

Environmental Systems and Societies

Air Pollution, Cancer and Low Birth Weight

Please see the [International Agency for Research on Cancer \(IARC\)](http://www.iarc.fr) website.

Air Pollution and Cancer

The World Health Organisation (WHO) has officially classified outdoor air pollution as carcinogenic (causing cancer). The IARC, a cautious organisation that only speaks out when the evidence is very strong, stated that air pollution from industrial and traffic fumes is a definite cause of lung cancer and is also linked to bladder cancer. Diesel engine exhaust fumes, solvents, metals and dusts have all been labelled as carcinogenic.

Air pollution is already known to increase the risk of respiratory and heart disease. Now it is recognised that the risk of developing lung cancer is significantly increased in people exposed to air pollution.

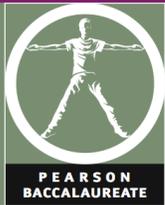
There are effective ways to reduce air pollution, and given the impacts of pollution, this needs to be addressed quickly. As the major sources are man-made, much can and should be done to protect the world's population from exposure, especially those in urban and industrial areas.



Heavy traffic – a leading source of particulate matter in urban areas

Air Pollution and Low Birth Weight

Another recent study (by the Centre for Research in Environmental Epidemiology in Barcelona) has shown that children born to mothers who live in areas with air pollution and dense traffic are more likely to have low birth weight and smaller head circumferences. Even in areas with



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relatively low levels of air pollution, babies were smaller – well below the European Union accepted limits.

The study found that for every increase of five micrograms per cubic metre of particulate matter, the risk of low birth weight increased by 18%. Although causation has not been proved, the link is a very strong one. The authors state that a substantial proportion of cases of low birth weight could be prevented in Europe if urban air pollution, especially particulate matter, was reduced.

Low birth weight is a concern since it frequently predicts poor health as children and later as adults. A smaller head circumference could predict problems with neurodevelopment.

The research was based on twelve countries, involving over 74,000 women between 1994 and 2011. It included a range of environments from rural to inner city. Other factors, such as smoking, were also included. In terms of location, poor people living in inner city areas, living on a poor diet, and where there was more traffic, were more likely to have low birth weight babies.

It is possible to reduce air pollution, although the advice is not always followed. The introduction of a low emission zone in London has had little effect on the concentration of particulate matter, although the mix of vehicles has changed. UK policy makers have resisted attempts to change diesel-powered taxis (which contribute 20% of London's locally generated particulate matter) to cleaner petrol-powered ones.

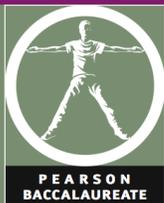
Smog in Harbin, China

Dense smog in the north-eastern Chinese city of Harbin led to visibility of less than 10 metres and pollution levels 40 times the recommended daily level. All highways across Heilongjiang province were shut. In Harbin, with a population of 11 million people, the airport was closed and all primary and middle schools were shut.

In Harbin measurements of PM_{2.5}, the smallest particulate matter with a diameter of 2.5 micrometres, reached 1,000 micrograms per cubic metre in places. This surpassed the peak of 900 that shocked Beijing residents in January's so-called "*airpocalypse*". PM_{2.5} is particularly dangerous because the matter is small enough to penetrate deep into the lungs and enter the bloodstream. The World Health Organisation's recommended level for daily exposure is just 25.

Officials blamed the first day of winter heating in the city, leading to increased coal burning, low winds and the burning of crop stubble as well as vehicle emissions. China remains heavily dependent on coal, which accounts for 68.4% of energy usage.

Visibility across most of neighbouring Jilin province was less than 500 metres. Trains were delayed, most highways closed and all flights from Changchun airport delayed. Emergency



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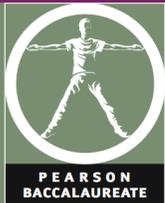
measures included closing schools and kindergartens and ordering cars with odd and even numbered licence plates to keep off the roads on alternate days. As a long-term measure this could back-fire as it encourages people to have a second car, often an older and more polluting one. It has been suggested that China will have to pay over \$800 billion to combat air pollution

Activities

1. What do the letters IARC stand for?
2. How many deaths were attributed to particulate matter in 2010?
3. How many cases of lung cancer are said to be caused by air pollution?
4. Where in the world is the greatest impact of air pollution?
5. Why is it such a problem?
6. Describe the link between air pollution and low birth weight.
7. Why is low birth weight a problem?
8. Was air quality a problem in Harbin in October 2013?
9. Use the websites provided to research and produce a presentation on air pollution in China.

A potential solution – low exhaust emission engine and particulate trap exhaust system





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Web sites

[International Agency for Research on Cancer \(IARC\)](#)

[Clean Air in London](#)

[A photo-gallery of the smog in Harbin](#)

[The cost of air pollution in China](#)

[Air pollution in China – Real time data](#)

[Centre for Research in Environmental Epidemiology](#)

Suggested Answers

1. International Agency for Research on Cancer
2. 3.2 million
3. 223,000
4. China and East Asia
5. It is a problem due to reduced life expectancy, declining health, increased cost of health care and reduced economic productivity.
6. As air pollution increases, the risk of low birth weight also increases – for every five micrograms per cubic metre of particulate matter, the risk of low birth weight increased by 18%.
7. Babies with low birth weight are more likely to experience poor health in childhood and as an adult compared with those who had a normal birth weight.
8. Harbin, like many cities in China, burns a huge amount of coal. Nationally, coal accounts for 64% of China's electricity production. There are also high levels of vehicle emissions and burning of stubble in the fields. The fact that the windspeed was low meant that there was very little dispersion of the pollution.
9. *Student activity