

## Q&As on outdoor air pollution and cancer

### **Q. What is outdoor air pollution?**

**A.** Outdoor air pollution refers to a complex mixture of pollutants found in outdoor environments. Some of the major sources of outdoor air pollution include exhaust from vehicles (especially those using old engines and dirty fuels), emissions from factories and coal-fired power plants, and emissions from households using coal, or wood-fired or low-efficiency stoves for cooking and heating.

### **Q. Why did IARC evaluate outdoor air pollution?**

**A.** The IARC Monographs Working Group, through a thorough review of all available scientific literature, evaluated whether the air pollution mixture as a whole causes cancer. The IARC Monographs Programme had previously confirmed that components of air pollution (e.g. benzene) and air pollution mixtures (e.g. diesel exhaust and coal smoke) are cancer-causing. The latest review identified that air pollution as a whole, as well as the small particles that make up part of air pollution (measures of PM<sub>2.5</sub> and PM<sub>10</sub>, particulate matter of different sizes, are used in monitoring air pollution and in epidemiological studies) cause cancer.

The advisory board of the IARC Monographs Programme (a group of leading international experts) regularly recommends priorities for evaluation of agents that could be associated with an increased risk of cancer. Several components of air pollution have been evaluated (e.g. engine exhaust, coal smoke), and there was already some evidence that lung cancer is associated with exposure to overall air pollution and to particulate matter, so the present assessment reviewed these questions.

### **Q. On what kind of evidence did the Working Group base their evaluation?**

**A.** The Working Group looked at more than 1000 studies from five continents, covering the scientific fields of atmospheric science, epidemiology, and toxicology. Evidence from all of these different types of research involving humans, animals, and experimental systems points to the conclusion that air pollution causes cancer.

### **Q. What kinds of cancers are linked to outdoor air pollution?**

**A.** Scientific studies showed a consistent association of outdoor air pollution with lung cancer as well as other diseases (such as respiratory and heart diseases). There is also a positive association with an increased risk of bladder cancer.

### **Q. How does the risk of lung cancer from outdoor air pollution compare with that from tobacco smoke?**

**A.** In areas with an intermediate level of outdoor air pollution, the risk of lung cancer associated with pollution is similar to that associated with passive smoking. But a much larger population is exposed to ambient air pollution than to passive smoking, and in certain densely populated regions of rapidly industrializing countries, the risk from air pollution can be much higher than that from passive smoking.

The risk of lung cancer among people exposed to high levels of air pollution is more than 50% greater than it is for people exposed to the lowest levels.

### **Q. Who is most at risk?**

**A.** Everyone is exposed to air pollution at some level, so everyone is at risk, but the higher the level of exposure, the higher the risk. People who live in polluted areas, or in close proximity to a source of pollution, are at increased risk. People who are more exposed to pollution because of their jobs (e.g. traffic police, drivers, street sellers) are also at increased risk.

### **Q. Which countries have the highest levels of air pollution?**

**A.** The composition of air pollution and the levels of exposure vary widely between locations. Studies show that exposure levels in rapidly industrializing countries have increased significantly in recent years; these levels are comparable to those found in industrialized countries (such as the United Kingdom and the USA) during most of the 20th century.

### **Q. Has the situation worsened? What is the global trend?**

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**A.** Over the past few decades, there has been a trend towards improvement in places like Europe, North America, and Japan. This shows that countries that were once very polluted can dramatically reduce air pollution levels by using improvements in engine and fuel technology, as well as policies on energy efficiency, and more recently by adopting renewable sources of energy.

Currently, the situation is comparatively worse in rapidly industrializing countries (e.g. India, China). While many of these countries are starting to take actions to reduce pollution (e.g. China, Mexico), there is still a long way to go until they achieve the levels found in some of the cleanest developed countries (e.g. Canada).

### **Q. What can be done to reduce the risk?**

**A.** Exposure to air pollution is largely beyond the control of individuals and requires action by public authorities at the national, regional, and international levels. Individuals can contribute to reducing the level of air pollution in their communities by reducing their personal fossil-fuel consumption (using clean/renewable energy sources, improving insulation of their homes to reduce the need for combustion for heating or cooling, eating locally produced food, and using sustainable modes of transportation like public transportation, cycling, and walking).

Actions by governments and businesses could include reducing fossil-fuel burning and emissions from industry, power generation, and transportation. Authorities need to identify the package of measures to reduce fossil-fuel use that corresponds to the local needs. Examples are elimination of fossil-fuel subsidies, increasing availability of clean/renewable energy sources, improvements in energy efficiency (insulation of buildings, city planning that reduces the need for long-distance travel, availability of sustainable modes of transportation, etc.).

Policy-makers can use the scientific evidence in the IARC Monograph to show the importance of taking appropriate action to reduce air pollution. Assessing the health impacts of public policies can help to identify those with better expected health benefits, and inform the design and implementation of the most effective measures.

### **Q: Are the current WHO guidelines on exposure to outdoor air pollution in line with what the Monograph describes? Are they out of date?**

**A.** The 2005 WHO air quality guidelines recommend levels of particulate matter that have been associated with low risks to health (an annual average concentration of 10 micrograms of PM<sub>2.5</sub> per cubic metre and 20 micrograms of PM<sub>10</sub> per cubic metre). All countries should aspire to achieve these levels so as to protect public health.

As many countries have concentrations of air pollution far above the recommended levels, the guidelines also identify the expected health gains from achieving intermediate targets. For example, by reducing particulate matter pollution from 70 to 20 micrograms of PM<sub>2.5</sub> per cubic metre, it is expected that air quality-related deaths could be reduced by about 15%.

WHO regularly reviews its public health guidance to ensure that it remains in line with the latest available evidence. The findings of a recent review of evidence on air quality and health found more extensive evidence of impacts on certain diseases (like heart disease), but studies published since 2005 essentially reconfirm the recommendations in the current guidelines, and there is currently no need to change the guideline values. A new revision of the guidelines will be considered in 2014 and would reflect the new evidence that has emerged since the 2005 guidelines, but it is not expected that different threshold values will be proposed for air pollutants.

(Data compiled from WHO and IARC publications)

More information:

#### **IARC Monograph on Diesel exhaust:**

<http://www.iarc.fr/en/media-centre/iarcnews/2012/mono105-info.php>  
[http://www.iarc.fr/en/media-centre/pr/2012/pdfs/pr213\\_E.pdf](http://www.iarc.fr/en/media-centre/pr/2012/pdfs/pr213_E.pdf)

#### **WHO Guidelines on Outdoor Air Pollution:**

[http://www.who.int/phe/health\\_topics/outdoorair/outdoorair\\_aqg/en/index.html](http://www.who.int/phe/health_topics/outdoorair/outdoorair_aqg/en/index.html)  
[http://www.who.int/phe/health\\_topics/outdoorair/en/](http://www.who.int/phe/health_topics/outdoorair/en/)