Making it easier to breathe: air pollution and children's health

Haciendo más fácil respirar: la contaminación del aire y la salud de los niños

Tornando mais fácil respirar: A poluição do ar e a saúde das crianças

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Air pollution remains a major threat to children's health, even though air quality in Europe has improved in recent decades. This article considers some of the latest scientific research on how air pollution affects the health of children and adults, as well as some of the current cleaner air policies. The European Union (EU) has designated 2013 as the EU Year of Air, with the aim of raising awareness about what health experts are calling "the invisible killer", and of agreeing a consensus about new health protection measures. Health and medical experts play a leading role in this process in an effort to ensure that our children grow up in clean environments.

AIR POLLUTION AND HEALTH

Air pollution originates from human activities such as industrial processes, transport, domestic and small-scale combustion, and agriculture. Ultimately, it is a consequence of our economic way of life and, although there are also natural sources of air pollution (e.g. Sahara dust), it indicates our dependency on the burning of fossil fuels.

In most cases, air pollution can no longer be seen or smelt, but the "invisible killer"[1] is still there, reducing average adult life expectancy by more than 8 months on average. In cities, where the majority of Europeans live, this situation is particularly worrying. According to the European Environment Agency, at least 80 % of city dwellers live with air pollution levels that are above the concentrations recommended by the World Health Organization (WHO)[2,3].

The effects of particulate matter (PM), ozone or nitrogen dioxide are the most frequently researched topic in the environmental health sciences. Each year, hundreds of new studies are being published that demonstrate the acute and chronic effects of air pollution on respiratory and cardiovascular health, and also increasingly on other health outcomes. Although not all mechanisms are fully understood, research has shown that the highest toll of air pollution comes from its cardiovascular effects. Studies have already demonstrated that a short-term increase in PM leads to increase the number of cardiac hospital admissions and deaths.

AIR POLLUTION IS A TOP HEALTH RISK FACTOR

The World Health Organization is the leading authority on the health effects of air pollution. The WHO has issued guidelines for outdoor air concentrations, for which leading scientists have conducted a thorough review of the evidence and recommended levels that should be adhered to for health protection[4].

In January 2013, WHO experts confirmed the conclusions of the 2005 guidelines with the preliminary results of the REVIHAAP project[5]. The evidence presented is particularly worrying, as the WHO found that the health effects of air pollutants occur at lower exposure levels than previously thought, and that the range of health effects is broader, also now including neurodevelopmental and cognitive impacts. Moreover, air pollution is increasingly linked to diabetes.

These findings confirm that air pollution is a top health risk factor. The 2010 Global Burden of Disease (GBD) assessment by 450 experts in a consortium of five partners, including the WHO, shows that globally air pollution is one of the top ten risk factors for

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HEAL has over 65 member organizations, representing health professionals, not-for-profit health insurers, patients, citizens, women, youth and environmental experts. Members include international and Europe-wide organizations, as well as national and local groups in 26 countries both within EU member states and the wider European region, as defined by the World Health Organization (WHO). HEAL brings independent expertise and evidence from the health community to different decision-making processes.

health. For the first time, the global GBD has ranked an environmental factor among the more widely discussed life-style risk factors such as tobacco and alcohol[6].

CHILDREN ARE PARTICULARLY VULNERABLE

As their bodies are still developing, children are particularly vulnerable to air pollution, and knowledge about the harm that occurs continues to grow. Indeed, leading researchers are now raising the alarm that pre-natal and early life exposure to pollutants can have irreversible consequences for children's development and may increase the risk for diseases that only become manifest itself much later in life[7].

This evidence supplements the results of studies showing how air pollution is implicated in the increase in children's asthma and its aggravation, particularly, by traffic. Evidence from the APHEKOM study, which conducted a health impact assessment for 25 European cities showed that living close to busy roads may be responsible for up to 30 % of new asthma cases in children[8].

In the largest multinational study about the consequences of prenatal exposure to outdoor air pollution, researchers found a consistent increased risk of lower birth weight among infants[9]. They analyzed data for 3 million births to evaluate the association between maternal exposure to outdoor particulate air pollution and birth weight. Low birth weight is a risk factor for infant mortality, childhood illness and adult cardiovascular disease. These findings support a growing body of evidence that outdoor air pollution is associated with a range of adverse pregnancy outcomes including low birth weight, preterm birth, stillbirth, and some congenital anomalies.

THE EU, AIR POLLUTION AND OUR HEALTH: WHAT NEEDS TO BE DONE

Reducing air pollution is not only a public health imperative, but would also bring immediate and long-lasting benefits for our health and wellbeing. Yet, what exactly should be done?

The broad lines for regulating air pollution as part of environmental legislation are no longer decided at the national or city level, but at the wider EU level. Air quality is an area where the European Union has taken early action since the 1970s, and laws are now in place to set concentration limits for outdoor air pollution (EU air quality standards), as well as to limit the overall emissions of hazardous air pollutants (National Emissions Ceilings Directive) and those for specific sectors (for example European vehicle standards).

As the EU Year of Air, 2013 will be a decisive year to see if policy-makers will set Europe on course for real improvements in air quality. Over the past decade, there have been many missed opportunities for cleaner air, and often also a lack of political will. Europe's economic crisis is also playing a role: as many people are struggling to make a living, they increasingly resort to burning wood, old furniture and other materials, thereby, increasing local pollution levels[10].

Over sixty health, environmental and citizens' organizations from across Europe have launched three priorities regarding what must be done to provide clean air everywhere[11]. These organizations urge decision-makers in the EU Commission, the European Parliament and national ministers to start working towards the following goals as soon as possible:

1. To adopt ambitious reduction commitments in the revised National Emissions Ceilings (NEC) Directive for existing and 'new' pollutants.

The NEC Directive sets binding emission caps for several air pollutants for member states and is therefore the cornerstone of EU legislation on air pollution control[12]. Member States have had few problems meeting the emission limits. Hence, new more ambitious ceilings should be set for 2020, 2025 and 2030. The new NEC Directive could also make a major contribution to tackling climate change, through binding reduction commitments for methane, as well as for black carbon, under a new mandatory commitment for PM2.5.

2. To adopt sector legislation to cut emissions from all major sources

Cutting emissions where they originate is one of the most cost effective ways for improving air quality. A number of sources of air pollution have been identified as particularly problematic, including agriculture, domestic solid-fuel combustion, small industrial combustion plants, road vehicles, non-road mobile machinery, international shipping and solvent use. EU laws for these sources are insufficient, inadequate or non-existent. Deciding on measures for these sectors would bring major support to local and regional authorities for air quality.

3. To enforce and strengthen ambient air quality limit values

EU-wide binding limit values have proven to be an effective tool, particularly for triggering local action. However, current EU standards do not protect our health, especially for PM2.5, where the standard is less strict than that recommended by the WHO, and that just set by the

USA. The EU standards need to be strengthened and action should be speeded up against member states in which the EU air quality standards are breached.

CLEAN AIR EVERYWHERE

During the next few months, health and medical experts will play a key role in the discussions at the EU and national levels about these policy measures. They will bring their expertise about the health effects of air pollution, particularly for children, to policy-makers and demand action to reduce this pollution. In addition, they will be able to encourage citizens to reduce pollution levels by switching to cleaner fuels and more efficient products, by walking and cycling more, and by eating less meat. Improving air quality is a challenge that concerns us all. However, it is particularly important to take action to provide a cleaner and healthier environment for our children.

Further information is available at www.env-health.org and www.knowyourairforhealth.eu

REFERENCES.

1. European Respiratory Society. 10 principles for clean air: http://erj.ersjournals.com/content/39/3/525.full.

2. See: http://www.eea.europa.eu/publications/air-quality-in-europe-2012.

3. Air pollution also leaves a deadly trace around the globe: The Organisation for Economic Co-operation and Development (OECD), predicts that urban air pollution will become the top environmental cause of mortality worldwide by 2050, ahead of dirty water and lack of sanitation. The number of premature deaths from exposure to particulate air pollutants could double from current levels to 3.6 million every year globally, with most occurring in China and India: http://www.oecd.org/newsroom/environmentactnoworfacecostlyconsequenceswarnsoecd.htm.

4. The global WHO guidelines were last updated in 2005: http://www.euro.who.int/en/what-we-do/health-topics/environment-and-health/air-quality.

5. See: http://www.euro.who.int/en/what-we-do/health-topics/environment-and-health/air-quality/activities/evidence-on-health-aspects-of-air-pollution-to-review-eu-policies-the-revihaap-projectTHIS The scientists actually recommend a revision of the WHO air quality guidelines and the EU's air quality standards for better health protection.

6. The Global Burden of Disease study aims to produce complete and comparable estimates of the burden of diseases, injuries, and risk factors for the years 2005 and 2010 for 21 regions covering the entire global. It includes 235 causes of death, 67 risk factors, and improved methods for the estimation of mortality and disease. Overall, the study reveals substantial shifts in the burden of disease from premature mortality to morbidity and disability, and from communicable to non-communicable, chronic disease: http://www.thelancet.com/themed/global-burden-of-disease.

7. More than 80 scientist have signed on the consensus statement on "Developmental origins of non-communicable disease: Implications for research and public health": http://www.ehjournal.net/content/11/1/42/abstract.

8. The results for asthma for 10 of the APHEKOM cities show that road traffic pollution is as serious as passive smoke in the development of childhood asthma, see: http://www.european-lung-foundation.org/18230-.htm.

9. See: http://ehp.niehs.nih.gov/2013/02/1205575/

10. Athens air pollution found at 15 times above EU alert level. Ekathimerini, 28 Feb 2013: http://www.ekathimerini.com/4dcgi/_w_articles_wsite1_1_28/02/2013_485136; Rise in oil tax forces Greeks to face cold as ancients did. New York Times, 3 Feb, 2013: http://www.nytimes.com/2013/02/04/world/europe/oil-tax-forces-greeks-to-fight-winter-with-fire.html?_r=1&.

11. NGO priorities for the review of the Thematic Strategy on Air Pollution: http://www.env-health.org/resources/position-papers/article/joint-position-paper-ngo.

12. The pollutants are: SO2, NOx, non-methane VOC, and ammonia.