**Promoting Clean Air – Combating “Fake News” and “Air Pollution Denial”**

Commentary to Lancet Respiratory Medicine

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A fierce debate on the health effects of air pollution erupted in the German media early this year. The scientific evidence that links ambient air pollution, in particular fine particles (PM2.5; particles smaller than 2.5 µm) and nitrogen dioxide (NO2), to disease and mortality1,2 was questioned by a small group of lung physicians and engineers. They call to lift the limit values of ambient particulate matter (PM) and NO2 concentrations in Europe, claiming lack of evidence for such limits3. Their claims – broadly covered by German mainstream and social media were welcomed by some politicians, industry organizations and members of the general public. NO2 emissions were a focus of this debate, because traffic restrictions have been issued in many German cities as a result of non-compliance with European Union limits.

Ambient air quality has improved substantially over the past five decades as emission control, efficient combustion engines and cleaner fossil fuels have been introduced in all sectors, including energy, manufacturing, transport and residential heating. However, urban areas with heavy traffic remain hot spots for PM and NO2 across Europe4.

PM2.5, ozone and NO2 affect the health of populations around the globe1. The effects start in the airways and the lung, but air pollution affects the entire body by inducing inflammatory systemic responses5. As a consequence, air pollution has been associated with increases in the incidence of respiratory and cardiovascular diseases and reduced life expectancy5. Furthermore, adverse effects on foetal development during pregnancy, lung and brain development in children, and increased risks for diabetes and dementia have been shown. The carcinogenic effect of particulate matter is now considered to be causal6.

The World Health Organisation (WHO) last revised the Global Air Quality Guidelines for PM, ozone and NO2 in 20051. These guidelines formed the basis for standard setting in Europe and many countries worldwide7. For Europe, the current Air Quality Directive adopted the WHO guideline value for NO2 as the European limit value. Unfortunately, the political negotiations failed to establish an evidence-based limit for PM. Indeed, the limit for PM2.5 was set two and a half-times higher than the WHO guideline value, thus providing no effective protection of public health. The scientific evidence on health effects of air pollution has meanwhile increased substantially2,8. Importantly, recent studies have documented that adverse health effects are observed even at concentrations well below the current WHO guideline values9. The resulting disease burden worldwide and in Europe is immense - the Global Burden of Disease (GBD) project has demonstrated that ambient air pollution ranks among the top-10 major risk factors world-wide and leads to an average loss of life expectancy of approximately 1 year in Europe 10.

Improving air quality and reducing its health effects in European urban areas requires major changes in energy consumption, transportation, city planning, and agricultural production. To set the right targets for policies, it is crucial to adopt the WHO guideline values in the current European Union Directive for all pollutants – not only for NO2. Policies that comprehensively aim to reduce PM, NO2 and ozone will inevitably also reduce precursors and air pollutants with shared sources such as ultrafine particles, soot or organic carbon which all have adverse health effects2. Moreover, there would be additional benefits in terms of climate change, since many of the required actions would also reduce carbon dioxide emissions11.

Why are we currently witnessing strong attacks on the scientific evidence used to derive air quality guidelines and standards, and criticism on the methodology used for health impact assessment around the world? In the recent German example, various communication channels, including talk shows, interviews in mainstream media, and social media presented biased and manipulative views of the science to make unsubstantiated false claims and question the validity of published scientific reports. Thereby, doubt was sown effectively among the general public about the quality of the underlying scientific evidence through massive mainstream media reporting. The biased coverage came under the guise of presenting ‘both sides’ of an alleged ‘scientific debate’. It was gladly taken up by some politicians . The ‘debate’ had all features that Farrell and colleagues discuss for the misinformation campaigns on climate change12 or the well-known strategies used decades ago by the tobacco industry13. This ‘Air Pollution Denial’ is not limited to Germany or Europe14. In the United States, for example, the scientific community15 witnesses attempts of industry consultants – now put in leading positions of the Environmental Protection Agency of the United States – to dismantle decades of successful science-based procedures in clean air policy. Meanwhile – so far with less media coverage - European industry consultants engage in questioning International Agency on Cancer with its conclusion for ambient air pollution to cause cancer6.

One can only speculate about the timing and motivation of the current emergence of ‘Air Pollution Deniers’. The attempts to question and undermine the scientific evidence coincide with the ongoing revision of the WHO air quality guidelines, with the ongoing fitness check of the European Air Quality Directive to decide about a revision, and with the ongoing review of the US-American PM standard15. Not everyone would welcome more stringent regulations that might be developed as a consequence of updated standards based on the available evidence. For obvious scientific reasons, WHO will not consider raising of guideline values. On the contrary, WHO faces the challenge of how to address evidence of adverse health effects occurring at levels below the current guideline values. Any course of action should not be influenced by lobbyists but follow scientific reasoning, with the goal to protect the health of people, globally.

In conclusion, three major steps are needed to reduce the effects of ambient air pollution. First, a tightening of European standards for fine particulate matter to abate health effects of air pollution in Europe. Second, efforts by the scientific community and national or international agencies concerned with public health and environment to protect the public, the legal, and the political system against campaigns of misinformation on the health effects of air pollution and the societal benefits of stringent clean air policies. Third, development of science-based, societal measures for sustainable and responsible energy consumption, traffic levels and agriculture practices to ensure the health of all populations globally.

**Authors contributions**

Annette Peters wrote the first draft, all authors revised the manuscript for critical content and approved the final version of the manuscript.

**Conflict of Interest:**

Dr. Forastiere reports "I am member of the Guidelines Development Group (GDG) for the revision of the World Health Organization Air Quality Guidelines. There is no compensation for this activity". Dr. Peters, Künzli, and Dr. Hoffmann have nothing to disclose.

**References**

1. WHO. Air quality guidelines. Global update 2005. Copenhagen, 2006.

2. WHO. Review of evidence on health aspects of air pollution – REVIHAAP. Copenhagen, 2013.

3. Kelly FJ. Urban air quality and health: two steps forward, one step back. *Eur Respir J* 2019; **53**(3).

4. de Hoogh K, Gulliver J, Donkelaar AV, et al. Development of West-European PM2.5 and NO2 land use regression models incorporating satellite-derived and chemical transport modelling data. *Environ Res* 2016; **151**: 1-10.

5. Thurston GD, Kipen H, Annesi-Maesano I, et al. A joint ERS/ATS policy statement: what constitutes an adverse health effect of air pollution? An analytical framework. *Eur Respir J* 2017; **49**(1).

6. IARC. Outdoor air pollution. In: Monographs on the evaluation of carcinogenic risks to humans, 2016.

7. Kutlar Joss M, Eeftens M, Gintowt E, Kappeler R, Kunzli N. Time to harmonize national ambient air quality standards. *Int J Public Health* 2017; **62**(4): 453-62.

8. Burnett R, Chen H, Szyszkowicz M, et al. Global estimates of mortality associated with long-term exposure to outdoor fine particulate matter. *Proc Natl Acad Sci U S A* 2018; **115**(38): 9592-7.

9. Di Q, Wang Y, Zanobetti A, et al. Air Pollution and Mortality in the Medicare Population. *N Engl J Med* 2017; **376**(26): 2513-22.

10. Collaborators GBDRF. Global, regional, and national comparative risk assessment of 84 behavioural, environmental and occupational, and metabolic risks or clusters of risks for 195 countries and territories, 1990-2017: a systematic analysis for the Global Burden of Disease Study 2017. *Lancet* 2018; **392**(10159): 1923-94.

11. Shindell D, Faluvegi G, Seltzer K, Shindell C. Quantified, Localized Health Benefits of Accelerated Carbon Dioxide Emissions Reductions. *Nat Clim Chang* 2018; **8**(4): 291-5.

12. Farrell J, McConnell K, Brulle R. Evidence-based strategies to combat scientific misinformation. *Nat Clim Chang* 2019; **9**: 5.

13. Oreskes N, Conway EM. Merchants of Doubt: How a Handful of Scientists Obscured the Truth on Issues from Tobacco Smoke to Global Warming: Bloomberg Press; 2010.

14. Stop denying the risks of air pollution. *Nature* 2019; **568**(7753): 433.

15. Goldman GT, Dominici F. Don't abandon evidence and process on air pollution policy. *Science* 2019; **363**(6434): 1398-400.