

Working group 3: **Health effects from air pollution in a changing climate**

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Background

Climate change may influence the health effects related to air pollution in many ways. Higher temperatures can lead to increased levels of some air pollutants, such as ozone and secondary inorganic particles. Direct interactions between air pollution and temperature may also occur, such as during heat wave related mortality episodes. Furthermore, there is evidence of interactions between traffic generated air pollution and pollen exposure in relation to allergy, particularly in children. In general, the anticipated changes in climate are mostly expected to aggravate the adverse health effects of air pollution. Thus, preventive action focusing on air pollution exposure would be expected to reduce some of the climate related health effects and vice versa.

It is also important to note that climate change and air pollution are closely connected, not only with regard to interactions in causing health effects. Some of the measures that may be taken against climate change may strongly influence air pollution levels and the other way around. For example, a greater use of solid biomass fuels in domestic heating will increase emissions of air pollutants if adequate protective technology is not applied. A change in particulate matter levels in atmosphere is expected to change its green-house properties, and in which direction may be dependent on the type of particulate matter that is affected. Health effects need to be adequately considered in prioritization of preventive measures.

The aim of this working group was to assess various aspects of the evidence regarding health effects of air pollution in relation to climate change. In addition, specific recommendations for action were proposed and research needs identified.

Conclusions

There are important health effects, including increased mortality, already now from air pollution. Furthermore, the world population is aging and the prevalence of chronic conditions like diabetes is increasing. These groups are more susceptible to the adverse effects of both air pollution and increased temperature. There is an increasing need for strategies dealing with climate change to take into account their impact on air pollution related health effects.

There is very strong evidence that PM is responsible for various health effects and ample evidence that primary combustion particles, including soot, are especially harmful.

There is strong evidence that secondary particles have adverse health effects, which seems partly to be related to aging processes of sulphate particles. Reduction of secondary particles has been demonstrated to lead to health improvement.

The serious health effects from biomass combustion emissions need to be considered. This includes not only the well known problem of biomass burning for cooking and heating, but also the biomass burning related to agricultural practices, including biofuel production.

Many shipping lanes run close to land and shipping emissions give an important contribution to population exposure. These emissions are poorly regulated. Shipping fuels contain high levels of sulphur and metals, and are not allowed for use on land.

The relation between acute health effects and ozone seems to be linear, which indicates that controlling peak exposure is insufficient for health protection. Controlling average exposure would be beneficial for health, vegetation and climate.

There are several examples of complex interactions between energy conservation, air pollution and health effects. Energy conservation strategies need to be carefully evaluated with respect to their effect on the indoor environment.

Climate change may, directly and indirectly, lead to a vast array of health effects, mostly negative. It may also modify the health effects from air pollution. The knowledge base does not allow for quantitative assessment.

Recommendations

We recommend that IPCC and UNFCCC carefully consider the air pollution health impacts of different climate change policies.

We recommend that air pollution regulatory agencies and other relevant bodies, e.g. CLRTAP, take into account the climate impact of different air pollution control strategies. In addition, we recommend that combustion-related primary particulate monitoring and abatement measures are developed.

We recommend WHO to consider integrating air pollution and climate change in future recommendations to the member states, with special attention to biomass fuels.

We recommend EU to integrate air pollution and climate into new research programs on health effects.

We also recommend IMO to include air pollution health aspects in their work for sustainable shipping.

Research needs

The use of different monitoring techniques for characterising primary combustion particles (including ultrafine particles and soot) for studies of health effects and risk assessment needs to be further evaluated.

The toxicity of biomass combustion emissions needs to be further studied. Recent reports indicate that these may be more toxic than previously thought.

There are only few studies on the health effects from nitrate and ammonium particles, and these need to be further investigated.

There is some evidence of interaction between temperature, particles and ozone, but this needs to be further studied.

The need and possibilities of adaptation of individuals and society to climate change should be studied, integrating consequences for air pollution related health effects.

The health consequences of the use of new fuels in the transport sector need to be studied.

Selected references

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