded by the Mayor of London. Providing bespoke advice on improving air quality, reducing idling or plans, resources to help support teaching on quality in curriculum, literature towards funding options and help with your applications.

[FIND OUT MORE](#)



### London Schools and Nurseries Air Quality Forum

A supportive community of schools, nurseries and local businesses who must jointly take action on air pollution and a better tomorrow is being led.

[FIND OUT MORE](#)



### Making the case for clean air

This resource is for members of the school community to make the case for action on air quality to their school leaders. It includes a template letter and briefing notes.

[DOWNLOAD DOCUMENT](#)



### Air Quality in Schools: Intervention Toolkit

This toolkit provides guidance on how you can improve or directly implement air quality improvements for your school. This includes advice on your strategic plan, air quality strategy adjacent to your school and budget changes where you have the capacity to invest. It has been designed to work alongside the Clean Air for Schools Framework and provides linear diagrams, specific physical interventions. It could also be used as a discussion resource.

[DOWNLOAD TOOLKIT \(PDF\)](#)



### Air pollution and health

Find out more about how air pollution can affect children and adults through this film.

[FIND OUT MORE](#)

## Clean Air Campaign resources

A collection of action-focused teaching resources covering a broad range of clean air campaigns to help your students bring clean air to your school.



**Raising awareness on active travel**  
This resource is designed to teach your students about active travel and how they can encourage others to participate.



**Anti-idling campaign**  
This resource is designed to teach your students about idling and why it is dangerous.



**Car Free Day**  
This resource is designed to help your students learn about Car Free Day and help raise awareness of it in the school community.



**Low Pollution Maps**  
This resource is designed to help your students learn about low pollution routes to school and create their own low pollution map to support healthier journeys to and from school.



**Walk to School Week**  
This resource is designed to teach students about Walk to School Week and how can they raise awareness about it through designing posters.



**Walking bus**  
This resource is designed to educate your students and the school community about walking buses, and to encourage their parents and families to help them run a walking bus.



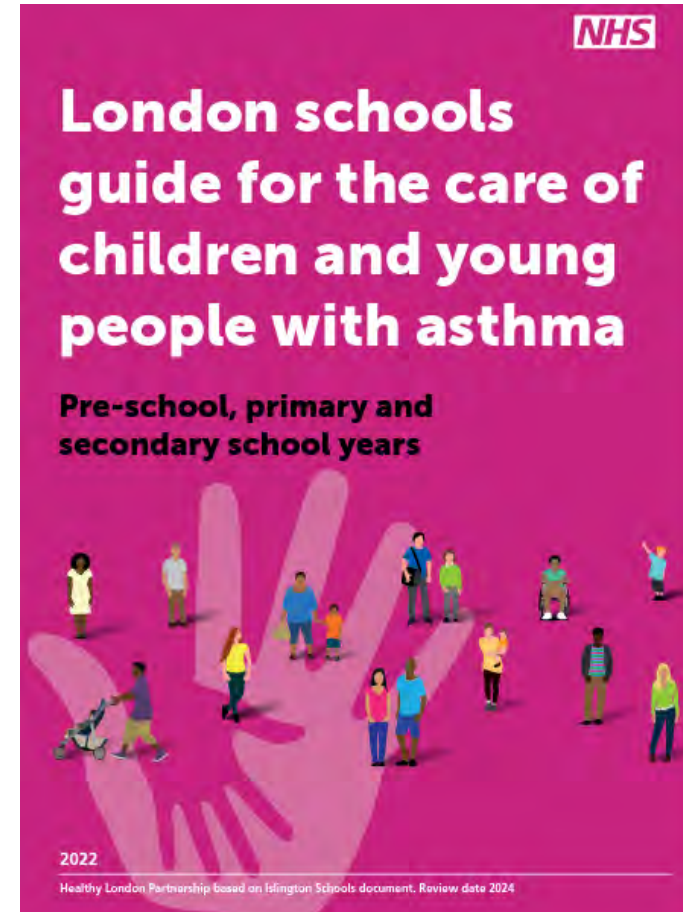
**Clean Air Vision resources**  
In this lesson, students will use their voices, and their creativity, to share their knowledge of solutions to air pollution with key decision-makers.

# Could clean air be part of asthma friendly schools?

- NHS colleagues asked GAP to review guide and provide practical suggestions to include clean air.

## Global Action Plan's suggested approach:

- Main focus must always be asthma
- Clean air schools benefit asthmatic individuals and have wider benefits
- Suggested adding *"create a clean air action plan using the Clean Air for Schools Framework. Start working towards completing 6 actions."*
- Focus is on completing the self-audit and 'working towards', not completing all actions.







Thank you!

Any questions or reflections?

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# Health Effects of Air Pollution on Children

Dr Ian Mudway

Imperial College London

MRC  
Centre for Environment & Health



Medical  
Research  
Council

Imperial College  
London

**NIHR** | Health Protection Research Unit in  
Environmental Exposures and Health  
at Imperial College London

**NIHR** | Health Protection Research Unit in  
Chemical and Radiation Threats and  
Hazards at Imperial College London

# Impacts of Air Pollution across the Life Course

Low birth weight



Smaller lungs  
Cognitive ability?



Increased risk of chronic disease  
Acute respiratory exacerbations



Acute and chronic  
Premature death  
Dementia



### Impact of London's road traffic air and noise pollution on birth weight: retrospective population based cohort study

Rachel B Smith,<sup>1,2</sup> Daniela Fecht,<sup>3</sup> John Gulliver,<sup>1</sup> Sean D Beevers,<sup>4</sup> David Dajnak,<sup>4</sup> Marta Blangiardo,<sup>1</sup> Rebecca E Ghosh,<sup>3</sup> Anna L Hansell,<sup>2,3</sup> Frank J Kelly,<sup>2,4</sup> H Ross Anderson,<sup>4,5</sup> Mireille B Toledano<sup>1,2</sup>

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<sup>2</sup>NHR HPRU in Health Impact of Environmental Hazards, King's College London, London, UK  
<sup>3</sup>UK Small Area Health Statistics Unit, MRC-PHE Centre for Environment and Health, Department of Epidemiology and Biostatistics, School of Public Health, Imperial College London, London, UK  
<sup>4</sup>MRC-PHE Centre for Environment and Health, Environmental Research

**ABSTRACT**

**OBJECTIVE**  
To investigate the relation between exposure to both air and noise pollution from road traffic and birth weight outcomes.

**DESIGN**  
Retrospective population based cohort study.

**SETTING**  
Greater London and surrounding counties up to the M25 motorway (2317 km<sup>2</sup>), UK, from 2006 to 2010.

**PARTICIPANTS**  
540 365 singleton term live births.

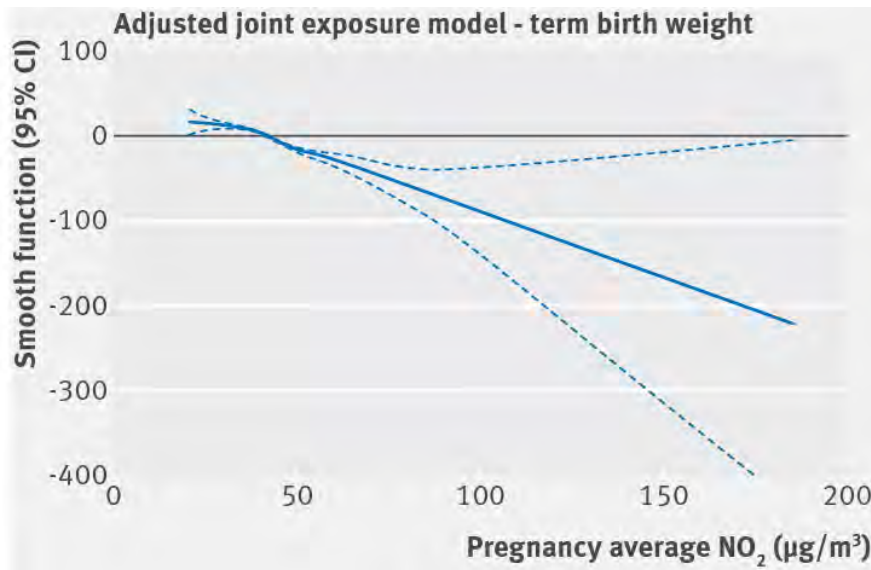
**MAIN OUTCOME MEASURES**  
Term low birth weight (LBW), small for gestational age (SGA) at term, and term birth weight.

**RESULTS**

increased odds of term SGA. Air pollutant associations were robust to adjustment for road traffic noise. Trends of decreasing birth weight across increasing road traffic noise categories were observed, but were strongly attenuated when adjusted for primary traffic related air pollutants. Only PM<sub>2.5 traffic exhaust</sub> and PM<sub>2.5</sub> were consistently associated with increased risk of term LBW after adjustment for each of the other air pollutants. It was estimated that 3% of term LBW cases in London are directly attributable to residential exposure to PM<sub>2.5</sub> >13.8 µg/m<sup>3</sup> during pregnancy.  
**CONCLUSIONS**  
The findings suggest that air pollution from road traffic in London is adversely affecting fetal growth. The results suggest little evidence for an independent exposure-response effect of traffic related noise on birth weight outcomes.

# London's road traffic air and noise pollution on birth weight

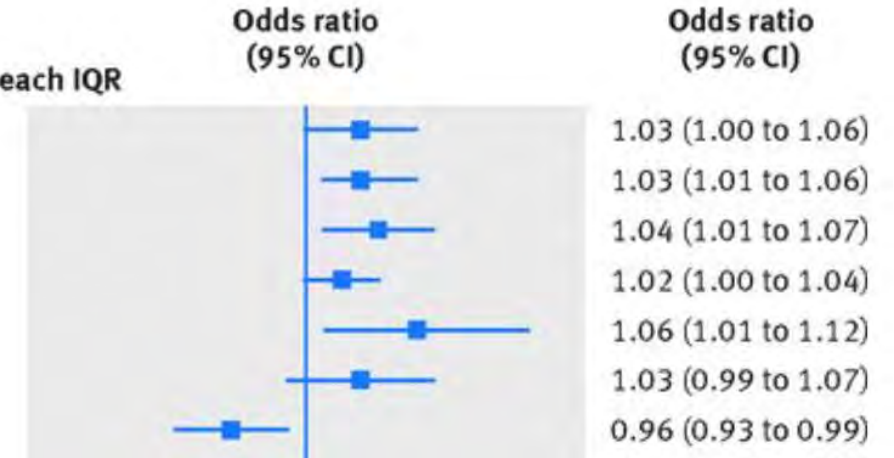
Odds of term low birth weight (LBW) associated with air pollutants



**Legend**

**Adjusted single air pollutant models for each IQR**

- NO<sub>2</sub>
- NO<sub>x</sub>
- PM<sub>2.5 traffic exhaust</sub>
- PM<sub>2.5 traffic non-exhaust</sub>
- PM<sub>2.5</sub>
- PM<sub>10</sub>
- O<sub>3</sub>



# Asthma

Ashworth et al. *Environmental Health* (2021) 20:54  
<https://doi.org/10.1186/s12940-021-00730-1>

Environmental Health

RESEARCH

Open Access



## Spatio-temporal associations of air pollutant concentrations, GP respiratory consultations and respiratory inhaler prescriptions: a 5-year study of primary care in the borough of Lambeth, South London

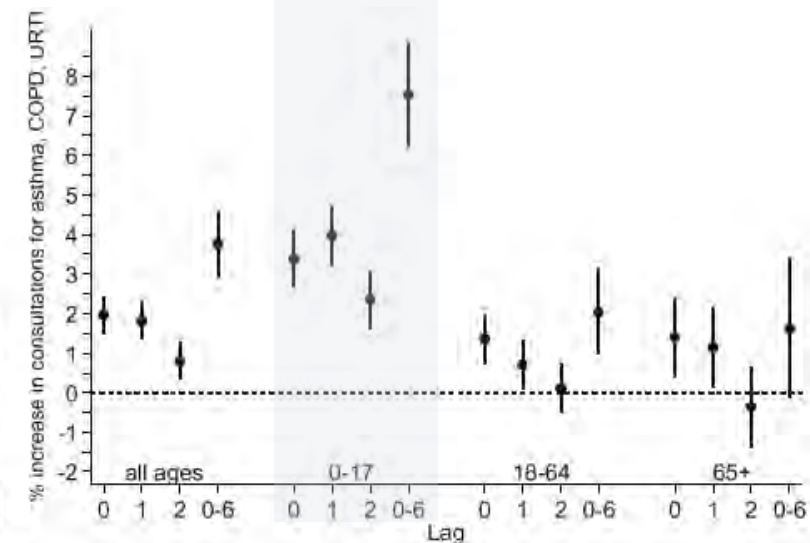
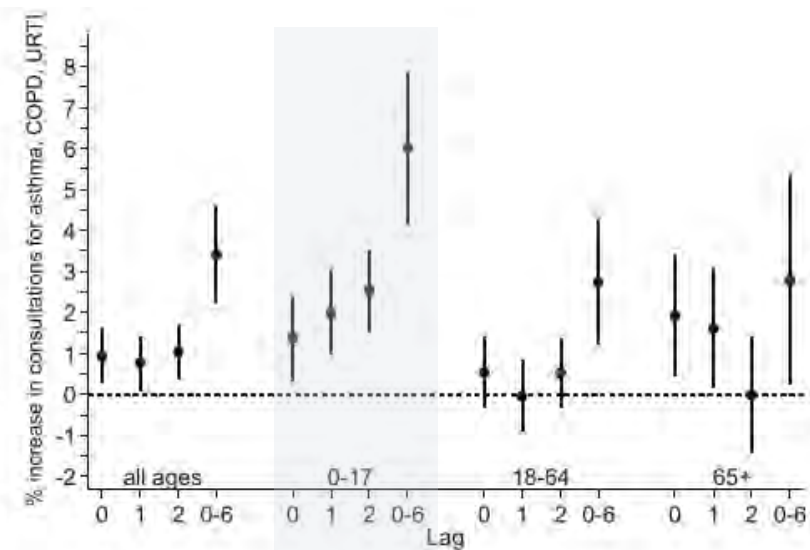
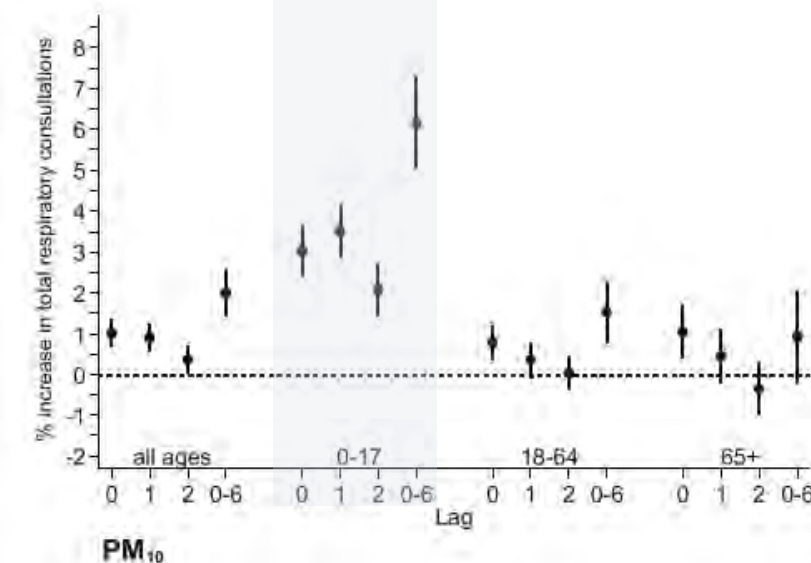
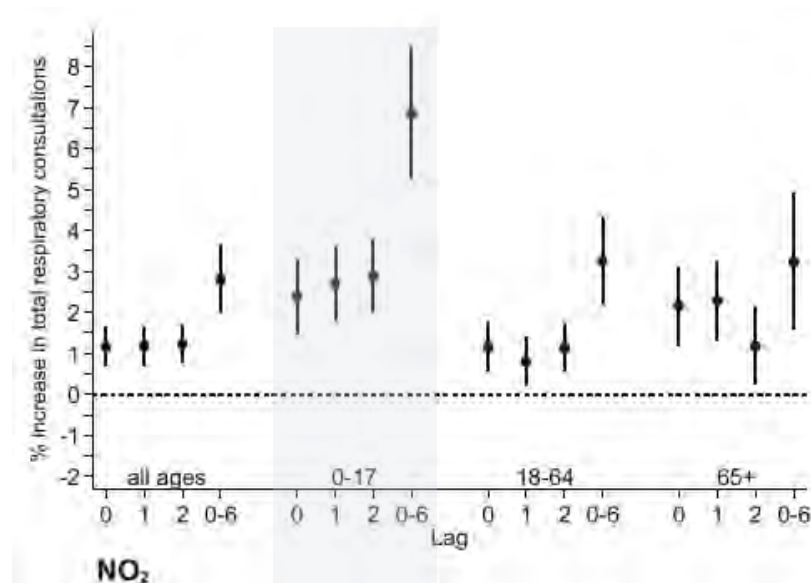
Mark Ashworth<sup>1\*</sup>, Antonis Analitis<sup>2</sup>, David Whitney<sup>1</sup>, Evangelia Samoli<sup>2</sup>, Sofia Zafeiratou<sup>2</sup>, Richard Atkinson<sup>3</sup>, Konstantina Dimakopoulou<sup>2</sup>, Sean Beavers<sup>1,4</sup>, Joel Schwartz<sup>5</sup>, Klea Katsouyanni<sup>2,4</sup> on behalf of the STEAM project research group

### Abstract

**Background:** Although the associations of outdoor air pollution exposure with mortality and hospital admissions are well established, few previous studies have reported on primary care clinical and prescribing data. We assessed the associations of short and long-term pollutant exposures with General Practitioner respiratory consultations and inhaler prescriptions.

**Methods:** Daily primary care data, for 2009–2013, were obtained from Lambeth DataNet (LDN), an anonymised dataset containing coded data from all patients (1.2 million) registered at general practices in Lambeth, an inner-city south London borough. Counts of respiratory consultations and inhaler prescriptions by day and Lower Super Output Area (LSOA) of residence were constructed. We developed models for predicting daily PM<sub>2.5</sub>, PM<sub>10</sub>, NO<sub>2</sub> and O<sub>3</sub> per LSOA. We used spatio-temporal mixed effects zero inflated negative binomial models to investigate the simultaneous short- and long-term effects of exposure to pollutants on the number of events.

(Continued on next page)



# Causes for Optimism



MRC-PHE  
Centre for Environment & Health

## Association of Improved Air Quality with Lung Development in Children

W. James Gauderman, Ph.D., Robert Urman, M.S., Edward Avol, M.S., Kiros Berhane, Ph.D., Rob McConnell, M.D., Edward Rappaport, M.S., Roger Chang, Ph.D., Fred Lurmann, M.S., and Frank Gilliland, M.D., Ph.D.

### ABSTRACT

#### BACKGROUND

Air-pollution levels have been trending downward progressively over the past several decades in southern California, as a result of the implementation of air quality-control policies. We assessed whether long-term reductions in pollution were associated with improvements in respiratory health among children.

#### METHODS

As part of the Children's Health Study, we measured lung function annually in 2120 children from three separate cohorts corresponding to three separate calendar periods: 1994–1998, 1997–2001, and 2007–2011. Mean ages of the children within each cohort were 11 years at the beginning of the period and 15 years at the end. Linear-regression models were used to examine the relationship between declining pollution levels over time and lung-function development from 11 to 15 years of age, measured as the increases in forced expiratory volume in 1 second (FEV<sub>1</sub>) and forced vital capacity (FVC) during that period (referred to as 4-year growth in FEV<sub>1</sub> and FVC).

#### RESULTS

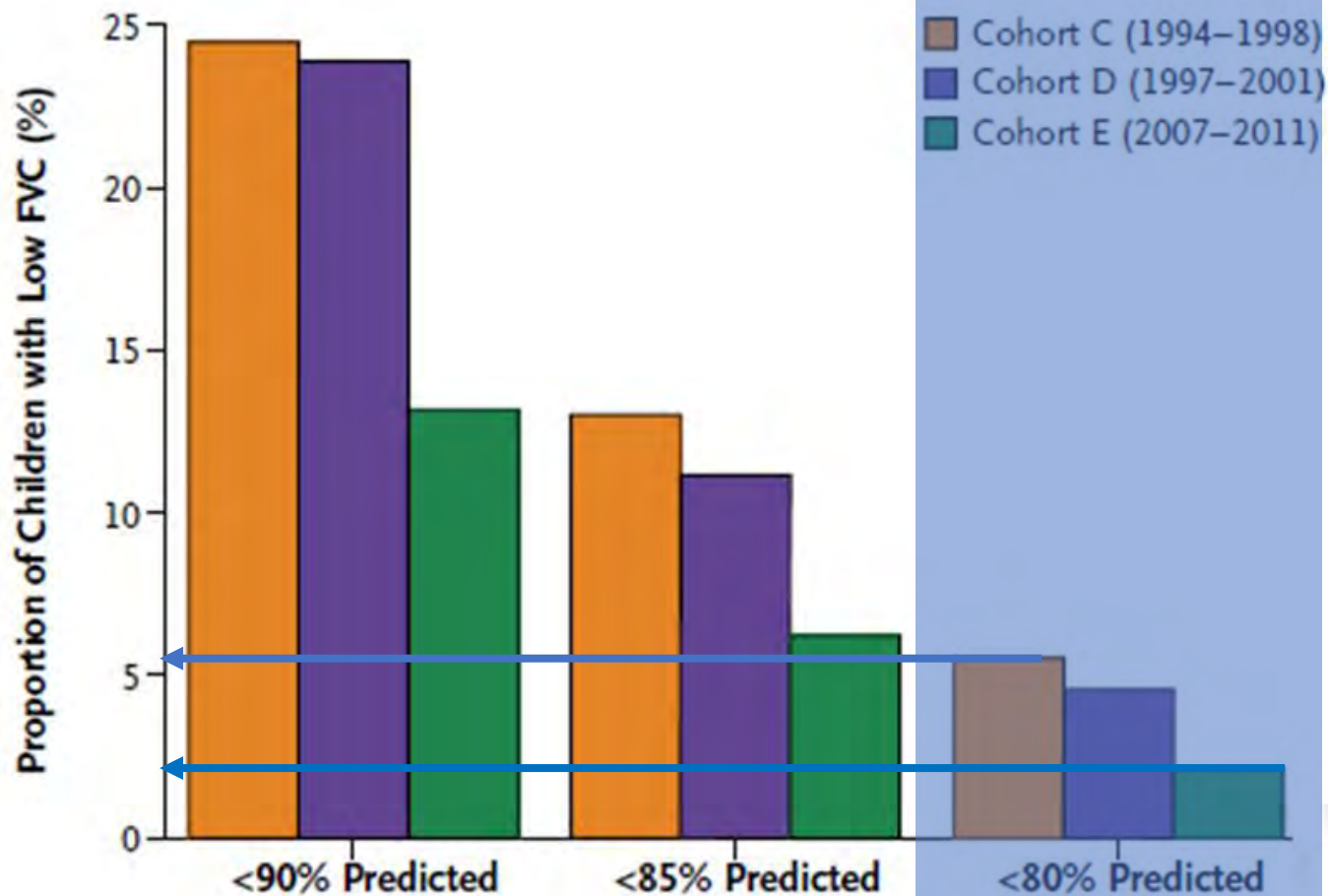
Over the 13 years spanned by the three cohorts, improvements in 4-year growth of both FEV<sub>1</sub> and FVC were associated with declining levels of nitrogen dioxide (P<0.001 for FEV<sub>1</sub> and FVC) and of particulate matter with an aerodynamic diameter of less than 2.5 μm (P= 0.008 for FEV<sub>1</sub> and P<0.001 for FVC) and less than 10 μm (P<0.001 for FEV<sub>1</sub> and FVC). These associations persisted after adjustment for several potential confounders. Significant improvements in lung-function development were observed in both boys and girls and in children with asthma and children without asthma. The proportions of children with clinically low FEV<sub>1</sub> (defined as <80% of the predicted value) at 15 years of age declined significantly, from 7.9% to 6.3% to 3.6% across the three periods, as the air quality improved (P=0.001).

#### CONCLUSIONS

We found that long-term improvements in air quality were associated with statistically and clinically significant positive effects on lung-function growth in children. (Funded by the Health Effects Institute and others.)

From the Department of Preventive Medicine, University of Southern California, Los Angeles (W.J.G., R.U., E.A., K.B., R.M., E.R., R.C., F.G.) and Sonoma Technologies, Petaluma (F.L.)—both in California. Address reprint requests to Dr. Gauderman at the Department of Preventive Medicine, University of Southern California, 2001 Soto St., 202-K, Los Angeles, CA 90032, or at jimg@usc.edu.

*N Engl J Med* 2015;372:905-13.  
DOI: 10.1056/NEJMoa1414323  
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Ultra low  
emission

ULEZ

ZONE

At all times

10 pm

Operating 24/7

## ULEZ central London from 8 April 2019

in the same area as the Congestion Charge

## ULEZ extension to inner London from 25 Oct 2021

up to North and South Circular roads, including existing central London zone (all vehicles)



## LEZ London-wide from 26 Oct 2020

(lorries and other vehicles more than 3.5 tonnes)



Greater London Authority Boundary



For a full list of affected vehicles see [tfl.gov.uk/ulez](https://tfl.gov.uk/ulez)

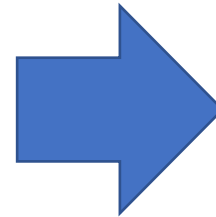
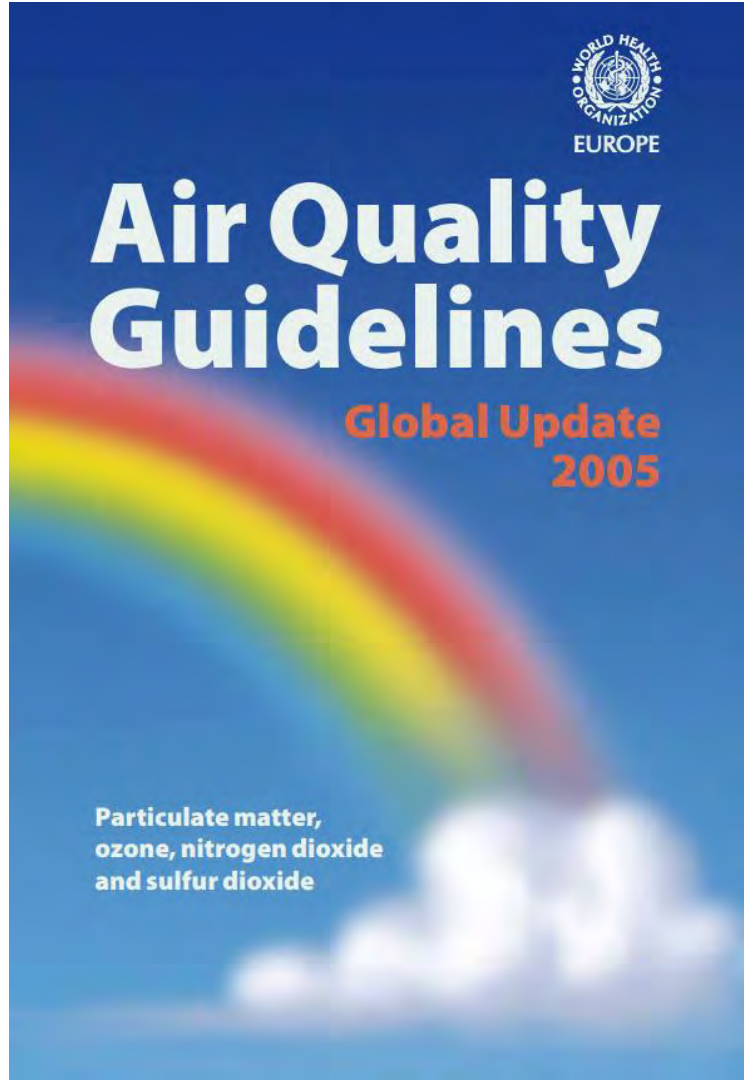


PM2.5 (ug/m3)



NO2 (ug/m3)





# Recommended AQG – with interim targets

Pollutant	Averaging time	Interim target				AQG level
		1	2	3	4	
PM <sub>2.5</sub> , µg/m <sup>3</sup>	Annual	35	25	15	10	5
	24-hour <sup>a</sup>	75	50	37.5	25	15
PM <sub>10</sub> , µg/m <sup>3</sup>	Annual	70	50	30	20	15
	24-hour <sup>a</sup>	150	100	75	50	45
O <sub>3</sub> , µg/m <sup>3</sup>	Peak season <sup>b</sup>	100	70	–	–	60
	8-hour <sup>a</sup>	160	120	–	–	100
NO <sub>2</sub> , µg/m <sup>3</sup>	Annual	40	30	20	–	10
	24-hour <sup>a</sup>	120	50	–	–	25
SO <sub>2</sub> , µg/m <sup>3</sup>	24-hour <sup>a</sup>	125	50	–	–	40
CO, mg/m <sup>3</sup>	24-hour <sup>a</sup>	7	–	–	–	4

<sup>a</sup> 99th percentile (i.e. 3–4 exceedance days per year).

<sup>b</sup> Average of daily maximum 8-hour mean O<sub>3</sub> concentration in the six consecutive months with the highest six-month running-average O<sub>3</sub> concentration.



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*Leading the way in Children's Health*

# Every breath we take The lifelong impact of air pollution

Report of a working party  
February 2016



Imperial College  
London  
Projects

Environmental  
Research Group



## Impacts of air pollution across the life course – evidence highlight note

Independent analysis prepared by:  
Gary Fuller, Stav Friedman and Ian Mudway  
Environmental Research Group, Imperial College London

# Chief Medical Officer's Annual Report 2022 Air pollution

