

COMMUNICATING THE HEALTH IMPACTS OF AIR POLLUTION

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INTRODUCTION

Air pollution is a public health emergency in the UK. Breathing dirty air can affect your physical wellbeing at every stage of life, from the womb to old age, and can lead to a lifetime of health complications. Yet, most people are unaware of the full effects of dirty air on their health and that of their family. This toolkit can help you change that.

When we talk about air pollution the most common statistics show premature deaths and years of life lost. While these statements are great at generating media buzz, they only tell part of the story. Breathing polluted air affects your body in the long and short-term. It's not just about early deaths; it's about your everyday health.

This toolkit is designed to help you speak about the health impacts of air pollution and to convince people to help clean up our air.

The toolkit offers practical tips on how to best engage the public¹ on the subject of air pollution, highlights the health conditions that most people care about and recommends the most effective language and imagery choices to communicate your message. Whether you are an experienced campaigner, grassroots activist, local parent or concerned health professional, this toolkit is for you.

This guidance has been developed through focus groups, online message testing, and consultation with key organisations working on air pollution in order to uncover the best ways to engage and drive public action on dirty air.² It has been designed to accompany the recent report from King's College London, Personalising the Health Impacts of Air Pollution. The full report can be found [here](#) and includes up to date statistics on the effects of air pollution across more than two dozen health outcomes.

1. This toolkit was designed to reach people not already engaged in air pollution. For any audience of already committed activists, we recommend you conduct additional tests.

This research was gathered from June-October 2019. The results are the most comprehensive we have to date, however will be continually updated.





Air pollution is a public health emergency, but we have the power to stop it. Let's get started.

OVERVIEW: THE TWO PAGES YOU NEED TO READ

TOP TIPS FOR COMMUNICATING AIR QUALITY AND HEALTH

If you read nothing else in this guide, read this page. Below are the key tips for effectively talking about health and air quality.

1. Discuss the conditions most relevant to your audience.

Based on focus groups research and digital testing, the UK general public care most about; Heart Attacks, being admitted to the hospital for asthma, asthma attacks, strokes and lung health. For a general audience, we recommend you focus on these health impacts. If your audience is concerned with a particular health impact, focus on that one. The key point is to speak to your audience about the health condition that matters the most to them and their loved one.

2. Use easy to understand language.

Simple, qualitative statements explaining the link between air pollution and health conditions such as 'Daily spikes in air pollution in London can trigger heart attacks.' are generally the best way to engage the public. Quantitative statements such as 'The risk of out of hospital cardiac arrest in London is 2.2% higher on high air pollution days than lower air pollution days.' can also engage new audiences but are generally less effective. On the whole, qualitative statements are more impactful.



3. Make sure the statements are believable.

When discussing health conditions it is important to not over-exaggerate the truth. Research suggests that the general public is most engaged by statements that are not overly dramatised. Furthermore, make sure that you are ready to back up any statements shared with the correct data and citations.

4. Be local.

Using images of popular and specific sites, relevant to the target audience, is more engaging than using generic images. This holds true across audiences, geographies and issues.

5. Use images that contextualise the issue.

On the whole, images that reveal the impact of air pollution on one's health, such as images of an ambulance (when talking about hospitalisation) or illustration of an affected organ are more engaging than images of people or generally polluted cities.

6. Don't be afraid to experiment with other messages.

The findings in this toolkit are relevant to the broad British public and make use of the latest available research. If you have a particular target in mind, another statement and image might be more relevant to that group. Don't be afraid to test results continuously, as we learn even more about the harmful effects of air pollution and human health.





1 WHICH HEALTH ISSUES MATTER MOST TO PEOPLE IN THE UK?

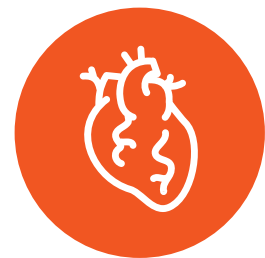
The proven health impacts of breathing polluted air are vast, ranging from stunted lung growth in children to heart failure and sudden death in adults (You can see a full list of the health impacts of air pollution in Appendix A).³ Engaging the public on this topic however, can be challenging.

As a rule, we recommend starting with the audience you want to target and thinking about what most concerns them. If you're speaking to a group of people above 55, you may want to talk about the increased risk of developing Chronic Obstructive Pulmonary Disease (COPD). If you're speaking to a group of parents, you may want to stress the relationship between breathing polluted air and reduced lung capacity in children.

3. We only tested health impacts that are proven by a sizeable amount of research. Newly uncovered impacts, such as the connections between air pollution and dementia or depression, do not yet have sufficient evidence to communicate causal links and were therefore excluded from this study.

THE HEALTH ISSUES WE CARE MOST ABOUT:

If you're speaking to a much wider audience, the question becomes more difficult. However, focus group research and digital testing found that the following five health issues are the most engaging for a general UK audience:



HEART ATTACK

Breathing polluted air over a long or short period of time can increase your risk of heart attack



ASTHMA HOSPITAL ADMISSIONS

Daily spikes in air pollution increases the number of asthma related visits for both children and adults



ASTHMA ATTACK

Short-term exposure to air pollution can increase asthma symptoms in children



STROKE

Breathing polluted air over a prolonged period of time increases your risk of stroke, and daily spikes in air pollution can trigger strokes



LUNG HEALTH

Prolonged exposure to air pollution reduces the lung capacity and size of children's lungs

If you are short on time or don't know which issue matters most to your audience, we would recommend focusing on the conditions listed above, testing which ones are most effective and focusing your efforts.

Note: The success of these statements will vary depending on your specific audience. Don't be afraid to make use of the available statements from this toolkit and see what works best for your context.



HOW TO TALK ABOUT HEALTH IMPACTS?

When communicating the health impacts of air pollution, the words you choose are incredibly important. It isn't only the **type of health condition** that determines how individuals engage with the content; the language you use is critical in influencing public engagement.

It is also important to find a balance between using attention-grabbing communications and being factually and medically accurate. Too often, we see statements that are either too academic to be understood or too exaggerated to be believable.⁴ Research carried out for this project suggests that the general public is most engaged by statements that are believable, not overly dramatised and easily comprehensible. It's not an easy mix to achieve but it can be done.

There are a number of different variables to keep in mind when talking about air pollution and human health. In Table 1 we've summarised these variables and included the latest findings to guide you on how much or how little these matter in your overall communications strategy.

4. Focus group results

2.1 FRAMING OPTIONS

TABLE 1

VARIABLE	DESCRIPTION	RESEARCH FINDINGS
LONG-TERM VS SHORT-TERM EXPOSURE	Do people care more about the effects of daily spikes in air pollution or the impacts of prolonged exposure over time?	There was no significant difference between the public’s engagement with content focusing on the impact of short term vs long term exposure to air pollution.
POLLUTION GENERALLY VS. TYPES OF POLLUTION SOURCES	Does it matter to the average person which type of pollutant they are breathing i.e. PM10, NO2, PM2.5?	Audiences engage most with non-scientific, easy to understand language. This means that statements referring to ‘pollution’ generally performed better than results referring to specific pollution sources.
QUANTITATIVE VS QUALITATIVE STATEMENTS	How important are statistics? Do they move people more than simply saying there’s a link between air pollution and a particular health outcome?	Qualitative statements were much more engaging than quantitative statements. While counterintuitive, this suggests that people prefer the general concept to a specific statistical statement. However, it’s important to note that an exceptional statistic has the ability to cut through. Nevertheless, this often the exception that proves the rule.
NUMBERS VS PERCENTAGES	Does a percentage increase in risk of developing a health condition resonate more than the number of people who are expected to develop health conditions? Health statements can be developed to use either so it’s up to us to figure out which one is most effective.	From our research, the most engaging quantitative statements were ‘percentage statements’ such as “Living near a busy road in London can increase your risk of coronary heart disease by 6.3%”. These performed much better than numerical statements such as “Each year, on average, higher air pollution days in London are responsible for 87 more cardiac arrests outside hospital than lower air pollution days.”
LOCAL VS GENERAL	What do people care about? The national average or the local impact?	Referring to specific locations is generally more engaging than discussing the impact of air pollution generally. This held true during every round of testing.

2.2 HEALTH STATEMENTS

We produced the following statements on the health impacts of air pollution across the UK. We have separated them by health outcome. The qualitative statements can be adapted to replace “the UK” for any particular city in the United Kingdom in order to increase the general impact.

2.2.1 BEST PERFORMING STATEMENTS⁵

LIVING NEAR A BUSY ROAD INCREASES YOUR RISK OF HEART ATTACK

Why this works?

- People can relate to it
- Contextualises air pollution into everyday exposure i.e. where you live
- Health impact is personalised with “your”

DAILY SPIKES IN AIR POLLUTION CAN TRIGGER HEART ATTACKS

Why this works?

- People can relate to it
- Credible cause and effect between elevated air pollution and heart attack

EXPOSURE TO AIR POLLUTION IN THE UK CAN INCREASE THE NUMBER OF PEOPLE ADMITTED TO HOSPITAL FOR ASTHMA

Why this works?

- People can relate to it
- Credible cause and effect between elevated air pollution and asthma

5. It is interesting to note that one of the top six statements was quantitative. This draws attention to the fact that there are exceptions to the findings uncovered in this research. The results presented in this toolkit therefore must not be seen as set rules to be strictly followed. Rather, you should continue to experiment to see how your target audience best engages with different types of content.

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2.2.1 BEST PERFORMING STATEMENTS (CONTINUED)

SUDDEN RISES IN AIR POLLUTION ARE LINKED TO MORE CHILDREN GOING TO HOSPITAL FOR ASTHMA

Why this works?

- People can relate to it
- Credible cause and effect between elevated air pollution and asthma
- Focus on a vulnerable group

SUDDEN RISES IN AIR POLLUTION IN THE UK CAN INCREASE THE NUMBER OF PEOPLE GOING TO HOSPITAL FOR ASTHMA

Why this works?

- People can relate to it
- Credible cause and effect between air pollution and asthma

IN LONDON, ADULTS ARE 1.4% MORE LIKELY TO BE HOSPITALISED FOR ASTHMA ON DAYS WITH HIGH NO₂ POLLUTION COMPARED TO DAYS WITH LOWER AIR POLLUTION

Why this works?

- People can relate to it
- Credible cause and effect between air pollution and asthma
- Believable statistic

2.2.2 QUALITATIVE STATEMENTS

HEART ATTACKS

- Air pollution in the UK increases your risk of heart attack.
- Exposure to air pollution can increase your risk of heart attack.
- **Living near a busy road increases your risk of heart attack. [Top Performing Statement]**
- Regularly breathing polluted air can increase your risk of heart attack.
- **Daily spikes in air pollution can trigger heart attacks. [Top Performing Statement]**

ASTHMA ADMISSIONS

- Sudden increases in air pollution in the UK are linked to more children going to hospital for asthma.
- **Exposure to air pollution in the UK can increase the number of people admitted to hospital for asthma. [Top Performing Statement]**

ASTHMA ATTACKS

- **Air pollution in the UK is linked to increased asthma symptoms in children. [Top Performing Statement]**
- Exposure to higher daily air pollution can trigger asthma symptoms in children with asthma.

STROKE

- Air pollution in the UK is linked to increased hospital admissions for stroke.
- Exposure to air pollution in the UK increases the risk of hospitalisation for strokes.
- Exposure to air pollution in the UK increases your risk of stroke.
- Living near a busy road in the UK increases your risk of stroke.
- Roadside air pollution in the UK increases your risk of stroke.

LUNG FUNCTION

- Air pollution in the UK is linked to stunted lung growth in children.
- Exposure to air pollution in the UK stunts the growth of children's lungs.
- Exposure to air pollution in the UK prevents the normal growth of children's lungs.

Statements in orange were the most engaging for the general public.

2.2.3 QUANTITATIVE STATEMENTS

The following statements are sourced from the report Personalising the Health Impacts of Air Pollution. They have been created for the following cities: London, Birmingham, Bristol, Derby, Liverpool, Manchester, Nottingham, Oxford and Southampton.

A full list of statements for all the cities can be found in Appendix B. For the purpose of this guide, we have included the statements for London as examples.

HEART ATTACKS

- Living near a busy road in London can increase your risk of coronary heart disease by 6.3%.⁶ [Top Performing Statement]
- Each year on average, higher air pollution days in London are responsible for 87 more cardiac arrests outside hospital than lower air pollution days.⁶ [Top Performing Statement]
- The risk of out of hospital cardiac arrest in London is 2.2% higher on high air pollution days than lower air pollution days.⁸
- Roadside air pollution in London may contribute to 821 new cases of coronary heart disease each year.⁹

STROKE

- The risk of emergency hospitalisations for stroke in London is 2.7% higher on high air pollution days than on lower air pollution days.¹⁰
- Living near a busy road in London increases your risk of hospitalisation for stroke by 6.6%.¹¹
- Living near a busy road in London may increase your risk of stroke by 10.2%.¹²
- On high air pollution days in London, there are on average 144 more hospital admissions for stroke each year than on lower air pollution days.¹³
- Roadside air pollution in London may contribute to 306 new cases of stroke each year.¹⁴
- Each year on average, higher air pollution days in London can send up to 219 more people to hospital for stroke than lower air pollution days.¹⁵

ASTHMA ADMISSIONS IN CHILDREN

- In London, an extra 74 children are hospitalised with asthma on days where air pollution is high compared to days where air pollution is low on average each year.¹⁶
- In London, your child is 4.2% more likely to be hospitalised for asthma on days with high NO₂ pollution compared to days with lower air pollution. [Top Performing Statement]¹⁷
- In London, adults are 1.4% more likely to be hospitalised for asthma on days with high NO₂ pollution compared to days with lower air pollution.¹⁸
- In London, an extra 33 adults are taken to hospital with asthma on days of high air pollution compared to days with lower air pollution.¹⁹

Statements in orange were the most engaging for the general public.

6. Assumption 45

7. Assumption 45

8. Assumption 46

9. Assumption 46

10. Assumption 46

11. Assumption 47

12. Assumption 47

13. Assumption 46

14. Assumption 47

15. Assumption 46

16. Assumption 46

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REDUCED LUNG CAPACITY

- Roadside air pollution in London stunts lung growth in children by 12.5%. [Top Performing Statement]²⁰
- Cutting air pollution in London by one fifth would increase children's lung capacity by around 4.1%.²¹
- Living near busy roads in London may contribute to an 8.7% greater chance of reduced lung function in children.²²

ASTHMA SYMPTOMS

- In London, children with asthma are 0.3% more likely to experience asthma symptoms on high air pollution days than on lower pollution days.²³
- On high air pollution days, 143 more children with asthma in London experience asthma symptoms than on lower pollution days. [Top Performing Statement]²⁴

Statements in orange were the most engaging for the general public.

20. Assumption 47

21. Assumption 48

22. Assumption 47

23. Assumption 49

24. Assumption 49

3

HOW TO VISUALISE HEALTH IMPACTS?

The images you use are critical in attracting public attention and engagement. We tested the following image variables to determine the best ways to visualise the impact of pollution on health. Here's what we found:





PEOPLE VS OBJECT

What we tested?

Do audiences respond better to images with people or without people?

What we found?

Audiences generally engaged more when there were no people in the images. Again, this may not hold true for all audience but in general it appears to be correct.



CAUSE VS IMPACT

What we tested?

Are people more interested in images revealing the cause or impact of health pollution? Are they interested in the exhaust coming from a car or the organ it affects?

What we found?

Audiences engaged best with posts that allude to the severity of the impact of pollution rather than the cause of the problem. For example, an image of an ambulance or a stressed heart was much more engaging than an image of a polluted street.



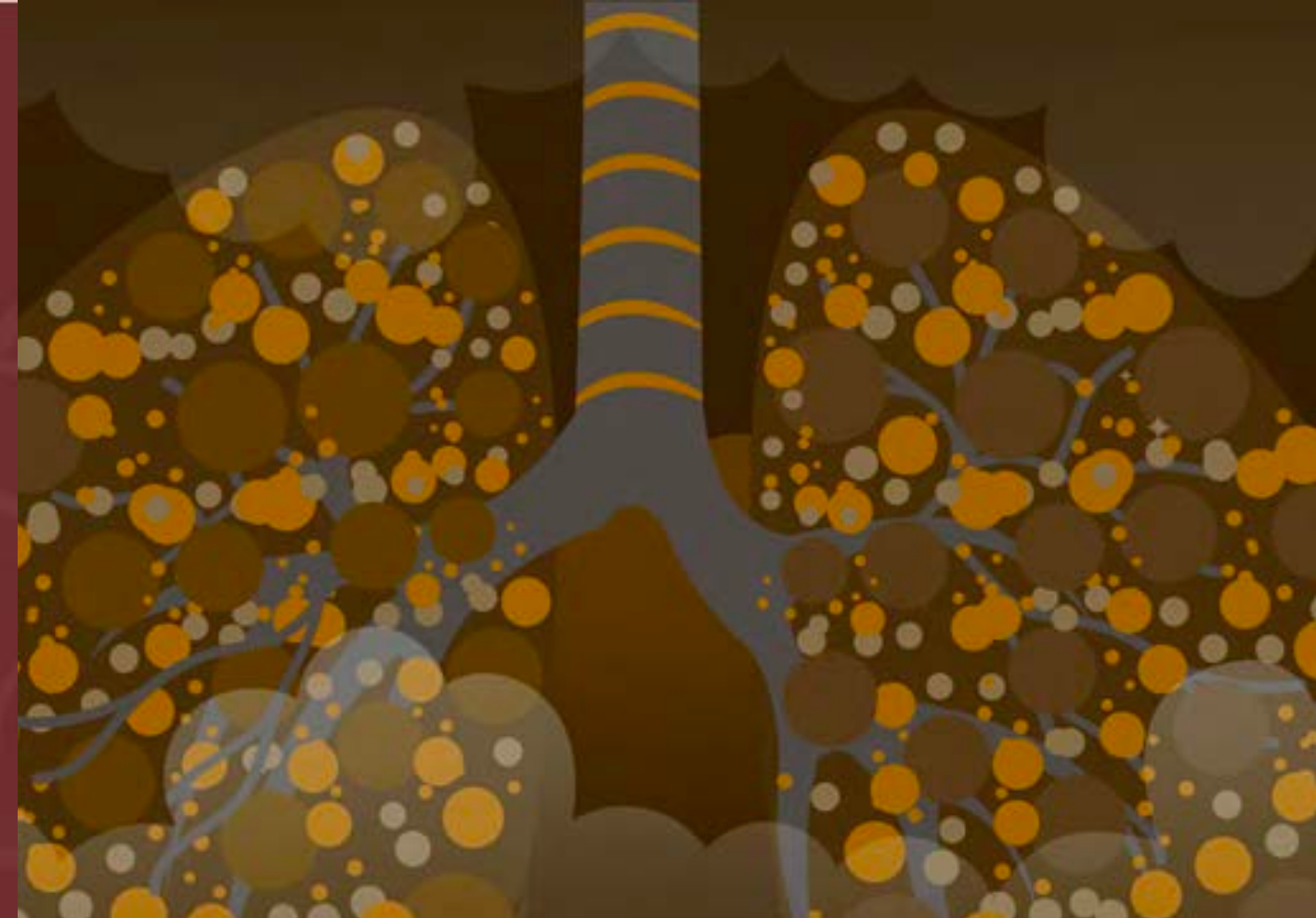
LOCAL VS GENERAL

What we tested?

Do people respond better to localised or more generic images?

What we found?

Like with language, images of a recognisable cityscape and outlines of cities were more engaging to local audiences.



**THESE GRAPHICS WERE PARTICULARLY
ENGAGING FOR AUDIENCES.
DOWNLOAD THE FILE OF SHARE GRAPHICS
[HERE.](#)**



4

SOCIAL MEDIA BEST PRACTICE

WHERE TO POST

This toolkit is designed for Facebook, Twitter, and Instagram. You can share the [graphics](#) through these platforms, using the range of [messages](#) to best suit your channel.

WHO TO TAG

Make sure you add relevant hashtags to your Instagram and Twitter posts, and tag relevant partners, groups or organisations.

WHO TO TARGET

Make sure, when sharing the posts that you geo-locate²⁵ your post to the UK or the city you are targeting.

WHEN TO TEST

It is important to note that the results gathered were not all-encompassing, and that other variations of images may perform better than those tested here. When conducting online campaigning, it is important to be flexible and adaptable. Share different variations of copy and images, and see which posts get the best results. Constantly learn from your work.

WHEN TO BOOST

Adding money to boost a post increases its reach and engagement. As little as £5 can therefore significantly increase the impact of your post.



25. The process or technique of identifying the geographical location of a person or device by means of digital information processed via the Internet.

HOW TO SPEAK ACCURATELY ABOUT HEALTH AND AIR POLLUTION?

When speaking about the health impacts of air pollution it is incredibly important to correctly represent the facts and source the research in order to maintain credibility. If possible, we would recommend linking the King's College research in your post and including this reference.²⁶

26. Marin Williams, Dimitris Evangelopolous, Klea Katsouyanni and Heather Walton (2019), Personalising the Health Impacts of Air Pollution – Summary For Decision Makers. <http://www.erg.kcl.ac.uk/research/home/projects/personalised-health-impacts.html>

EXPLAINING THE STATEMENTS

Separate statements are given for each health outcome and pollution comparison (Appendix B), and are paired with a note about the basis for the statement (Appendix C). It is important to always provide these together because different numbers can be produced depending on the exact approach used in the calculations. Journalists, experts and interested members of the public may want to understand exactly where the numbers come from.

ADJUSTING THE STATEMENTS

Sometimes people may want to cover several statements together and summarise them. This needs to be done with care. Some health outcomes are subsets of other ones and should not be added. For example, asthma admissions are a subset of respiratory disease admissions.

Other statements are for different types of health outcomes and do not have one term to describe them as a summary. Adding numbers of people admitted to hospital to numbers of children with low lung function would give a total that was difficult to label sensibly, and would make tracking back to the basis of the statement more difficult.

Adding across statement types is also unwise. Comparisons of short-term exposure beside busy roads to quieter streets to higher versus lower pollution days may include some overlap.

These statements are based on studies done on a population basis. They therefore apply to the population in general or to specific sub-groups. They do not apply to specific people or specific locations.

ACKNOWLEDGEMENTS

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APPENDIX

APPENDIX–A: RESEARCH METHODOLOGY

STEP 1: RESEARCHING THE LINK BETWEEN AIR POLLUTION IN CERTAIN CITIES AND HEALTH

Detailed meta-analysis of studies connecting air pollution and human health have been undertaken by other people, and these results, large studies across Europe and opinions from expert Committees have been assessed to see if the evidence is reliable enough to use for quantification. From this, 31 health outcomes have been identified where there is good evidence to link exposure and an impact on health. These are as follows:

1. Lung function FEV1 children long term PM_{2.5}, NO₂
2. Low (<80% of predicted value) lung function children long term PM_{2.5}, PM₁₀, NO₂
(Updated: Numbers of children age 6-8 with FEV1 less than 85% predicted 'low lung function', European cohorts)
3. "Lung function FEV1 children long term California statements PM_{2.5}, PM₁₀, NO₂
4. FVC at age 15 (Californian study)
5. Lung function FVC growth children long term California statements PM_{2.5}, PM₁₀, NO₂
(% change in FVC in children from age 11-15 (Californian study))
6. Lung cancer long-term PM_{2.5}, PM₁₀
7. Myocardial Infarction (MI) short term CO, PM_{2.5}, PM₁₀, NO₂
8. Myocardial Infarction (MI) long-term PM_{2.5}, PM₁₀, NO₂
9. Cardiac arrest short-term PM_{2.5}, PM₁₀, NO₂, CO, Ozone
10. Respiratory admissions short-term all ages NO₂, PM_{2.5}, Ozone
11. Respiratory admissions short-term elderly NO₂, PM_{2.5}, Ozone
12. Cerebrovascular disease short term PM_{2.5}, PM₁₀, CO, Ozone, NO₂
13. Cerebrovascular disease long term PM_{2.5}, PM₁₀
14. Heart failure short term PM_{2.5}, PM₁₀, NO₂, CO, Ozone, SO₂
15. Heart failure long-term PM₁₀, NO₂, SO₂
16. Asthma admissions in children PM_{2.5}, PM₁₀, NO₂, Ozone, (SO₂)
17. Asthma admissions in adults PM₁₀, NO₂, Ozone
18. Asthmatic symptoms in asthmatic children short-term PM₁₀
19. Asthma incidence long-term
20. Term low birth weight
21. Cardiovascular Disease (CVD) admissions all ages short-term PM_{2.5}, PM₁₀, NO₂
22. Cardiovascular Disease (CVD) admissions elderly PM₁₀, NO₂, Ozone
23. pneumonia admissions short term PM₁₀, NO₂, PM_{2.5}, Ozone
24. COPD admissions short term all ages CO, PM₁₀, NO₂, PM_{2.5}, Ozone
25. COPD admissions short-term elderly CO, PM₁₀, NO₂, PM_{2.5}, Ozone
26. Hypertension short-term PM_{2.5}, PM₁₀, NO₂
27. Hypertension long-term PM_{2.5}, PM₁₀, NO₂
28. Diastolic Blood Pressure (DBP) short-term PM_{2.5}, PM₁₀, NO₂, Ozone
29. DBP long-term PM_{2.5}, PM₁₀, NO₂, Ozone
30. Cardiac arrhythmia short-term PM_{2.5}, PM₁₀, NO₂, CO
31. Atrial fibrillation short-term PM_{2.5}, NO₂, CO, Ozone, SO₂
32. Prevalence bronchitic symptoms in asthmatic children long-term 5-14yrs
33. Bronchitis prevalence in children (long-term exposure)

STEP 2: STATEMENT SIMPLIFICATION

Starting with these 33 health outcomes, we created 17 simplified statements to carry into our digital testing:

- 1 Exposure to air pollution reduces lung function in children
- 2 Exposure to air pollution stunts the growth of children's lungs
- 3 Exposure to air pollution increases the chance of developing lung cancer (Exposure to air pollution contributes to an increased chance of developing lung cancer)
- 4 Exposure to air pollution increases the number of hospital admissions for respiratory conditions (Exposure to higher daily air pollution increases the number of hospital admissions for respiratory conditions)
- 5 Exposure to air pollution increases the risk of heart attacks
- 6 Exposure to air pollution increases the risk of stroke
- 7 Exposure to air pollution increases the risk of heart failure
- 8 Exposure to air pollution can increase the chance of a child with asthma developing bronchitis
- 9 Exposure to air pollution can increase the number of people admitted to the hospital for asthma
- 10 Exposure to air pollution can make children's asthma worse
- 11 Exposure to air pollution can increase the severity and frequency of asthma attacks
- 12 Exposure to air pollution can result in a low birthweight for newborns
- 13 Exposure to air pollution increases the number of hospital admissions for heart disease (Exposure to higher daily air pollution increases the number of hospital admissions for heart disease)
- 14 Exposure to air pollution increases the number of pneumonia hospital admissions (Exposure to higher daily air pollution increases the number of pneumonia hospital admissions)
- 15 Exposure to air pollution increases the number of hospital admissions related to Chronic Obstructive Pulmonary Disease (COPD) [Exposure to higher daily air pollution increases the number of hospital admissions related to COPD]
- 16 Exposure to air pollution can result in high blood pressure
- 17 Exposure to air pollution can lead to irregular heartbeats and sudden death

See how these statements were formulated [here](#).

STEP 3: FOCUS GROUP TESTING

Through focus groups we were able to examine which issues and language framings engaged people the most. We did this by conducting focus groups, revealing how audiences reacted to these statements; ie. whether they believed them, thought they were engaging, worth reacting to etc.

Thinking about the side effects of air pollution, participants mainly pointed out that many people suffer from respiratory conditions, asthma, lung disease and the increasing risk of developing cancer. A few also mentioned the negative consequences that air pollution has on global warming, wildlife and environment as a result of absorbing various chemicals. Despite a high level of awareness on the negative consequences of air pollution, hardly any participants recalled any seeing any warnings about it.

The following table reveals the key takeaways from the focus group, and indicates whether or not the statements were then included in the digital message testing.

STATEMENT	RESPONSE	CREDIBILITY	DIGITAL TESTED?
Exposure to air pollution Can result in a low birthweight for newborns	While some people thought that this statement had credibility, many thought that it felt off balance and other factors were being ignored.	Low–Medium	Yes
Exposure to air pollution Reduces lung function in children	There was broad agreement with the veracity of this statement, and this was largely because participants were already aware of a link between lung function and exposure to air pollution. Most people framed ‘lung function’ as ‘asthma’	Medium	No
Exposure to air pollution stunts the growth of children’s lungs	This statement was the most surprising and shocking amongst the group of parents	Medium	Yes
Exposure to air pollution increases the chance of developing lung cancer	The question of degree of risk may be an important consideration here – participants feel that any increased risk is bad, so adding statistics here may dampen some of the impact.	High	Yes
Exposure to air pollution increases the number of hospital admissions related to chronic obstructive pulmonary disease (copd)	Exposure to air pollution increases the number of hospital admissions related to Chronic Obstructive Pulmonary Disease (COPD)	Medium	No
Exposure to air pollution increases the number of pneumonia hospital admissions	This statement was the most problematic of all the lung function statements, and the one that picked up the most disagreement This was largely due to the perception that pneumonia is a viral or bacterial condition and not one that tends to be linked to environmental factors.	Low	No

STATEMENT	RESPONSE	CREDIBILITY	DIGITAL TESTED?
Exposure to air pollution increases the number of hospital admissions for respiratory conditions	For some participants, this was a more effective wording than statement 5, and it replaces COPD with the more accessible and more widely understood phrase ‘respiratory conditions’. But for others the lack of a specific illness or condition makes this message less hard hitting, and therefore fails to convey the impact that would otherwise be present in, for example, ‘cancer’ or ‘asthma.	Medium	Yes
Exposure to air pollution increases the risk of heart attacks	Unlike the messages around respiratory issues, the messages linking air pollution to cardiovascular issues were less readily accepted by participant	Low–Medium	Yes
Exposure to air pollution increases the risk of stroke	For many, the link between strokes and air pollution was a hard one to believe, but again, some were prepared to see it as a contributing factor	Medium–High	Yes
Exposure to air pollution increases the risk of heart failure	Similarly to the other statements, the link between heart failure and exposure to air pollution was less clear.	Medium–High	No
Exposure to air pollution can result in high blood pressure	Unlike the preceding ones, this statement is much less definitive, stating that exposure to air pollution CAN result in high blood pressure. This more measured approach was popular, though one group appreciated that it was therefore less attention grabbing as a result.	Low	No
Exposure to air pollution can increase the risk of heart attacks	This statement simply changes the more definitive phrase ‘increases’ to the more conditional term ‘can increase’. As such, it was more popular in one group as it is less pointed in its language, and therefore less scary...However, in the other group it was disliked for this exact reason – they felt that the use of the word ‘can’ dilutes any potency and shock value that this message might otherwise contain	Medium–Low	Yes

STATEMENT	RESPONSE	CREDIBILITY	DIGITAL TESTED?
Exposure to air pollution can lead to irregular heartbeats and sudden death	This statement proved problematic largely due to the phrase ‘sudden death’ which tended to grab people’s attention. This was felt to lack credibility and be sensationalist	Low	No
Exposure to air pollution can increase the number of people admitted to the hospital for asthma	Statements relating to asthma were best received by participants, as they had already linked asthma to air pollution in the discussion prior to seeing any of the statements.	High	Yes
Exposure to air pollution can make children’s asthma worse	Generally, of all the statements in this section, (indeed, of the statements overall) this one was received most positively by participants	High	Yes
Exposure to air pollution can increase the change of a child with asthma developing bronchitis	There was some doubt, particularly amongst parents, of the likelihood of children being able to develop bronchitis as a result of asthma	Low	No
Exposure to air pollution can increase the severity and frequency of asthma attacks	Generally agreement. On this statement, participants mentioned the use of the word ‘exposure’ and its potentially problematic use across the statements—for some it implied a ‘high dose’—or purposefully breathing in polluted air.	High	Yes

STEP 4: DIGITAL TESTING

Using the focus group insights, we conducted online messaging testing to further explore how language and visual framings impact public engagement. We did so through analysing the success of facebook advertisements at encouraging audiences to take medium barrier actions²⁷. These results also worked to further validify existing findings.

Round 1:

In round 1, we analysed how the public engaged with the winning statements from the focus groups. Results from this round of digital message testing revealed that the most engaging health topics for the general public related to; Heart Attacks, Asthma Attacks, Strokes, Reduced Lung Capacity and being admitted to hospital because of Asthma .

Round 2:

In round 2 we tested how language framing impacted engagement rates. Results from this round revealed that qualitative statements were more engaging than quantitative statements. Within quantitative statements, Percentage Statements were more engaging than Numerical Statements. Furthermore, city specific framings were more engaging than more general posts. Finally, it was also revealed that of the health conditions tested, heart attacks and asthma attacks were the most engaging.

Round 3:

Round three specifically explored the visual representation of the posts. Through testing it was revealed that images revealing the impact rather than cause of the problem were most engaging. Furthermore, people responded best to city specific imagery, and best to images without people.

²⁷. Results were collected based on how likely audiences were to complete an online quiz after seeing a facebook post.

APPENDIX B: HEALTH STATEMENTS

London

Cardiac Arrest

- Living in London, your risk of out-of-hospital cardiac arrest would be reduced by 2.2%, or even 3.8%, if higher pollution days were reduced to lower pollution days instead. (see assumption 1)
- If higher air pollution days in London were lower instead, we could avoid 87 (perhaps even 153) cardiac arrests each year. (see assumption 2)
- Living near a busy road in London increases your risk of out-of-hospital cardiac arrest by 3.0%, or even 4.6%. (see assumption 42)
- Living near a busy road in London can contribute to 81 more out-of-hospital cardiac arrests each year. (see assumption 43)

Stroke

- Living in London, your risk of emergency hospitalisation for stroke would be reduced by 2.7%, or even 4.1%, if higher pollution days were reduced to lower pollution days instead.
- If higher air pollution days in London were lower instead, we could avoid 144 (perhaps even 219) emergency hospital admissions for stroke each year. (see assumption 3)
- Living near a busy road in London increases your risk of hospitalisation for stroke by 6.6%. (see assumption 4)
- Living near a busy road in London may contribute to 230 hospital admissions for stroke each year. (see assumption 4)
- Living near busy roads in London may contribute to a 10.2% greater chance of stroke. (see assumption 43)
- Living near a busy road in London may contribute to 306 strokes each year. (see assumption 43)

Asthma admissions in children

- Living in London, if you are aged below 14 years, your risk of being admitted to hospital for asthma would be reduced by 4.2%, or even 6.4%, if higher pollution days were reduced to lower pollution days instead. (see assumption 44)
- If higher air pollution days in London were lower instead, we could avoid 74 (perhaps even 111) hospital admissions each year for asthma in people aged below 14. (see assumption 44)

Asthma admissions in adults

- In London, the risk of adults being admitted to hospital for asthma would be reduced by 1.4%, or even 2.7%, if higher pollution days were reduced to lower pollution days instead. (see assumption 10)
- If higher air pollution days in London were lower instead, we could avoid 33 (perhaps even 63) hospital admissions each year for asthma in adults. (see assumption 11)

Reduced lung growth and low lung function

- Living near busy roads in London may contribute to an 8.7% greater chance of low lung function in children. (see assumption 12)
- Cutting air pollution in London by one fifth may contribute to a 2.3% greater chance of better lung function in children. (see assumption 13)
- Cutting air pollution in London by one fifth may result in 7,927 fewer children with low lung function each year. (see assumption 13)
- Living near busy roads in London may stunt lung growth in children by 12.5%. (see assumption 14)
- Cutting air pollution in London by one fifth would increase children's lung capacity by around 4.1%. (see assumption 15)

Lung Cancer

- Living near busy roads in London may contribute to a 9.7% greater chance of developing lung cancer. (see assumption 14)
- Living near busy roads in London may contribute to 390 lung cancer cases. (see assumption 14)
- Cutting air pollution in London by one fifth would decrease lung cancer cases by around 7.6%. (see assumption 16)
- Cutting air pollution in London by one fifth would result in 306 fewer lung cancer cases each year. (see assumption 16)

Asthma symptoms in children

- In London on high air pollution days, 142 more children with asthma experience asthma symptoms than on lower pollution days. (see assumption 18).

Term low birthweight

- Living near busy roads in London may contribute to a 0.4% greater risk of babies being born underweight. (see assumption 19)
- Living near busy roads in London may contribute to 144 babies born underweight each year. (see assumption 19)
- Cutting air pollution in London by one fifth would decrease low birthweights by around 0.1%. (see assumption 20)
- Cutting air pollution in London by one fifth would result in 138 fewer babies born underweight each year. (see assumption 20)

Respiratory admissions all ages

- Living in London, your risk of being admitted to hospital for respiratory disease would be reduced by 1.4%, or even 2.2%, if higher pollution days were reduced to lower pollution days instead. (see assumption 44)

Cardiovascular admissions all ages

- Living in London, your risk of being admitted to hospital for cardiovascular disease would be reduced by 0.5%, or even 0.9%, if higher pollution days were reduced to lower pollution days instead. (see assumption 25)
- If higher air pollution days in London were lower instead, we could avoid 153 (perhaps even 279) hospital admissions each year for cardiovascular disease. (see assumption 26)

Coronary Heart Disease (CHD) Incidence (all ages)

- Living near busy roads in London may contribute to a 6.3% greater chance of coronary heart disease. (see assumption 29)
- Living near busy roads in London may contribute to 821 coronary heart disease cases. (see assumption 29)
- Cutting air pollution in London by one fifth would decrease the risk of coronary heart disease by around 4.8%. (see assumption 30)
- Cutting air pollution in London by one fifth may result in 1,885 fewer cases of coronary heart disease each year. (see assumption 30)

Bronchitic Symptoms (Asthmatic Children)

- Asthmatic children that live near busy roads in London may be subject to a 11.5% greater chance of experiencing bronchitic symptoms (cough and phlegm). (see assumption 31)
- Air pollution may contribute to 4,067 more asthmatic children that live near busy roads in London experiencing bronchitic symptoms each year. (see assumption 31)
- Cutting air pollution in London by one fifth would decrease the risk of bronchitic symptoms in asthmatic children each year by around 3.5%. (see assumption 32)
- Cutting air pollution in London by one fifth could contribute to 3,685 fewer asthmatic children with bronchitic symptoms each year. (see assumption 32)

Acute bronchitis in children

- Living near busy roads in London may contribute to a 0.6% greater risk of a chest infection (acute bronchitis) in children. (see assumption 32)
- Living near busy roads in London may contribute to 1,598 cases of a chest infection (acute bronchitis) in children. (see assumption 32)
- Cutting air pollution in London by one fifth would decrease the risk of a chest infection (acute bronchitis) in children by around 0.5%. (see assumption 33)
- Cutting air pollution in London by one fifth may result in 3,683 fewer children with a chest infection (acute bronchitis) each year. (see assumption 33)

COPD admissions (all ages)

- Living in London, your risk of being admitted to hospital for COPD would be reduced by 2.1%, or even 3.1%, if higher pollution days were reduced to lower pollution days instead. (see assumption 34)
- If higher air pollution days in London were lower instead, we could avoid 136 (perhaps even 202) hospital admissions each year for COPD. (see assumption 35)

Pneumonia admissions in children

- Living in London, the risk of children being admitted to hospital for pneumonia would be reduced by 2.3%, or even 3.6%, if higher pollution days were reduced to lower pollution days instead. (see assumption 38)
- If higher air pollution days in London were lower instead, we could avoid 9 (perhaps even 14) hospital admissions each year for pneumonia in children. (see assumption 39)

Birmingham

Cardiac Arrest

- The risk of out of hospital cardiac arrest in Birmingham is 2.3% higher on high air pollution days than lower air pollution days (short-term). (see assumption 1)
- Each year on average, higher air pollution days in Birmingham are responsible for 12 more cardiac arrests outside hospital than lower air pollution days. (short-term). (see assumption 2)

Stroke

- The risk of emergency hospitalisations for stroke in Birmingham is 2.6% higher on high air pollution days than on lower air pollution days (short-term). (see assumption 3)
- Living near a busy road in Birmingham increases your risk of hospitalisation for stroke by 4.0% (short-term). (see assumption 4)
- On high air pollution days in Birmingham, there are on average 27 more hospital admissions for stroke each year than on lower air pollution days (short-term). (see assumption 5)
- Lowering air pollution by 32.1% on high air pollution days in Birmingham could save 27 hospital admissions for stroke each year (short-term/alternative). (see assumption 6)
- Each year on average, higher air pollution days in Birmingham can send up to 42 more people to hospital for stroke than lower air pollution days (short-term). (see assumption 7)

Asthma admissions in children

- In Birmingham, your child is 4.1% more likely to be hospitalised for asthma on days with high NO₂ pollution compared to days with lower air pollution (short-term). (see assumption 8)
- In Birmingham, an extra 15 children are hospitalised with asthma on days where air pollution is high compared to days where air pollution is low on average each year ‘ (short-term). (see assumption 9)

Asthma admissions in adults

- In Birmingham, adults are 1.4% more likely to be hospitalised for asthma on days with high NO₂ pollution compared to days with lower air pollution (short-term). (see assumption 10)
- In Birmingham, an extra 11 adults are taken to hospital with asthma on days of high air pollution compared to days with lower air pollution(short-term). (see assumption 10)

Reduced lung growth and low lung function

- Roadside air pollution in Birmingham stunts lung growth in children by 7.7% (long-term). (see assumption 12)
- Cutting air pollution in Birmingham by one fifth would increase children’s lung capacity by around 2.6% (long-term). (see assumption 13)
- Living near busy roads in Birmingham may contribute to a 4.7% greater chance of reduced lung function in children (long-term). (see assumption 14)
- Cutting air pollution in Birmingham by one fifth may contribute to a 1.3% greater chance of better lung function in children (long-term). (see assumption 15)
- Cutting air pollution in Birmingham by one fifth would result in 659 fewer children with low lung function each year (long-term). (see assumption 15)

Lung cancer

- Cutting air pollution in Birmingham by one fifth would decrease lung cancer cases by around 6.4% (long-term). (see assumption 16)
- Cutting air pollution in Birmingham by one fifth would result in 50 fewer lung cancer cases each year (long-term). (see assumption 16)

Asthmatic symptoms in children

- In Birmingham, children with asthma are 0.3% more likely to experience asthma symptoms on high air pollution days than on lower pollution days (short-term). (see assumption 17).
- On high air pollution days, 42 more children with asthma in Birmingham experience asthma symptoms than on lower pollution days (short-term). (see assumption 18).

Term low birthweight

- Living near busy roads in Birmingham may contribute to a 0.2% greater risk of babies being born underweight (long-term). (see assumption 19)
- Cutting air pollution in Birmingham by one fifth would decrease the risk of babies being born underweight by around 0.1% (long-term). (see assumption 20)
- Cutting air pollution in Birmingham by one fifth would result in 11 fewer babies born underweight each year (long-term). (see assumption 20)

Respiratory admissions all ages

- The risk of emergency hospitalisations for respiratory disease in Birmingham is 1.5% higher on high air pollution days than on lower air pollution days (short-term). (see assumption 21)
- On high air pollution days in Birmingham, there are on average 149 more hospital admissions for respiratory disease each year than on lower air pollution days (short-term). (see assumption 22)
- Lowering air pollution by 31.7% on high air pollution days in Birmingham could save 149 hospital admissions for respiratory disease each year (short-term/alternative). (see assumption 23)
- Each year on average, higher air pollution days in Birmingham can send up to 238 more people to hospital for respiratory disease than lower air pollution days (short-term). (see assumption 24)

Cardiovascular admissions all ages

- The risk of emergency hospitalisations for cardiovascular disease in Birmingham is 0.5% higher on high air pollution days than on lower air pollution days (short-term). (see assumption 25)
- On high air pollution days in Birmingham, there are on average 34 more hospital admissions for cardiovascular disease each year than on lower air pollution days (short-term). (see assumption 26)
- Lowering air pollution by 42.9% on high air pollution days in Birmingham could save 34 hospital admissions for cardiovascular disease each year (short-term/alternative). (see assumption 27)
- Each year on average, higher air pollution days in Birmingham can send up to 62 more people to hospital for cardiovascular disease than lower air pollution days (short-term). (see assumption 28)

Coronary Heart Disease (CHD) Incidence (all ages)

- Living near busy roads in Birmingham may contribute to a 0.2% greater chance of coronary heart disease (long-term). (see assumption 29)
- Cutting air pollution in Birmingham by one fifth would decrease the risk of coronary heart disease by around 3.3% (long-term). (see assumption 30)
- Cutting air pollution in Birmingham by one fifth would result in 165 fewer cases of coronary heart disease each year (long-term). (see assumption 30)

Bronchitic symptoms (asthmatic children)

- Air pollution may contribute to asthmatic children that live near busy roads in Birmingham being subject to a 6.7% greater chance of developing bronchitic symptoms (long-term). (see assumption 31)
- Cutting air pollution in Birmingham by one fifth would decrease the risk of bronchitic symptoms in asthmatic children each year by around 2.1% (long-term). (see assumption 32)
- Cutting air pollution in Birmingham by one fifth would result in 328 fewer asthmatic children with bronchitic symptoms each year (long-term). (see assumption 32)

Acute bronchitis in children

- Living near busy roads in Birmingham may contribute to a 0.0% greater risk of a chest infection (acute bronchitis) in children (long-term). (assumption 32)
- Cutting air pollution in Birmingham by one fifth would decrease the risk of a chest infection (acute bronchitis) in children by around 0.3% (long-term). (see assumption 33)
- Cutting air pollution in Birmingham by one fifth would result in 371 fewer children with a chest infection (acute bronchitis) each year (long-term). (see assumption 33)

COPD admissions (all ages)

- The risk of emergency hospitalisations for COPD in Birmingham is 2.3% higher on high air pollution days than on lower air pollution days (short-term). (see assumption 34)
- On high air pollution days in Birmingham, there are on average 69 more hospital admissions for COPD each year than on lower air pollution days (short-term). (see assumption 35)
- Lowering air pollution by 31.7% on high air pollution days in Birmingham could save 69 hospital admissions for COPD each year (short-term/alternative). (see assumption 36)
- Each year on average, higher air pollution days in Birmingham can send up to 103 more people to hospital for COPD than lower air pollution days (short-term). (see assumption 37)

Pneumonia admissions in children

- The risk of emergency hospitalisations for pneumonia in children in Birmingham is 2.5% higher on high air pollution days than on lower air pollution days (short-term). (see assumption 38)
- On high air pollution days in Birmingham, there are on average 2 more hospital admissions for pneumonia in children each year than on lower air pollution days (short-term). (See assumption 39)
- Lowering air pollution by 31.7% on high air pollution days in Birmingham could save 2 hospital admissions for pneumonia in children each year (short-term/alternative). (See assumption 40)
- Each year on average, higher air pollution days in Birmingham can send up to 3 more people to hospital for pneumonia in children than lower air pollution days (short-term). (See assumption 41)

Bristol

Cardiac Arrest

- The risk of out of hospital cardiac arrest in Bristol is 2.2% higher on high air pollution days than lower air pollution days (short-term). (see assumption 1)
- Each year on average, higher air pollution days in Bristol are responsible for 4 more cardiac arrests outside hospital than lower air pollution days. (short-term). (see assumption 2)

Stroke

- The risk of emergency hospitalisations for stroke in Bristol is 2.8% higher on high air pollution days than on lower air pollution days (short-term). (see assumption 3)
- Living near a busy road in Bristol increases your risk of hospitalisation for stroke by 2.8% (short-term). (see assumption 4)
- On high air pollution days in Bristol, there are on average 9 more hospital admissions for stroke each year than on lower air pollution days (short-term). (see assumption 5)
- Lowering air pollution by 35.9% on high air pollution days in Bristol could save 9 hospital admissions for stroke each year (short-term/alternative). (see assumption 6)
- Each year on average, higher air pollution days in Bristol can send up to 14 more people to hospital for stroke than lower air pollution days (short-term). (see assumption 7)

Asthma admission for children

- In Bristol, your child is 4.4% more likely to be hospitalised for asthma on days with high NO₂ pollution compared to days with lower air pollution (short-term). (see assumption 8)
- In Bristol, an extra 5 children are hospitalised with asthma on days where air pollution is high compared to days where air pollution is low on average each year (short-term). (see assumption 9)

Asthma admissions in adults

- In Bristol, adults are 1.5% more likely to be hospitalised for asthma on days with high NO₂ pollution compared to days with lower air pollution (short-term). (see assumption 10)
- In Bristol, an extra 4 adults are taken to hospital with asthma on days of high air pollution compared to days with lower air pollution (short-term). (see assumption 11)

Reduced lung growth and low lung function

- Roadside air pollution in Bristol stunts lung growth in children by 5.3% (long-term). (see assumption 12)
- Cutting air pollution in Bristol by one fifth would increase children's lung capacity by around 2.3% (long-term). (see assumption 13)
- Living near busy roads in Bristol may contribute to a 3.0% greater chance of reduced lung function in children (long-term). (see assumption 14)
- Cutting air pollution in Bristol by one fifth may contribute to a 1.2% greater chance of better lung function in children (long-term). (see assumption 15)
- Cutting air pollution in Bristol by one fifth would result in 199 fewer children with low lung function each year (long-term). (see assumption 15)

Lung cancer

- Cutting air pollution in Bristol by one fifth would decrease lung cancer cases by around 5.9% (long-term). (see assumption 16)
- Cutting air pollution in Bristol by one fifth would result in 18 fewer lung cancer cases each year (long-term). (see assumption 16)

Asthma symptoms in children

- In Bristol, children with asthma are 0.2% more likely to experience asthma symptoms on high air pollution days than on lower pollution days (short-term). (see assumption 17).
- On high air pollution days, 12 more children with asthma in Bristol experience asthma symptoms than on lower pollution days (short-term). (see assumption 18).

Term low birthweight

- Living near busy roads in Bristol may contribute to a 0.2% greater risk of babies being born underweight (long-term). (see assumption 19)
- Cutting air pollution in Bristol by one fifth would decrease the risk of babies being born underweight by around 0.1% (long-term). (see assumption 20)
- Cutting air pollution in Bristol by one fifth would result in 4 fewer babies born underweight each year (long-term). (see assumption 20)

Respiratory admissions all ages

- The risk of emergency hospitalisations for respiratory disease in Bristol is 1.4% higher on high air pollution days than on lower air pollution days (short-term). (see assumption 21)
- On high air pollution days in Bristol, there are on average 43 more hospital admissions for respiratory disease each year than on lower air pollution days (short-term). (see assumption 22)
- Lowering air pollution by 27.7% on high air pollution days in Bristol could save 43 hospital admissions for respiratory disease each year (short-term/alternative). (see assumption 23)
- Each year on average, higher air pollution days in Bristol can send up to 68 more people to hospital for respiratory disease than lower air pollution days (short-term). (see assumption 24)

Cardiovascular admissions all ages

- The risk of emergency hospitalisations for cardiovascular disease in Bristol is 0.5% higher on high air pollution days than on lower air pollution days (short-term). (see assumption 25)
- On high air pollution days in Bristol, there are on average 10 more hospital admissions for cardiovascular disease each year than on lower air pollution days (short-term). (see assumption 26)
- Lowering air pollution by 45.5% on high air pollution days in Bristol could save 10 hospital admissions for cardiovascular disease each year (short-term/alternative). (see assumption 27)
- Each year on average, higher air pollution days in Bristol can send up to 19 more people to hospital for cardiovascular disease than lower air pollution days (short-term). (see assumption 28)

Coronary Heart Disease (CHD) Incidence (all ages)

- Living near busy roads in Bristol may contribute to an 8.0% greater chance of coronary heart disease (long-term). (see assumption 29)
- Cutting air pollution in Bristol by one fifth would decrease the risk of coronary heart disease by around 3.1% (long-term). (see assumption 30)
- Cutting air pollution in Bristol by one fifth would result in 62 fewer cases of coronary heart disease each year (long-term). (see assumption 30)

Bronchitic symptoms (asthmatic children)

- Air pollution may contribute to asthmatic children that live near busy roads in Bristol may experiencing a 4.5% greater chance of developing bronchitic symptoms (long-term). (see assumption 31)
- Cutting air pollution in Bristol by one fifth would decrease the risk of bronchitic symptoms in asthmatic children each year by around 1.9% (long-term). (see assumption 32)
- Cutting air pollution in Bristol by one fifth would result in 94 fewer asthmatic children with bronchitic symptoms each year (long-term). (see assumption 32)

Acute bronchitis in children

- Living near busy roads in Bristol may contribute to a 0.8% greater risk of a chest infection (acute bronchitis) in children (long-term). (see assumption 32)
- Cutting air pollution in Bristol by one fifth would decrease the risk of a chest infection (acute bronchitis) in children by around 0.3% (long-term). (see assumption 33)
- Cutting air pollution in Bristol by one fifth would result in 114 fewer children with a chest infection (acute bronchitis) each year (long-term). (see assumption 33)

COPD admissions (all ages)

- The risk of emergency hospitalisations for COPD in Bristol is 2.0% higher on high air pollution days than on lower air pollution days (short-term). (see assumption 34)
- On high air pollution days in Bristol, there are on average 20 more hospital admissions for COPD each year than on lower air pollution days (short-term). (see assumption 35)
- Lowering air pollution by 27.7% on high air pollution days in Bristol could save 20 hospital admissions for COPD each year (short-term/alternative). (see assumption 36)
- Each year on average, higher air pollution days in Bristol can send up to 30 more people to hospital for COPD than lower air pollution days (short-term). (see assumption 37)

Pneumonia admissions in children

- The risk of emergency hospitalisations for pneumonia in children in Bristol is 2.2% higher on high air pollution days than on lower air pollution days (short-term). (see assumption 38)
- On high air pollution days in Bristol, there are on average 1 more hospital admission for pneumonia in children each year than on lower air pollution days (short-term). (see assumption 39)
- Lowering air pollution by 27.7% on high air pollution days in Bristol could save 1 hospital admission for pneumonia in children each year (short-term/alternative). (see assumption 40)
- Each year on average, higher air pollution days in Bristol can send up to 1 more people to hospital for pneumonia in children than lower air pollution days (short-term). (see assumption 41)

Derby

Cardiac arrest

- The risk of out of hospital cardiac arrest in Derby is 1.8% higher on high air pollution days than lower air pollution days (short-term). (see assumption 1)
- Each year on average, higher air pollution days in Derby are responsible for 0 more cardiac arrests outside hospital than lower air pollution days. (short-term). (see assumption 2)

Stroke

- The risk of emergency hospitalisations for stroke in Derby is 3.9% higher on high air pollution days than on lower air pollution days (short-term). (see assumption 3)
- On high air pollution days in Derby, there are on average 8 more hospital admissions for stroke each year than on lower air pollution days (short-term). (see assumption 5)
- Lowering air pollution by 38.2% on high air pollution days in Derby could save 8 hospital admissions for stroke each year (short-term/alternative). (see assumption 6)
- Each year on average, higher air pollution days in Derby can send up to 13 more people to hospital for stroke than lower air pollution days (short-term). (see assumption 7)

Asthma Admissions children

- In Derby, your child is 6.2% more likely to be hospitalised for asthma on days with high NO₂ pollution compared to days with lower air pollution (short-term). (see assumption 8)
- In Derby, an extra 5 children are hospitalised with asthma on days where air pollution is high compared to days where air pollution is low on average each year (short-term). (see assumption 9)

Asthma admissions in adults

- In Derby, adults are 2.1% more likely to be hospitalised for asthma on days with high NO₂ pollution compared to days with lower air pollution (short-term). (see ‘ assumption 10)
- In Derby, an extra 3 adults are taken to hospital with asthma on days of high air pollution compared to days with lower air pollution(short-term). .see assumption 11)

Reduced lung growth and low lung function

- Cutting air pollution in Derby by one fifth would increase children’s lung capacity by around 3.1% (long-term). (see assumption 13)
- Cutting air pollution in Derby by one fifth may contribute to a 1.7% greater chance of better lung function in children (long-term). (see assumption 15)
- Cutting air pollution in Derby by one fifth would result in 179 fewer children with low lung function each year (long-term). (see assumption 15)

Term low birthweight

- Cutting air pollution in Derby by one fifth would decrease the risk of babies being born underweight by around 0.1% (long-term). (see assumption 20)
- Cutting air pollution in Derby by one fifth would result in 3 fewer babies born underweight each year (long-term). (see assumption 20)

Bronchitic symptoms (asthmatic children)

- Cutting air pollution in Derby by one fifth would decrease the risk of bronchitic symptoms in asthmatic children each year by around 2.6% (long-term). (see assumption 32)
- Cutting air pollution in Derby by one fifth would result in 85 fewer asthmatic children with bronchitic symptoms each year (long-term). (see assumption 32)

Liverpool

Cardiac arrest

- The risk of out of hospital cardiac arrest in Liverpool is 2% higher on high air pollution days than lower air pollution days (short-term). (see assumption 1)
- Each year on average, higher air pollution days in Liverpool are responsible for 4 more cardiac arrests outside hospital than lower air pollution days. (short-term). (see assumption 2)

Stroke

- The risk of emergency hospitalisations for stroke in Liverpool is 2.6% higher on high air pollution days than on lower air pollution days (short-term). (See assumption 3)
- Living near a busy road in Liverpool increases your risk of hospitalisation for stroke by 2.4% (short-term). (see assumption 4)
- On high air pollution days in Liverpool, there are on average 12 more hospital admissions for stroke each year than on lower air pollution days (short-term). (see assumption 5)
- Lowering air pollution by 36.0% on high air pollution days in Liverpool could save 12 hospital admissions for stroke each year (short-term/alternative). (see assumption 6)
- Each year on average, higher air pollution days in Liverpool can send up to 19 more people to hospital for stroke than lower air pollution days (short-term). (see assumption 7)

Asthma Admissions children

- In Liverpool, your child is 4.0% more likely to be hospitalised for asthma on days with high NO₂ pollution compared to days with lower air pollution (short-term). (see assumption 8)
- In Liverpool, an extra 7 children are hospitalised with asthma on days where air pollution is high compared to days where air pollution is low on average each year (short-term). (see assumption 9)

Asthma admissions in adults

- In Liverpool, adults are 1.3% more likely to be hospitalised for asthma on days with high NO₂ pollution compared to days with lower air pollution (short-term). (see assumption 10)
- In Liverpool, an extra 5 adults are taken to hospital with asthma on days of high air pollution compared to days with lower air pollution (short-term). (see assumption 11)

Reduced lung growth and low lung function

- Roadside air pollution in Liverpool stunts lung growth in children by 4.6% (long-term). (see assumption 12)
- Cutting air pollution in Liverpool by one fifth would increase children's lung capacity by around 2.1% (long-term). (see assumption 13)
- Living near busy roads in Liverpool may contribute to a 2.5% greater chance of reduced lung function in children (long-term). (see assumption 14)
- Cutting air pollution in Liverpool by one fifth may contribute to a 1.1% greater chance of better lung function in children (long-term). (see assumption 15)
- Cutting air pollution in Liverpool by one fifth would result in 174 fewer children with low lung function each year (long-term). (see assumption 15)

Lung cancer

- Cutting air pollution in Liverpool by one fifth would decrease lung cancer cases by around 5.3% (long-term). (see assumption 16)
- Cutting air pollution in Liverpool by one fifth would result in 17 fewer lung cancer cases each year (long-term). (see assumption 16)

Asthma symptoms in children

- In Liverpool, children with asthma are 0.2% more likely to experience asthma symptoms on high air pollution days than on lower pollution days (short-term). (see - assumption 17).
- On high air pollution days, 12 more children with asthma in Liverpool experience asthma symptoms than on lower pollution days (short-term). (see assumption 17).

Term low birthweight

- Living near busy roads in Liverpool may contribute to a 0.1% greater risk of babies being born underweight (long-term). (see assumption 19)
- Cutting air pollution in Liverpool by one fifth would decrease the risk of babies being born underweight by around 0.1% (long-term). (v 20)
- Cutting air pollution in Liverpool by one fifth would result in 3 fewer babies born underweight each year (long-term). (see assumption 20)

Respiratory admissions all ages

- The risk of emergency hospitalisations for respiratory disease in Liverpool is 1.4% higher on high air pollution days than on lower air pollution days (short-term). (see assumption 21)
- On high air pollution days in Liverpool, there are on average 61 more hospital admissions for respiratory disease each year than on lower air pollution days (short-term). (see assumption 22)
- Lowering air pollution by 26.7% on high air pollution days in Liverpool could save 61 hospital admissions for respiratory disease each year (short-term/alternative). (see assumption 23)
- Each year on average, higher air pollution days in Liverpool can send up to 98 more people to hospital for respiratory disease than lower air pollution days (short-term). (see assumption 24)

Cardiovascular admissions all ages

- The risk of emergency hospitalisations for cardiovascular disease in Liverpool is 0.5% higher on high air pollution days than on lower air pollution days (short-term). (see assumption 25)
- On high air pollution days in Liverpool, there are on average 14 more hospital admissions for cardiovascular disease each year than on lower air pollution days (short-term). (see assumption 26)
- Lowering air pollution by 45.9% on high air pollution days in Liverpool could save 14 hospital admissions for cardiovascular disease each year (short-term/alternative). (see assumption 27)
- Each year on average, higher air pollution days in Liverpool can send up to 25 more people to hospital for cardiovascular disease than lower air pollution days (short-term). (see assumption 28)

Coronary Heart Disease (CHD) Incidence (all ages)

- Cutting air pollution in Liverpool by one fifth would decrease the risk of coronary heart disease by around 3.0% (long-term). (see assumption 30)
- Cutting air pollution in Liverpool by one fifth would result in 62 fewer cases of coronary heart disease each year (long-term). (see assumption 30)

Bronchitic symptoms (asthmatic children)

- Air pollution may contribute to asthmatic children that live near busy roads in Liverpool experiencing a 3.8% greater chance of developing bronchitic symptoms (long-term). (see assumption 31)
- Cutting air pollution in Liverpool by one fifth would decrease the risk of bronchitic symptoms in asthmatic children each year by around 1.7% (long-term). (see assumption 32)
- Cutting air pollution in Liverpool by one fifth would result in 85 fewer asthmatic children with bronchitic symptoms each year (long-term). (see assumption 32)

Acute bronchitis in children

- Cutting air pollution in Liverpool by one fifth would decrease the risk of a chest infection (acute bronchitis) in children by around 0.3% (long-term). (see assumption 33)
- Cutting air pollution in Liverpool by one fifth would result in 104 fewer children with a chest infection (acute bronchitis) each year (long-term). (see assumption 33)

COPD admissions (all ages)

- The risk of emergency hospitalisations for COPD in Liverpool is 2.0% higher on high air pollution days than on lower air pollution days (short-term). (see assumption 34)
- On high air pollution days in Liverpool, there are on average 29 more hospital admissions for COPD each year than on lower air pollution days (short-term). (see assumption 35)
- Lowering air pollution by 26.7% on high air pollution days in Liverpool could save 29 hospital admissions for COPD each year (short-term/alternative). (see assumption 36)
- Each year on average, higher air pollution days in Liverpool can send up to 42 more people to hospital for COPD than lower air pollution days (short-term). (see assumption 37)

Pneumonia admissions in children

- The risk of emergency hospitalisations for pneumonia in children in Liverpool is 2.2% higher on high air pollution days than on lower air pollution days (short-term). (see assumption 38)
- On high air pollution days in Liverpool, there are on average 1 more hospital admissions for pneumonia in children each year than on lower air pollution days (short-term). (see assumption 39)
- Lowering air pollution by 26.7% on high air pollution days in Liverpool could save 1 hospital admissions for pneumonia in children each year (short-term/alternative). (see assumption 40)
- Each year on average, higher air pollution days in Liverpool can send up to 1 more people to hospital for pneumonia in children than lower air pollution days (short-term). (see assumption 41)

Manchester

Cardiac arrest

- The risk of out of hospital cardiac arrest in Manchester is 2.4% higher on high air pollution days than lower air pollution days (short-term). (see assumption 1)
- Each year on average, higher air pollution days in Manchester are responsible for 6 more cardiac arrests outside hospital than lower air pollution days. (short-term). (see assumption 2)

Stroke

- The risk of emergency hospitalisations for stroke in Manchester is 2.8% higher on high air pollution days than on lower air pollution days (short-term). (see assumption 3)
- On high air pollution days in Manchester, there are on average 14 more hospital admissions for stroke each year than on lower air pollution days (short-term). (see assumption 5).
- Lowering air pollution by 33.5% on high air pollution days in Manchester could save 14 hospital admissions for stroke each year (short-term/alternative). (see assumption 6)
- Each year on average, higher air pollution days in Manchester can send up to 22 more people to hospital for stroke than lower air pollution days (short-term). (see assumption 7)

Asthma Admissions children

- In Manchester, your child is 4.4% more likely to be hospitalised for asthma on days with high NO₂ pollution compared to days with lower air pollution (short-term). (see assumption 8)
- In Manchester, an extra 8 children are hospitalised with asthma on days where air pollution is high compared to days where air pollution is low on average each year (short-term). (see assumption 9)

Asthma Admissions Adults

- In Manchester, adults are 1.5% more likely to be hospitalised for asthma on days with high NO₂ pollution compared to days with lower lower air pollution (short-term). (see assumption 10)
- In Manchester, an extra 6 adults are taken to hospital with asthma on days of high air pollution compared to days with lower air pollution(short-term). (see assumption 11)

Reduced lung growth and low lung function

- Cutting air pollution in Manchester by one fifth would increase children's lung capacity by around 2.6% (long-term). (see assumption 13)
- Cutting air pollution in Manchester by one fifth may contribute to a 1.3% greater chance of better lung function in children (long-term). (see assumption 15)
- Cutting air pollution in Manchester by one fifth would result in 284 fewer children with low lung function each year (long-term). (see assumption 15)

Lung cancer

- Cutting air pollution in Manchester by one fifth would decrease lung cancer cases by around 5.6% (long-term). (see assumption 16)
- Cutting air pollution in Manchester by one fifth would result in 20 fewer lung cancer cases each year (long-term). (see assumption 16)

Term low birthweight

- Cutting air pollution in Manchester by one fifth would decrease the risk of babies being born underweight by around 0.1% (long-term). (see assumption 19)
- Cutting air pollution in Manchester by one fifth would result in 5 fewer babies born underweight each year (long-term). (see assumption 20)

Respiratory admissions all ages

- The risk of emergency hospitalisations for respiratory disease in Manchester is 1.4% higher on high air pollution days than on lower air pollution days (short-term). (see assumption 21)
- On high air pollution days in Manchester, there are on average 68 more hospital admissions for respiratory disease each year than on lower air pollution days (short-term). (see assumption 22)
- Lowering air pollution by 33.5% on high air pollution days in Manchester could save 68 hospital admissions for respiratory disease each year (short-term/alternative). (see assumption 23)
- Each year on average, higher air pollution days in Manchester can send up to 109 more people to hospital for respiratory disease than lower air pollution days (short-term). (see assumption 24)

Cardiovascular admissions all ages

- The risk of emergency hospitalisations for cardiovascular disease in Manchester is 0.5% higher on high air pollution days than on lower air pollution days (short-term). (see assumption 25)
- On high air pollution days in Manchester, there are on average 18 more hospital admissions for cardiovascular disease each year than on lower air pollution days (short-term). (Assumption 26)
- Lowering air pollution by 49.6% on high air pollution days in Manchester could save 18 hospital admissions for cardiovascular disease each year (short-term/alternative). (see assumption 27)
- Each year on average, higher air pollution days in Manchester can send up to 32 more people to hospital for cardiovascular disease than lower air pollution days (short-term). (see assumption 28)

Bronchitic symptoms (asthmatic children)

- Cutting air pollution in Bristol by one fifth would decrease the risk of bronchitic symptoms in asthmatic children each year by around 2.1% (long-term). (see assumption 32)
- Cutting air pollution in Bristol by one fifth would result in 134 fewer asthmatic children with bronchitic symptoms each year (long-term). (see assumption 32)

COPD admissions (all ages)

- The risk of emergency hospitalisations for COPD in Manchester is 2.1% higher on high air pollution days than on lower air pollution days (short-term). (see assumption 34)
- On high air pollution days in Manchester, there are on average 32 more hospital admissions for COPD each year than on lower air pollution days (short-term). (see assumption 35)
- Lowering air pollution by 33.5% on high air pollution days in Manchester could save 32 hospital admissions for COPD each year (short-term/alternative). (see assumption 36)
- Each year on average, higher air pollution days in Manchester can send up to 47 more people to hospital for COPD than lower air pollution days (short-term). (see assumption 37)

Pneumonia admissions in children

- The risk of emergency hospitalisations for pneumonia in children in Manchester is 2.3% higher on high air pollution days than on lower air pollution days (short-term). (see assumption 38)
- On high air pollution days in Manchester, there are on average 1 more hospital admissions for pneumonia in children each year than on lower air pollution days (short-term). (see assumption 39)
- Lowering air pollution by 33.5% on high air pollution days in Manchester could save 1 hospital admissions for pneumonia in children each year (short-term/alternative). (see assumption 40)
- Each year on average, higher air pollution days in Manchester can send up to 1 more people to hospital for pneumonia in children than lower air pollution days (short-term). (see assumption 41)

Nottingham

Cardiac arrest

- The risk of out of hospital cardiac arrest in Nottingham is 2.3% higher on high air pollution days than lower air pollution days (short-term). (see assumption 1)
- Each year on average, higher air pollution days in Nottingham are responsible for 3 more cardiac arrests outside hospital than lower air pollution days. (short-term). (see assumption 2)

Stroke

- The risk of emergency hospitalisations for stroke in Nottingham is 3.3% higher on high air pollution days than on lower air pollution days (short-term). (see assumption 3)
- Living near a busy road in Nottingham increases your risk of hospitalisation for stroke by 1.5% (short-term). (see assumption 4)
- On high air pollution days in Nottingham, there are on average 8 more hospital admissions for stroke each year than on lower air pollution days (short-term). (Assumption 5)
- Lowering air pollution by 35.7% on high air pollution days in Nottingham could save 8 hospital admissions for stroke each year (short-term/alternative). (see assumption 6)
- Each year on average, higher air pollution days in Nottingham can send up to 13 more people to hospital for stroke than lower air pollution days (short-term). (see assumption 7)

Asthma Admissions children

- In Nottingham, your child is 5.1% more likely to be hospitalised for asthma on days with high NO₂ pollution compared to days with lower air pollution (short-term). (see assumption 8)
- In Nottingham, an extra 5 children are hospitalised with asthma on days where air pollution is high compared to days where air pollution is low on average each year (short-term). (see assumption 9)

Asthma admissions in adults

- In Nottingham, adults are 1.7% more likely to be hospitalised for asthma on days with high NO₂ pollution compared to days with lower air pollution (short-term). (see assumption 10)
- In Nottingham, an extra 3 adults are taken to hospital with asthma on days of high air pollution compared to days with lower air pollution (short-term). (see assumption 11)

Lung capacity

- Roadside air pollution in Nottingham stunts lung growth in children by 2.8% (long-term). (see assumption 12)
- Cutting air pollution in Nottingham by one fifth would increase children's lung capacity by around 2.8% (long-term). (see assumption 13)
- Living near busy roads in Nottingham may contribute to a 1.5% greater chance of reduced lung function in children (long-term). (see assumption 14)
- Cutting air pollution in Nottingham by one fifth may contribute to a 1.5% greater chance of better lung function in children (long-term). (see assumption 15)
- Cutting air pollution in Nottingham by one fifth would result in 175 fewer children with low lung function each year (long-term). (see assumption 15)

Lung cancer

- Cutting air pollution in Nottingham by one fifth would decrease lung cancer cases by around 6.7% (long-term). (see assumption 16)
- Cutting air pollution in Nottingham by one fifth would result in 15 fewer lung cancer cases each year (long-term). (see assumption 16)

Asthma symptoms in children

- In Nottingham, children with asthma are 0.3% more likely to experience asthma symptoms on high air pollution days than on lower pollution days (short-term). (see assumption 17).
- On high air pollution days, 11 more children with asthma in Nottingham experience asthma symptoms than on lower pollution days (short-term). (see assumption 17)

Term low birthweight

- Living near busy roads in Nottingham may contribute to a 0.1% greater risk of babies being born underweight (long-term). (see assumption 19)
- Cutting air pollution in Nottingham by one fifth would decrease the risk of babies being born underweight by around 0.1% (long-term). (see assumption 20)
- Cutting air pollution in Nottingham by one fifth would result in 3 fewer babies born underweight each year (long-term). (see assumption 20)

Respiratory admissions all ages

- The risk of emergency hospitalisations for respiratory disease in Nottingham is 1.5% higher on high air pollution days than on lower air pollution days (short-term). (see assumption 21)
- On high air pollution days in Nottingham, there are on average 36 more hospital admissions for respiratory disease each year than on lower air pollution days (short-term). (see assumption 22)
- Lowering air pollution by 34.2% on high air pollution days in Nottingham could save 36 hospital admissions for respiratory disease each year (short-term/alternative). (see assumption 23)
- Each year on average, higher air pollution days in Nottingham can send up to 57 more people to hospital for respiratory disease than lower air pollution days (short-term). (see assumption 24)

Cardiovascular admissions all ages

- The risk of emergency hospitalisations for cardiovascular disease in Nottingham is 0.5% higher on high air pollution days than on lower air pollution days (short-term). (see assumption 25)
- On high air pollution days in Nottingham, there are on average 8 more hospital admissions for cardiovascular disease each year than on lower air pollution days (short-term). (see assumption 26)
- Lowering air pollution by 41.6% on high air pollution days in Nottingham could save 8 hospital admissions for cardiovascular disease each year (short-term/alternative). (see assumption 27)
- Each year on average, higher air pollution days in Nottingham can send up to 15 more people to hospital for cardiovascular disease than lower air pollution days (short-term). (see assumption 28)

Coronary Heart Disease (CHD) Incidence (all ages)

- Living near busy roads in Nottingham may contribute to a 1.0% greater chance of coronary heart disease (long-term). (see assumption 29)
- Cutting air pollution in Nottingham by one fifth would decrease the risk of coronary heart disease by around 3.7% (long-term). (see assumption 30)
- Cutting air pollution in Nottingham by one fifth would result in 52 fewer cases of coronary heart disease each year (long-term). (see assumption 30)

Bronchitic symptoms (asthmatic children)

- Air pollution may contribute to asthmatic children that live near busy roads in Nottingham experiencing a 2.3% greater chance of developing bronchitic symptoms (long-term). (see assumption 31)
- Cutting air pollution in Nottingham by one fifth would decrease the risk of bronchitic symptoms in asthmatic children each year by around 2.3% (long-term). (see assumption 32)
- Cutting air pollution in Nottingham by one fifth would result in 84 fewer asthmatic children with bronchitic symptoms each year (long-term). (see assumption 32)

Acute bronchitis in children

- Living near busy roads in Nottingham may contribute to a 0.1% greater risk of a chest infection (acute bronchitis) in children (long-term). (see assumption 32)
- Cutting air pollution in Nottingham by one fifth would decrease the risk of a chest infection (acute bronchitis) in children by around 0.4% (long-term). (see assumption 33)
- Cutting air pollution in Nottingham by one fifth would result in 97 fewer children with a chest infection (acute bronchitis) each year (long-term). (see assumption 33)

COPD admissions (all ages)

- The risk of emergency hospitalisations for COPD in Nottingham is 2.2% higher on high air pollution days than on lower air pollution days (short-term). (see assumption 34)
- On high air pollution days in Nottingham, there are on average 17 more hospital admissions for COPD each year than on lower air pollution days (short-term). (see assumption 35)
- Lowering air pollution by 34.2% on high air pollution days in Nottingham could save 17 hospital admissions for COPD each year (short-term/alternative). (see assumption 36)
- Each year on average, higher air pollution days in Nottingham can send up to 25 more people to hospital for COPD than lower air pollution days (short-term). (see assumption 37)

Pneumonia admissions in children

- The risk of emergency hospitalisations for pneumonia in children in Nottingham is 2.4% higher on high air pollution days than on lower air pollution days (short-term). (see assumption 38)
- On high air pollution days in Nottingham, there are on average 0 more hospital admissions for pneumonia in children each year than on lower air pollution days (short-term). (see assumption 39)
- Lowering air pollution by 34.2% on high air pollution days in Nottingham could save 0 hospital admissions for pneumonia in children each year (short-term/alternative). (see assumption 40)
- Each year on average, higher air pollution days in Nottingham can send up to 1 more child to hospital for pneumonia than lower air pollution days (short-term). (see assumption 41)

Oxford

Cardiac arrest

- The risk of out of hospital cardiac arrest in Oxford is 1.9% higher on high air pollution days than lower air pollution days (short-term). (see assumption 1)
- Each year on average, higher air pollution days in Oxford are responsible for 6 more cardiac arrests outside hospital than lower air pollution days. (short-term). (see assumption 2)

Stroke

- The risk of emergency hospitalisations for stroke in Oxford is 2.2% higher on high air pollution days than on lower air pollution days (short-term). (see assumption 3)
- Living near a busy road in Oxford increases your risk of hospitalisation for stroke by 7.4% (short-term). (see assumption 4)
- On high air pollution days in Oxford, there are on average 2 more hospital admissions for stroke each year than on lower air pollution days (short-term). (see assumption 5)
- Lowering air pollution by 26.2% on high air pollution days in Oxford could save 2 hospital admissions for stroke each year (short-term/alternative). (see assumption 6)
- Each year on average, higher air pollution days in Oxford can send up to 4 more people to hospital for stroke than lower air pollution days (short-term). (see assumption 7)

Asthma admissions Children

- In Oxford, your child is 3.5% more likely to be hospitalised for asthma on days with high NO₂ pollution compared to days with lower air pollution (short-term). (see assumption 8)
- In Oxford, an extra 1 child is hospitalised with asthma on days where air pollution is high compared to days where air pollution is low on average each year (short-term). (see assumption 9)

Asthma admissions in adults

- In Oxford, adults are 1.2% more likely to be hospitalised for asthma on days with high NO₂ pollution compared to days with lower air pollution (short-term). (see assumption 10)
- In Oxford, an extra 1 adult are taken to hospital with asthma on days of high air pollution compared to days with lower air pollution(short-term). (see assumption 11)

Lung capacity

- Roadside air pollution in Oxford stunts lung growth in children by 14.1% (long-term). (see assumption 12)
- Cutting air pollution in Oxford by one fifth would increase children's lung capacity by around 2.8% (long-term). (see assumption 13)
- Living near busy roads in Oxford may contribute to a 10.3% greater chance of reduced lung function in children (long-term). (see assumption 14)
- Cutting air pollution in Oxford by one fifth may contribute to a 1.5% greater chance of better lung function in children (long-term). (see assumption 15)
- Cutting air pollution in Oxford by one fifth would result in 77 fewer children with low lung function each year (long-term). (see assumption 15)

Lung cancer

- Cutting air pollution in Oxford by one fifth would decrease lung cancer cases by around 6.0% (long-term). (see assumption 16)
- Cutting air pollution in Oxford by one fifth would result in 28 less lung cancer cases each year (long-term). (see assumption 16)

Asthma symptoms in children

- In Oxford, children with asthma are 0.2% more likely to experience asthma symptoms on high air pollution days than on lower pollution days (short-term). (see assumption 17).
- On high air pollution days, 4 more children with asthma in Oxford experience asthma symptoms than on lower pollution days (short-term). (see assumption 17).

Term low birthweight

- Living near busy roads in Oxford may contribute to a 0.4% greater risk of babies being born underweight (long-term). (see assumption 19)
- Cutting air pollution in Oxford by one fifth would decrease the risk of babies being born underweight by around 0.1% (long-term). (see assumption 20)
- Cutting air pollution in Oxford by one fifth would result in 1 fewer baby born underweight each year (long-term). (see assumption 20)

Cardiovascular admissions all ages

- The risk of emergency hospitalisations for cardiovascular disease in Oxford is 0.4% higher on high air pollution days than on lower air pollution days (short-term). (see assumption 25)
- On high air pollution days in Oxford, there are on average 3 more hospital admissions for cardiovascular disease each year than on lower air pollution days (short-term). (see assumption 26)
- Lowering air pollution by 40.2% on high air pollution days in Oxford could save 3 hospital admissions for cardiovascular disease each year (short-term/alternative). (see assumption 27)
- Each year on average, higher air pollution days in Oxford can send up to 5 more people to hospital for cardiovascular disease than lower air pollution days (short-term). (see assumption 28)

Coronary Heart Disease (CHD) Incidence (all ages)

- Cutting air pollution in Oxford by one fifth would decrease the risk of coronary heart disease by around 2.7% (long-term). (see assumption 30)
- Cutting air pollution in Oxford by one fifth would result in 83 fewer cases of coronary heart disease each year (long-term). (see assumption 30)

Bronchitic symptoms (asthmatic children)

- Air pollution may contribute to asthmatic children that live near busy roads in Oxford experiencing a 13.3% greater chance of developing bronchitic symptoms (long-term). (see assumption 31)
- Cutting air pollution in Oxford by one fifth would decrease the risk of bronchitic symptoms in asthmatic children each year by around 2.3% (long-term). (see assumption 32)
- Cutting air pollution in Oxford by one fifth would result in 38 fewer asthmatic children with bronchitic symptoms each year (long-term). (see assumption 32).

Acute bronchitis in children

- Cutting air pollution in Oxford by one fifth would decrease the risk of a chest infection (acute bronchitis) in children by around 0.3% (long-term). (see assumption 33)
- Cutting air pollution in Oxford by one fifth would result in 31 fewer children with a chest infection (acute bronchitis) each year (long-term). (see assumption 33)

Southampton

Cardiac arrest

- The risk of out of hospital cardiac arrest in Southampton is 1.9% higher on high air pollution days than lower air pollution days (short-term). (see assumption 1)
- Each year on average, higher air pollution days in Southampton are responsible for 2 more cardiac arrests outside hospital than lower air pollution days. (short-term). (see assumption 2)

Stroke

- The risk of emergency hospitalisations for stroke in Southampton is 3.0% higher on high air pollution days than on lower air pollution days (short-term). (Assumption 3)
- Living near a busy road in Southampton increases your risk of hospitalisation for stroke by 2.0% (short-term). (Assumption 4)
- On high air pollution days in Southampton, there are on average 7 more hospital admissions for stroke each year than on lower air pollution days (short-term). (Assumption 5)
- Lowering air pollution by 30.2% on high air pollution days in Southampton could save 7 hospital admissions for stroke each year (short-term/alternative). (Assumption 6)
- Each year on average, higher air pollution days in Southampton can send up to 10 more people to hospital for stroke than lower air pollution days (short-term). (Assumption 7)

Asthma admissions Children

- In Southampton, your child is 4.7% more likely to be hospitalised for asthma on days with high NO₂ pollution compared to days with lower air pollution (short-term). (see assumption 8)
- In Southampton, an extra 4 children are hospitalised with asthma on days where air pollution is high compared to days where air pollution is low on average each year (short-term). (see assumption 9)

Asthma admissions in adults

- In Southampton, adults are 1.6% more likely to be hospitalised for asthma on days with high NO₂ pollution compared to days with lower air pollution (short-term). (see assumption 10)
- In Southampton, an extra 3 adults are taken to hospital with asthma on days of high air pollution compared to days with lower air pollution (short-term). (see assumption 11)

Lung capacity

- Roadside air pollution in Southampton stunts lung growth in children by 3.8% (long-term). (see assumption 12)
- Cutting air pollution in Southampton by one fifth would increase children's lung capacity by around 3.2% (long-term). (see assumption 13)
- Living near busy roads in Southampton may contribute to an 2.0% greater chance of reduced lung function in children (long-term). (see assumption 14)
- Cutting air pollution in Southampton by one fifth may contribute to a 1.7% greater chance of better lung function in children (long-term). (see assumption 15)
- Cutting air pollution in Southampton by one fifth would result in 150 fewer children with low lung function each year (long-term). (see assumption 15)

Lung cancer

- Cutting air pollution in Southampton by one fifth would decrease lung cancer cases by around 5.9% (long-term). (see assumption 16)
- Cutting air pollution in Southampton by one fifth would result in 10 fewer lung cancer cases each year (long-term). (see assumption 16)

Asthma symptoms in children

- In Southampton, children with asthma are 0.3% more likely to experience asthma symptoms on high air pollution days than on lower pollution days (short-term). (see assumption 17).
- On high air pollution days, 9 more children with asthma in Southampton experience asthma symptoms than on lower pollution days (short-term). (see assumption 17).

Term low birthweight

- Living near busy roads in Southampton may contribute to a 0.1% greater risk of babies being born underweight (long-term). (see assumption 19)
- Cutting air pollution in Southampton by one fifth would decrease the risk of babies being born underweight by around 0.1% (long-term). (see assumption 20)
- Cutting air pollution in Southampton by one fifth would result in 3 fewer babies born underweight each year (long-term). (see assumption 20)

Respiratory admissions all ages

- The risk of emergency hospitalisations for respiratory disease in Southampton is 1.2% higher on high air pollution days than on lower air pollution days (short-term). (see assumption 21)
- On high air pollution days in Southampton, there are on average 27 more hospital admissions for respiratory disease each year than on lower air pollution days (short-term). (see assumption 22)
- Lowering air pollution by 27.7% on high air pollution days in Southampton could save 27 hospital admissions for respiratory disease each year (short-term/alternative). (see assumption 23)
- Each year on average, higher air pollution days in Southampton can send up to 43 more people to hospital for respiratory disease than lower air pollution days (short-term). (see assumption 24)

Cardiovascular admissions all ages

- The risk of emergency hospitalisations for cardiovascular disease in Southampton is 0.4% higher on high air pollution days than on lower air pollution days (short-term). (see assumption 25)
- On high air pollution days in Southampton, there are on average 6 more hospital admissions for cardiovascular disease each year than on lower air pollution days (short-term). (see assumption 26)
- Lowering air pollution by 41.0% on high air pollution days in Southampton could save 6 hospital admissions for cardiovascular disease each year (short-term/alternative). (see assumption 27)
- Each year on average, higher air pollution days in Southampton can send up to 11 more people to hospital for cardiovascular disease than lower air pollution days (short-term). (see assumption 28)

Coronary Heart Disease (CHD) Incidence (all ages)

- Living near busy roads in Southampton may contribute to a 5.6% greater chance of coronary heart disease (long-term). (see assumption 29)
- Cutting air pollution in Southampton by one fifth would decrease the risk of coronary heart disease by around 4.2% (long-term). (see assumption 30)
- Cutting air pollution in Southampton by one fifth would result in 48 fewer cases of coronary heart disease each year (long-term). (see assumption 30)

Bronchitic symptoms (asthmatic children)

- Air pollution may contribute to asthmatic children that live near busy roads in Southampton experiencing a 3.1% greater chance of developing bronchitic symptoms (long-term). (see assumption 31)
- Cutting air pollution in Southampton by one fifth would decrease the risk of bronchitic symptoms in asthmatic children each year by around 2.6% (long-term). (see assumption 32)
- Cutting air pollution in Southampton by one fifth would result in 69 fewer asthmatic children with bronchitic symptoms each year (long-term). (see assumption 32)

Acute bronchitis in children

- Living near busy roads in Southampton may contribute to a 0.6% greater risk of a chest infection (acute bronchitis) in children (long-term). (see assumption 32)
- Cutting air pollution in Southampton by one fifth would decrease the risk of a chest infection (acute bronchitis) in children by around 0.4% (long-term). (see assumption 33)
- Cutting air pollution in Southampton by one fifth would result in 81 fewer children with a chest infection (acute bronchitis) each year (long-term). (see assumption 33)

COPD admissions (all ages)

- The risk of emergency hospitalisations for COPD in Southampton is 1.9% higher on high air pollution days than on lower air pollution days (short-term). (see assumption 34)
- On high air pollution days in Southampton, there are on average 12 more hospital admissions for COPD each year than on lower air pollution days (short-term). (see assumption 35)
- Lowering air pollution by 27.7% on high air pollution days in Southampton could save 12 hospital admissions for COPD each year (short-term/alternative). (see assumption 36)
- Each year on average, higher air pollution days in Southampton can send up to 18 more people to hospital for COPD than lower air pollution days (short-term). (see assumption 37)

Pneumonia admissions in children

- The risk of emergency hospitalisations for pneumonia in children in Southampton is 2.0% higher on high air pollution days than on lower air pollution days (short-term). (see assumption 38)
- On high air pollution days in Southampton, there are on average 0 more hospital admission for pneumonia in children each year than on lower air pollution days (short-term). (see assumption 39)
- Lowering air pollution by 27.7% on high air pollution days in Southampton could save 0 hospital admission for pneumonia in children each year (short-term/alternative). (see assumption 40)
- Each year on average, higher air pollution days in Southampton can send up to 1 more child to hospital for pneumonia than lower air pollution days (short-term). (see assumption 41)

APPENDIX C: ASSUMPTIONS

Assumption 1

Assumes typical high air pollution days are at the average of the top half of the annual range of PM_{2.5} levels and typical low air pollution days were at the average of the bottom half of the range of levels. In more technical terms, this is the difference between the 75th and 25th percentile of daily average particulate matter concentrations.

Assumption 2

Assumes half the year was at the average of the top half of the annual range of particulate matter levels and these days were reduced to the average of the bottom half of the range of levels. In more technical terms, this is the difference between the 75th and 25th percentile of daily average PM_{2.5} concentrations. Calculation applies to all ages.

Assumption 3

Assumes typical high air pollution days are at the average of the top half of the annual range of NO₂ levels and typical low air pollution days were at the average of the bottom half of the range of levels. In more technical terms, this is the difference between the 75th and 25th percentile of daily average nitrogen dioxide concentrations. Nitrogen dioxide may be acting as a marker for other traffic pollutants.

Assumption 4

Based on the difference between the middle of the range of daily average nitrogen dioxide levels at roadsides and the middle of the range of daily average nitrogen dioxide levels away from roads. Nitrogen dioxide may be acting as a marker for other traffic pollutants.

Assumption 5

Assumes half the year was at the average of the top half of the annual range of nitrogen dioxide levels and these days were reduced to the average of the bottom half of the range of levels. Nitrogen dioxide may be acting as a marker for other traffic pollutants.

Assumption 6

Assumes half the year was at the average of the top half of the annual range of nitrogen dioxide levels and these days were reduced to the average of the bottom half of the range of levels. (The 75th to the 25th percentile). This is a change in air pollution level on high days of 22%. Nitrogen dioxide may be acting as a marker for other traffic pollutants.

Assumption 7

Assumes half the year was at the average of the top half of the annual range of nitrogen dioxide levels and these days were reduced to the average of the bottom half of the range of levels. Figure given uses the upper 95% confidence interval of the concentration-response function. Nitrogen dioxide may be acting as a marker for other traffic pollutants.

Assumption 8

Assumes typical high air pollution days are at the average of the top half of the annual range of nitrogen dioxide (NO₂) levels and typical low air pollution days were at the average of the bottom half of the range of levels. In more technical terms, this is the difference between the 75th and 25th percentile of daily average nitrogen dioxide concentrations.

Assumption 9

Assumes half the year was at the average of the top half of the annual range of nitrogen dioxide levels and these days were reduced to the average of the bottom half of the range of levels. In more technical terms, this is the difference between the 75th and 25th percentile of daily average nitrogen dioxide concentrations. Calculation applies to children aged 0-14.

Assumption 10

Assumes typical high air pollution days are at the average of the top half of the annual range of NO₂ levels and typical low air pollution days were at the average of the bottom half of the range of levels. In more technical terms, this is the difference between the 75th and 25th percentile of daily average nitrogen dioxide concentrations.

Assumption 11

Assumes half the year was at the average of the top half of the annual range of nitrogen dioxide levels and these days were reduced to the average of the bottom half of the range of levels. In more technical terms, this is the difference between the 75th and 25th percentile of nitrogen dioxide concentrations. Calculation applies to adults age 15-64.

Assumption 12

Based on the difference between long term average nitrogen dioxide levels at roadsides compared to the long-term average at less polluted, quieter streets (the Birmingham background). Compares the resulting predicted change in Forced Vital Capacity (a measure of the volume of the lungs) in children from age 11-15 with the theoretical normal values in children across the same age span.

Assumption 13

20% is an arbitrary number for a reduction in long-term NO₂ concentrations. Compares the resulting predicted change in Forced Vital Capacity (a measure of the volume of the lungs) in children from age 11-15 with the theoretical normal values in children across the same age span.

Assumption 14

Based on the difference between long term average air nitrogen dioxide levels at roadsides compared to the long-term average at less polluted, quieter streets (the Birmingham background). Refers to children aged 6-8.

Assumption 15

20% is an arbitrary number for a reduction in long-term NO₂ concentrations. Low lung function refers to children with FEV₁ (Forced expiratory volume in 1 second – a measure of how fast a child can breathe out) less than 85% of that predicted for healthy children of the same age and gender. It is typically low in asthmatics. Refers to children aged 6-8.

Assumption 16

20% is an arbitrary number for a reduction in long-term PM_{2.5} concentrations. Lung cancer develops through many steps and smoking is the major cause but air pollution may contribute too.

Assumption 17

Assumes half the year was at the average of the top half of the annual range of particulate air pollution (PM₁₀) levels and these days were reduced to the average of the bottom half of the range of levels. Asthmatic symptoms include cough, wheeze and breathlessness.

Assumption 18

Assumes half the year was at the average of the top half of the annual range of particulate air pollution (PM10) levels and these days were reduced to the average of the bottom half of the range of levels. Asthmatic symptoms include cough, wheeze and breathlessness. Applies to children age 5-14.

Assumption 19

Based on the difference between long term average nitrogen dioxide levels at roadsides compared to the long-term average at less polluted, quieter streets (the Birmingham background). Babies born underweight refers to babies born at term with a birthweight less than 2,500g.

Assumption 20

20% is an arbitrary number for a reduction in long-term NO₂ concentrations. Babies born underweight refers to babies born at term with a birthweight less than 2,500g.

Assumption 21

Assumes typical high air pollution days are at the average of the top half of the annual range of O₃ levels and typical low air pollution days were at the average of the bottom half of the range of levels. In more technical terms, this is the difference between the 75th and 25th percentile of daily average ozone concentrations.

Assumption 22

Assumes half the year was at the average of the top half of the annual range of ozone levels and these days were reduced to the average of the bottom half of the range of levels.

Assumption 23

Assumes half the year was at the average of the top half of the annual range of ozone levels and these days were reduced to the average of the bottom half of the range of levels. (The 75th to the 25th percentile).

Assumption 24

Assumes half the year was at the average of the top half of the annual range of ozone levels and these days were reduced to the average of the bottom half of the range of levels. Figure given uses the upper 95% confidence interval of the concentration-response function.

Assumption 25

Assumes typical high air pollution days are at the average of the top half of the annual range of PM_{2.5} levels and typical low air pollution days were at the average of the bottom half of the range of levels. In more technical terms, this is the difference between the 75th and 25th percentile of daily average particulate matter concentrations.

Assumption 26

Assumes half the year was at the average of the top half of the annual range of PM_{2.5} levels and these days were reduced to the average of the bottom half of the range of levels.

Assumption 27

Assumes half the year was at the average of the top half of the annual range of PM_{2.5} levels and these days were reduced to the average of the bottom half of the range of levels. (The 75th to the 25th percentile).

Assumption 28

Assumes half the year was at the average of the top half of the annual range of PM_{2.5} levels and these days were reduced to the average of the bottom half of the range of levels. Figure given uses the upper 95% confidence interval of the concentration-response function.

Assumption 29

Based on the difference between long term average PM₁₀ levels at roadsides compared to the long-term average at less polluted, quieter streets (the Birmingham background). Coronary heart disease (heart attacks and a type of angina (heart pain)) has many well-established causes e.g (fatty diet) but air pollution may contribute too.

Assumption 30

20% is an arbitrary number for a reduction in long-term PM₁₀ concentrations. Coronary heart disease (heart attacks and a type of angina (heart pain)) has many well-established causes e.g (fatty diet) but air pollution may contribute too.

Assumption 32

Based on the difference between long term average PM₁₀ levels at roadsides compared to the long-term average at less polluted, quieter streets (the Birmingham background). Acute bronchitis means transient inflammation of the upper airways of the lung as a result of a chest infection. (There are other types of chest infections as well). Refers to children aged 6-12.

Assumption 33

20% is an arbitrary number for a reduction in long-term PM₁₀ concentrations. Acute bronchitis means transient inflammation of the upper airways of the lung as a result of a chest infection. (There are other types of chest infections as well). Refers to children aged 6-12.

Assumption 34

Assumes typical high air pollution days are at the average of the top half of the annual range of O₃ levels and typical low air pollution days were at the average of the bottom half of the range of levels. In more technical terms, this is the difference between the 75th and 25th percentile of daily average particulate matter concentrations.

Assumption 35

Assumes half the year was at the average of the top half of the annual range of O₃ levels and these days were reduced to the average of the bottom half of the range of levels.

Assumption 36

Assumes half the year was at the average of the top half of the annual range of O₃ levels and these days were reduced to the average of the bottom half of the range of levels. (The 75th to the 25th percentile).

Assumption 37

Assumes half the year was at the average of the top half of the annual range of O₃ levels and these days were reduced to the average of the bottom half of the range of levels. Figure given uses the upper 95% confidence interval of the concentration-response function.

Assumption 38

Assumes typical high air pollution days are at the average of the top half of the annual range of O₃ levels and typical low air pollution days were at the average of the bottom half of the range of levels. In more technical terms, this is the difference between the 75th and 25th percentile of daily average particulate matter concentrations.

Assumption 40

Assumes half the year was at the average of the top half of the annual range of O₃ levels and these days were reduced to the average of the bottom half of the range of levels. (The 75th to the 25th percentile).

Assumption 41

Assumes half the year was at the average of the top half of the annual range of O₃ levels and these days were reduced to the average of the bottom half of the range of levels. Figure given uses the upper 95% confidence interval of the concentration-response function.

Assumption 42

A typical air pollution day was defined as the middle of the range of air pollution levels in a year as measured at roadside or urban background monitoring stations within London

Assumption 43

Based on the difference between long term average air pollution levels at roadsides compared to the long-term average at less polluted, quieter streets (the London background).

Assumption 44

A typical higher air pollution day was defined as the middle of the top half of the range of particulate air pollution levels in a year and a typical low pollution day as the middle of the bottom half of the range.

Assumption 45

Based on the difference between long term average air pollution levels at roadsides compared to the long-term average at less polluted, quieter streets (the London background). Coronary heart disease (heart attacks and a type of angina (heart pain)) has many well-established causes e.g. (fatty diet) but air pollution may contribute too.

Assumption 46

Assumes half the year was at the average of the top half of the annual range of particulate air pollution levels and these days were reduced to the average of the bottom half of the range of levels.

Assumption 47

Based on the difference between long term average air pollution levels at roadsides compared to the long-term average at less polluted, quieter streets (the London background).

Assumption 48

Based on the difference between long term average air pollution levels across London compared to a hypothetical 20% reduction scenario.

Assumption 49

Assumes half the year was at the average of the top half of the annual range of particulate air pollution (PM10) levels and these days were reduced to the average of the bottom half of the range of levels. Asthmatic symptoms include cough, wheeze and breathlessness. Applies to children age 5-14.