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High pollution levels 'causing' huge reduction in intelligence'

Damian Carrington
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Air pollution causes a "huge" reduction in intelligence, according to new research, indicating that the damage to society of toxic air is far deeper than the well-known impacts on physical health.

The research was conducted in China but is relevant across the world, with 95% of the global population

breathing unsafe air. It found that high pollution levels led to significant drops in test scores in language and arithmetic, with the average impact equivalent to having lost a year of education.

"Polluted air can cause everyone to reduce their level of education by one year, which is huge," said of Xi Chen at Yale school of public health in the US, and one of the research team. "But we know the effect is worse for the elderly, especially those over 64, and for men,

and for those with low education. If we calculate [the loss] for those, it may be a few years of education."

Previous research has found that air pollution harms cognitive performance in students, but this is the first to examine people of all ages and the difference between men and women.

The damage in intelligence was worst for those over 64, with serious consequences, said Chen. "We usually make the most critical financial decisions in old age."

Rebecca Daniels, of the UK public health charity Medact, called the findings "extremely worrying".

Air pollution causes 7m premature deaths a year but the harm to people's mental abilities is less well known. A recent study found toxic air was linked to "extremely high mortality in people with mental disorders as earlier work linked it to increased mental illness in children. Another analysis found those living near busy roads had an increased risk of dementia.

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Dirty air 'causing huge reduction in intelligence'

similar preliminary findings in their work. "It is because high air pollution can potentially be associated with oxidative stress, neuroinflammation, and neurodegeneration of humans," he said.

Chen said air pollution was most likely to be the cause of the loss of intelligence, rather than simply being a correlation. The study followed the same people as air pollution varied from one year to the next, meaning that many other possible causal factors, such as genetic differences, are automatically accounted for.

The scientists also accounted for the gradual decline in cognition seen as people age and ruled out people being more impatient or uncooperative during tests when pollution was high.

Air pollution was seen to have a short-term impact on intelligence as

well and Chen said this could also have important consequences, for example for students who have to take crucial entrance exams on polluted days.

"But there is no short cut to solve this issue," he said. "Governments really need to take concrete measures to reduce air pollution. That may benefit human capital, which is one of the most important driving forces of economic growth." In China, air pollution is declining but remains three times above World Health Organization limits, Chen said.

According to the WHO, 20 of the world's most polluted cities are in developing countries. China, home to several of those cities, has been

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Xi Chen Yale school of public health

engaged in a "war against pollution" for the last five years.

Damage to intelligence was likely to be incremental, Chen said, with a 1mg/m³ rise in pollution over three years equivalent to losing more than a month of education. Small pollution particles were especially damaging, he said: "That is the same wherever you live. As human beings we have more in common than is different."

Aarash Saleh, a registrar in respiratory medicine in the UK and part of the Doctors Against Diesel campaign, said: "This study adds to the concerning bank of evidence showing that exposure to air pollution can worsen our cognitive function.

"Road traffic is the biggest contributor to air pollution in residential areas and the government needs to act urgently to remove heavily polluting vehicles from our roads."

Daniels said: "The UK's air is illegally polluted and is harming people's health every day. Current policies are not up to the scale of the challenge: government must commit to bringing air pollution below legal limits as soon as possible."

THE



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Dementia threat soars in areas hit by pollution

Up to 40 per cent increased risk on worst roads

Chris Smyth Health Editor

Living in a polluted area increases the risk of dementia by up to 40 per cent, the first British study of its kind has found.

Thousands of cases of the illness could be prevented every year by cutting traffic fumes, said researchers who add to growing evidence that dirty urban air can damage the brain.

Polluted air is known to cause lung and heart problems as tiny soot particles and chemicals such as nitrogen dioxide (NO₂) pass deep into the body.

Research is also increasingly linking traffic fumes to thinking problems. Last year a Canadian study of 2.2 million people concluded that those who lived continuously near a busy road were 12 per cent more likely to get dementia.

Scientists now say that Britain's higher pollution levels may make the risk even greater in this country after looking at data on 131,000 Londoners aged above 50, of whom 2,200 developed dementia over seven years.

The research cannot prove a causal link but it found that people living in the fifth of areas with the highest levels of fine particulate matter (PM2.5) were 20 per cent more likely to get dementia during the study. Those exposed to the highest fifth of NO₂ levels were 40 per cent more likely to get dementia even after adjusting for age, class and other health habits, according to results in the journal *BMJ Open*.

Frank Kelly, of King's College London, senior author of the study, said

that while results were not conclusive "it is increasingly appreciated that the impacts of air pollution on health are seen far beyond the lungs".

He said it was "very likely that high air pollution alone does not cause dementia but rather it increases the risk of an individual developing it", adding: "Air pollution is linked with many more conditions than dementia and therefore there is now overwhelming evidence that we should be improving air quality in cities to improve public health."

Traffic fumes, particularly from diesel, are the main sources of PM2.5 and NO₂ and Professor Kelly said that ministers had a responsibility to cut pollution. He advised people wanting to minimise their exposure to "plan low-pollution routes and try and avoid rush hour".

He added that indoors, people could decrease emissions by not burning candles or having open fires and by increasing ventilation when cooking.

Exactly how pollution harms the brain is not fully understood, nor how long people need to be living in polluted areas to be at risk, as the study looked only at pollution exposures at one point in time. Professor Kelly said that damage was likely to build up over years or decades as the result of inflammation and other reactions to pollution.

"We thus hypothesise that it is these reactions by our body to elevated pollution occurring over and over again that leads to the eventual tissue damage such as to the lungs, blood vessels or

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most consumers assuming it was the

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Dementia linked to pollution

brain," he said. The study suggested that each extra microgram per cubic metre of PM2.5 increased dementia risk by 7 per cent, compared with 1 per cent in the Canadian research. Professor Kelly said: "The pollution concentrations in London are higher and this would be the most likely explanation."

He estimated that bringing pollution down to the lowest levels seen in London could prevent 7 per cent of all dementia cases in the study. With 200,000 people developing dementia each year in Britain, cleaner air could result in "significant public health gain", he said.

Marrie van Tongeren, of the University of Manchester, said: "There is a growing body of evidence of the link between air pollution and brain health, including dementia and Alzheimers. This study adds to this... As most people in the UK live in urban areas, exposure to traffic-related and other air pollutants is ubiquitous. Hence, even a relatively small increase in risk will result in a large public health impact."

With no treatment for Alzheimers,

HEALTH

Air pollution prematurely ages lungs by four years

By Tom Bawden
SCIENCE CORRESPONDENT

Air pollution will prematurely age the lungs of the average Briton by more than four years during their lifetime, thereby raising the risks of chronic lung disease, a study suggests.

As people get older, their lungs function less effectively, in some cases leading to chronic obstructive pulmonary disease (COPD) – a group of lung conditions that cause breathing difficulties, such as bronchitis and emphysema.

Researchers have discovered that air pollution can accelerate the onset of COPD by ageing the lungs considerably over a period of decades. They estimate that long-term exposure to air containing five micrograms of tiny particulate pollution per cubic metre ages the lungs by two years.

With two-thirds of the UK population living in areas containing 10 micrograms per cubic metre or more, the analysis indicates that the average set of lungs will age by four extra years during a person's lifetime.

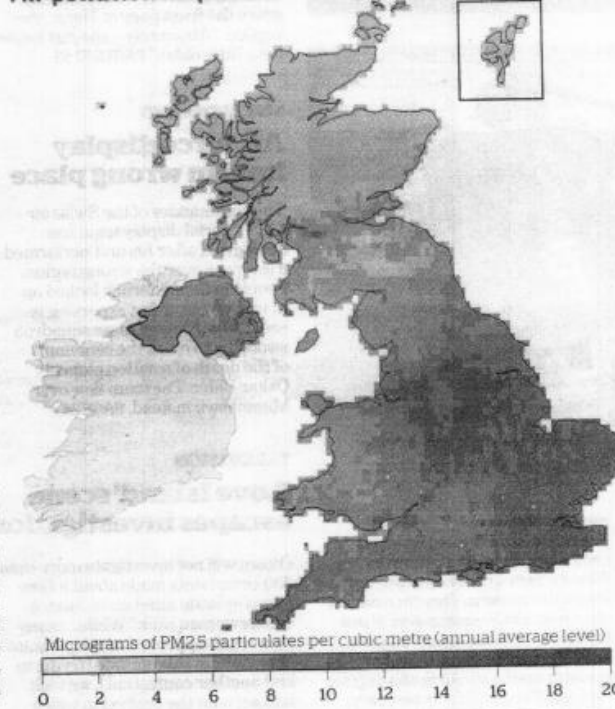
"This study shows that exposure to polluted air seriously harms human health by reducing life expectancy and making people more prone to developing chronic lung disease," said Professor Tobias Welte, of Hannover University in Germany. "Access to clean air is a fundamental need and right for all citizens in Europe."

Dr Penny Woods, the chief executive of the British Lung Foundation, said: "Living with a lung condition can leave you less capable of work and at a greater risk of an early death.

"We need politicians to step up and

(i) Asthma, lung cancer, heart disease, strokes and diabetes are among the **most serious illnesses** that are caused or exacerbated by air pollution.

Air pollution map of the UK



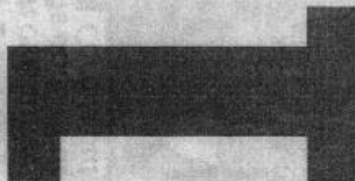
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protect their constituents from toxic air. It's time our country's air quality health crisis was taken seriously with the introduction of clean-air zones in the most polluted cities."

The UK has consistently breached EU air pollution limits in recent years and the High Court has ruled three times that the Government must do more to curb nitrogen dioxide levels – much of which comes from traffic.

A spokesman for the Department for Environment, Food and Rural Affairs said: "We are already investing £3.5bn to clean up our air, while our clean air strategy has been commended by the World Health Organisation."

The research also included academics from the University of Leicester and was published in the *European Respiratory Journal*.



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