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Executive Body for the Convention on Long-range Transboundary Air Pollution

Steering Body to the Cooperative Programme for Monitoring and Evaluation of the Long-range Transmission of Air Pollutants in Europe

Working Group on Effects

Third joint session
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Item 3 of the provisional agenda
Progress in activities in 2017 and further development of effects-oriented activities

Effects of air pollution on health

Report of the Joint Task Force on the Health Aspects of Air Pollution on its twentieth meeting

Summary

The present report is being submitted for the consideration of the Steering Body to the Cooperative Programme for Monitoring and Evaluation of the Long-range Transmission of Air Pollutants in Europe and the Working Group on Effects in accordance with the request of the Executive Body for the Convention on Long-range Transboundary Air Pollution in the 2016-2017 workplan for the implementation of the Convention (ECE/EB.AIR/133/Add.1, items 1.1.1.7, 1.1.1.17-1.1.1.19 and 1.1.3.1-1.1.3.3).

The report presents the results of the discussions on the health impacts of ambient air pollution and a summary of progress on the other workplan items discussed at the Task Force's twentieth meeting (Bonn, Germany, 16-17 May 2017).

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I. Introduction

1. The present report summarizes the results and discussions on the health impacts of ambient air pollution presented at the twentieth meeting of the Joint Task Force on the Health Aspects of Air Pollution (Task Force on Health) under the World Health Organization (WHO) European Centre for Environment and Health and the United Nations Economic Commission for Europe (ECE) Executive Body for the Convention on Long-Range Transboundary Air Pollution. The report also provides a summary of workplan items discussed at the meeting, in accordance with the 2016-2017 workplan for the implementation of the Convention (ECE/EB.AIR/133/Add.1) adopted by the Executive Body at its thirty-fourth session in December 2015.

2. The twentieth meeting of the Task Force on Health was held in Bonn, Germany, on 16 and 17 May 2017. Altogether, 52 experts from 32 Parties to the Convention attended the meeting, in addition to a representative of the Convention secretariat. The European Union, a Party to the Convention, was represented by the European Commission and the European Environment Agency. The meeting was co-chaired by Mr. Jonathan Dubnov (Israel) and Ms. Dorota Jarosinska (WHO European Centre for Environment and Health). Mr. Román Pérez-Velasco and Mr. Jiang Zhou (WHO European Centre for Environment and Health) acted as rapporteurs. Twelve temporary advisers participated in the meeting, from the following organizations: the European Lung Foundation (United Kingdom of Great Britain and Northern Ireland); the Flemish Institute for Technological Research (Belgium); the Health Effects Institute (United States of America); the Institute of Environmental Assessment and Water Research (Spain); the Institute of Public Health of Serbia "Dr. Milan Jovanovic Batut"; King's College London (United Kingdom); Public Health France; the Regional Environmental Centre for Central Asia (Uzbekistan); the Regional Health Service of Lazio (Italy); the Spanish National Research Council; the Swiss Tropical and Public Health Institute; and the United States Environmental Protection Agency. Two observers were present at the meeting, namely the representatives of the International Institute for Applied Systems Analysis (Austria) and the Documentation Office for Air and Health at the Swiss Tropical and Public Health Institute. The German and Swiss Governments both provided financial support for the meeting.

3. A session of the meeting was dedicated to commemorating the twentieth anniversary of the Task Force on Health and its achievements. A representative from WHO gave an historical overview of the Task Force, showing how it had evolved since 1998. The Task Force had experienced both a growth in participation and a shift in its focus: initially serving principally as a forum for the scientific review of evidence it had become a platform for sharing information and experiences on air pollution policies and activities and providing updates on the progress in research on the health impacts and challenges related to health and air pollution. The representative also gave an overview of the reports on the health risks of air pollution, tools and methods for capacity-building and the Task Force's contributions to policy development.

4. A former Chair of the Task Force also presented highlights of the Task Force and its work, noting that the meetings brought together experts from different fields, and highlighting how the provisional assessment report on particulate matter prepared in 1999 had helped to raise awareness about the associated health risks among the Convention community. The Task Force on Health had become a unique forum of interdisciplinary discussion, able to use top expertise and evidence to inform policies directly addressing air quality, but also broader policies, related to energy, transport or the environment.

II. National and international policies and processes on air quality and health

A. Updates on partner organizations and World Health Organization global activities

5. A representative of the Convention secretariat presented the latest work of ECE in relation to air quality and health, including: the activities of the Cooperative Programme for Monitoring and Evaluation of the Long-range Transmission of Air Pollutants in Europe (EMEP) and the Working Group on Effects, and the introduction of thematic sessions at their joint meetings; the messages of the 2016 scientific assessment report[1] in relation to the impact of the Convention on air quality and health; the outcomes of the latest sessions of the Executive Body; and the activities of the Working Group on Strategies and Review. In addition, ECE was implementing a capacity-building programme to promote ratification of the Convention and its protocols, and to enhance awareness of air pollution issues in the region. As a result, all Parties in Eastern Europe, the Caucasus and Central Asia had reported their emissions to the Convention for the first time in 2016. Outreach efforts and cooperation with other agencies on matters related to air pollution were also highlighted. Finally, the Batumi Action for Cleaner Air (ECE/BATUMI.CONF/2016/7) was brought to the attention of participants, and Parties were encouraged to submit more voluntary actions under that initiative.

6. A representative of the European Commission provided an update on recent developments in European Union air pollution policy. The Clean Air Policy Package from 2013 had now been concluded with a new directive on emission reductions for certain air pollutants.[2] The directive set ambitious reduction commitments for the main pollutants to be reached by 2020 and 2030. Furthermore, it included new components to facilitate implementation of the policy, in particular by the development of national programmes to achieve the reduction commitments in line with other main policy areas (e.g., agriculture and transport), and the achievements of the European Union ambient air quality limit values. The European Commission would launch the European Clean Air Forum, which would provide a basis for structured dialogues, exchange of knowledge and good practices in order to enhance the capacity of relevant stakeholders to improve air quality. The Forum aimed to provide a space to reflect on the development of policies, projects and programmes in the context of air pollution and air quality, and facilitate the implementation of European, national and local air policies. The first Clean Air Forum would be held in Paris in November 2017 and would focus on three themes: air quality in cities; air pollution from the agricultural sector; and clean air business opportunities.[3] The European Commission had also initiated Clean Air Dialogues with the European Union member States with the objective to enhance the means for exchanging best practices both at the European Union and the national level to achieve the headlines of the strategy, i.e., tackling

[1] See Rob Maas and Peringe Grennfelt, eds., *Towards Cleaner Air: Scientific Assessment Report 2016* (Oslo, 2016) and United States Environmental Protection Agency and Environment and Climate Change Canada, *Towards Cleaner Air: Scientific Assessment Report 2016-North America* (2016, online report).

[2] Directive (EU) 2016/2284 of the European Parliament and of the Council of 14 December 2016 on the reduction of national emissions of certain atmospheric pollutants, amending Directive 2003/35/EC and repealing Directive 2001/81/EC, O.J. (L 344).

[3] More information is available on the web page for the conference: http://www.euconf.eu/clean-air/index.html.

poor air quality in the short term, in particular the European Union ambient air quality limit values, and reducing the negative health impact of air pollution in the longer term. A first pilot phase was under way in 2017 (with Hungary, Ireland and Luxembourg). Building on the experience from the pilot phase, the European Commission would develop the dialogue further. It was worth noting that the country dialogues were complementary to other European Commission actions, in particular infringement procedures if there was a risk of non-compliance with the ambient air quality limit values. Information was also provided on the European Union Urban Agenda[4] and the Air Quality Partnership, addressing the specific challenges of cities up to 2030 and specifically on air pollution, and the most recent Environmental Implementation Review,[5] which identified air quality as a key challenge for the European Union member States. The ambient air quality legislation would be reviewed starting in 2017, with the aim of finalizing the legislation in 2019. The review would be backward-looking only, i.e., it would not automatically open up the directive for changes.

7. A WHO representative summarized the highlights from the 2016 Task Force meeting and provided an overview of the 2016-2017 workplan. Activities included further development of methods to quantify the health effects of long-range transboundary air pollution, collection and assessment of evidence on ozone and particulate matter, and assessment of communication strategies across Parties to the Convention. As part of the activities, WHO had launched the software AirQ+ in May 2016, and was now working on further methodological development and a capacity-building curriculum. Other highlights included the start of the update of the WHO air quality guidelines in 2016, the draft report "Overview on Communication Strategies/Systems in Different Parties to the Convention", and the publication of the reports, *Health Risk Assessment of Air Pollution — General Principles*[6] and *Evolution of WHO Air Quality Guidelines: Past, Present and Future*.[7]

B. Updates on World Health Organization regional activities

8. In addition, a representative of WHO provided information on the upcoming Sixth Ministerial Conference on Environment and Health (Ostrava, Czechia, 13-15 June 2017), including the organization of a side event on air quality and health (together with the Climate and Clean Air Coalition, ECE, the European Environment Agency, the Nordic Council of Ministers and the United Nations Environment Programme). The overall procedure and expected outcomes of the Ministerial Conference were presented, in particular the portfolio of actions included in the draft outcome document. The overall objective of the actions was to improve outdoor and indoor air quality. In the subsequent discussion, participants asked the Task Force to consider actions on strengthening the links between air pollution, climate change and the urban agenda, building evidence on the health effects of biomass combustion, performing evaluations of interventions and sharing good practices.

[4] See European Commission. "Urban Agenda for the EU" (accessed on 31 May 2017). Available from https://ec.europa.eu/futurium/en/urban-agenda.

[5] European Commission. "The Environmental Implementation Review", 10 May 2017. Available from http://ec.europa.eu/environment/eir/index_en.htm

[6] World Health Organization Regional Office for Europe (Copenhagen, 2016). Available from http://www.euro.who.int/en/health-topics/environment-and-health/air-quality/publications.

[7] World Health Organization Regional Office for Europe (Copenhagen, 2017). Available from http://www.euro.who.int/en/health-topics/environment-and-health/air-quality/publications.

III. Global perspectives on air pollution

9. A representative of WHO Headquarters gave an overview of activities on air pollution at the global level. An increasing burden of disease and new evidence on the adverse health effects of air pollution had increased demands for global action. As a result, the World Health Assembly had adopted a resolution in 2015 and a road map in 2016 for an enhanced global response to air pollution. In particular, WHO gathered data and raised awareness on air pollution by hosting global databases on ambient air quality in cities and household energy uses. WHO was updating its Ambient Air Pollution Database, with more recent measurements including data from rural areas, and also developing methods to improve population exposure assessments from particulate matter. Several reviews were currently being conducted to support the update of the WHO air quality guidelines, namely on the health impacts of desert and sand dust, and on the effectiveness of personal-level interventions to reduce air pollution exposure and/or improve health. WHO also helped to connect air pollution to sustainable development by acting as the custodian of the air pollution-related Sustainable Development Goals, providing data for global reporting and helping to refine the indicators to make them more health relevant. Other activities included the Guidelines for Accurate and Transparent Health Estimates Reporting (GATHER) checklist for standardized reporting of global health estimates, and the BreatheLife campaign, which was a global campaign led by WHO, the Climate and Clean Air Coalition and the Government of Norway to raise awareness about the health risks of short-lived climate pollutants, which contributed significantly to global warming and air pollution.

10. Thereafter, the WHO representative presented the current status of the Clean Household Energy Solutions Toolkit (CHEST), which would include tools, guidance and other materials that could be used at the local, national or regional level to support country-level implementation of the *WHO Guidelines for Indoor Air Quality: Household Fuel Combustion*.[8] Challenges in global monitoring of household energy use were highlighted, including the efforts for survey harmonization, in cooperation with the Global Alliance for Clean Cookstoves and the World Bank. A briefing on the Urban Health Initiative was also offered, including the project work in Accra and Kathmandu to adapt models originally developed for the WHO European Region. The Task Force was finally briefed on the last meeting of the Global Platform on Air Quality and Health, a WHO-led initiative bringing together other United Nations agencies and national and regional agencies and research institutions working on air quality. The Platform aimed to strengthen capacity for air quality monitoring worldwide and assessment and reporting of related health impacts in a transparent and harmonized way, and to stimulate policies that reduced air pollution exposure and related deaths and disease. Ongoing activities related to the Platform included further enhancement of methods to assess population exposure, the creation of a Task Force on the exposure-response functions to assess health impacts from air pollution, response to acute air pollution episodes and other communication issues. It was also announced that a WHO Conference on Air Quality and Health would be held in Geneva in 2018.

11. A representative of the Health Effects Institute gave a review of the Global Burden of Disease project, an international collaboration covering most countries in the world. The Task Force was briefed on the methods for estimation of health burden (both premature mortality and disability adjusted life years) attributable to air pollution, and updated on the latest Global Burden of Disease air quality and disease burden estimates, recently published in *The Lancet*.[9] The latest global estimates were higher than the previous ones (2013) owing

[8] World Health Organization (Geneva, 2014).

[9] Aaron J. Cohen and others, “Estimates and 25-year trends of the global burden of disease attributable

to a number of factors, including: incorporation of the latest exposure data (satellite and measurements); improvements in the integrated exposure-response functions; and demographic changes (in particular, aging and increases in diseases related to or affected by air pollution). In addition, opportunities for understanding and communicating regional- and country-level air quality and health burden using Global Burden of Disease data — particularly where extensive country level data were not available — were presented. Firstly, Global Burden of Disease data could be used to identify the ranking of the burden from air pollution in individual countries and how it changed over time. Secondly, the new State of Global Air interactive website made Global Burden of Disease population-weighted annual average fine particular matter ($PM_{2.5}$) and ozone data available publicly. The website, for example, allowed comparison of global, regional, and country trends in population-weighted pollutant levels and health burden, both for the population as a whole and for vulnerable groups.

12. Lastly, because understanding the contributions of individual sources, including the contribution of transboundary pollution, was key to identifying solutions to improve air quality, the representative of the Health Effects Institute reported on the Institute's application of the Global Burden of Disease methodology for that purpose, Global Burden of Disease Major Air Pollution Sources (GBD-MAPS). The project was an international collaboration relying on in-country expertise that helped analyse current and future impacts of major source contributions to air pollution and health burden under alternative energy and pollution control scenarios. A report on China had been published in 2016 and another one on India was due in summer 2017. Additional analyses at the national, regional and global levels were envisaged.

13. In the subsequent discussion, participants raised and discussed issues related to the differences between the Global Burden of Disease and the European Health Risks of Air Pollution in Europe (HRAPIE)[10] approaches in terms of methods and results. In particular, participants posed questions on how to reconcile those differences, which methods were most suitable for the region and for reporting Sustainable Development Goal indicator 3.9.1, and how to communicate those differences and also the uncertainty around results to stakeholders.

IV. Communication and public health messages for air pollution

14. A representative of the European Commission briefed participants on the development of a harmonized European Union-wide ambient air quality index (AAQI), building on experience from several member States and applying to ambient concentrations of critical pollutants. As a scoping exercise, a total of 21 air quality indices were reviewed, examining different characteristics such as pollutants covered, source and availability of data or intended user groups and links to health advice. It had been decided to include four core pollutants, namely, nitrogen dioxide, ozone, and particulate matter (PM_{10} and $PM_{2.5}$). Sulphur dioxide would be included as an option, where it was monitored and relevant. An individual sub-index would be calculated for each pollutant, and the "worst case" of the core group of pollutants would be taken as the overall ambient air quality index. The missing data would be filled by forecasting methods. The main target groups of the ambient

to ambient air pollution: an analysis of data from the Global Burden of Diseases Study 2015", *The Lancet*, vol. 389, No. 10082 (May 2017), pp. 1907-1918.

[10] Marie-Eve Héroux and others, "Quantifying the health impacts of ambient air pollutants: recommendations of a WHO/Europe project", *International Journal of Public Health*, vol. 60, No. 5 (July 2015), pp. 619-627. Available from https://doi.org/10.1007/s00038-015-0690-y.

air quality index were European Union citizens who were concerned about poor air quality and its possible effects on health, followed by local authorities. Finally, a series of screenshots of prototype air pollution maps were shared, where the colour of the ambient air quality index in a particular monitoring station ranged from brown ("very bad") to blue ("very good") and was determined by the worst pollutant at station level.

15. An update on the ambient air quality index was also provided by the European Environment Agency. A final report and prototype had been submitted to the Agency in November 2016 with some pending issues, including further work on gap filling with Copernicus Atmosphere Monitoring Service (CAMS) results, definition of band thresholds and development of health messages. Five proposed band thresholds were presented to the meeting participants for their feedback. In addition, proposals to link the band descriptors to health-related terminology were made, although that might be challenging as the European Union standards were not always associated to health risks.

16. In the ensuing discussion, participants pointed out that, if health messages were to be developed to accompany the index, both general and specific messages for relevant population subgroups needed to be developed. In addition, possible communication difficulties were recognized, since the ambient air quality index might differ from those already in use within the member States. If any health messages were to be adopted, they would need to be appropriate to the concentrations/cut-points and consistent with those used in member countries. Finally, it was acknowledged that the process warranted public consultation.

17. An expert from the Lazio Regional Health Service gave an overview of communication with patients with cardio-respiratory diseases. Factors such as gender, age, socioeconomic status, pre-existing conditions and medical interventions affected susceptibility to air pollution. Therefore, tailored messages should be developed for patients and also for the health personnel looking after them. Two recent studies were recommended to learn more about the importance of effect modification and susceptibility[11] and communication of the risk of air pollution to patients.[12] A recent European Respiratory Society workshop had identified two major areas that should be considered by future developers of clinical guidelines. First, patients should understand the health effects of acute episodes of air pollution and the preventive actions to be taken. Second, health-care providers needed tools to advise patients about air pollution and on how to change their treatment plans or activities on high pollution days, and how to decrease long-term exposure. It was noted that, although consensus standards for managing cardio-respiratory diseases recommended limiting exposure to ambient air pollution for preventing exacerbations, there was currently no direct evidence that improved clinical management reduced the risk of adverse health effects from exposure to air pollution. The need for a holistic approach, which recognized the health benefits of physical activity as well as the adverse effects of pollutants, was discussed. Lastly, the speaker made some recommendations for improving knowledge in the area, including the conduct of systematic reviews on susceptibility and preventive actions, the development of evidence-based recommendations and the launch of a research agenda.

[11] Ester Rita Alessandrini and others, "Association between Short-term Exposure to $PM_{2.5}$ and PM_{10} and Mortality in Susceptible Subgroups: A Multisite Case-Crossover Analysis of Individual Effect Modifiers", *American Journal of Epidemiology*, vol. 184, No. 10 (November 2016) pp. 744-754.

[12] Pippa Powell, Bert Brunekreef and Jonathan Grigg. "How do you explain the risk of air pollution to your patients?", *Breathe*, vol. 12, No. 3 (September 2016), pp. 201-203. Available from: https://doi.org/10.1183/20734735.011416.

18. A representative of Public Health France presented the French surveillance system on air and health. Official warnings were issued when daily mean values of PM_{10} were greater or equal to 80 micrograms per cubic meter (µg/m^3) or PM_{10} concentrations greater or equal to 50 µg/m^3 occurred in two or more consecutive days, or in case of certain sources of pollution (e.g., volcano eruptions, wildfires). Real-time daily variations in syndromic surveillance data were monitored during an air pollution episode. Actions taken were based on maps of forecasts of air pollution episodes from the Central Laboratory for Air Quality Monitoring, and people were increasingly relying on personal devices (e.g., smartphones) to check directly the concentrations of air pollutants (in recent years there had been a lesser use of the air quality index). To quantify retrospectively the health impact of air pollution episodes, epidemiologic studies on mortality and morbidity were focused on spatial health impact assessment — based on modelled data on a 4 x 4 kilometre grid and time-series analysis. A new ongoing study had been designed to test the hypothesis of a different slope for a cumulative effect of high levels of pollution over several consecutive days in the Paris region. The French High Council for Public Health had drafted health messages to be issued during episodes of air pollution. To ensure efficient communication, the following strategies were recommended: messages that were easy to understand for everyone; messages that allowed everyone to identify if they or others were sensitive to air pollution; and connection between health messages and messages engaging actions to reduce air pollution. The presenter raised the issue of promoting colour-coded health messages within the European Union.

19. The Public Health France representative also gave an update on recent activities of the French Surveillance Programme on Air and Health. Currently, 20 cities with more than 100,000 inhabitants were included in the programme, 119 quantitative health impact assessments had been performed in urban areas and the results had been widely disseminated. The representative also reiterated the significance of the work performed under the Air Pollution and Health: a European Information System (APHEIS) and the Improving Knowledge and Communication for Decision Making on Air Pollution and Health in Europe (APHEKOM) initiatives, and their positive impacts on policymaking. The achievements under the two initiatives included:

(a) Establishment of a collaborative, bottom-up network, which had been very successful in helping both local and European decision-making;

(b) The network had fostered interactions and collaborations between multiple disciplines and regions to create skilled local teams to enrich know-how and the quality of its findings and explore important health impact assessment methodological issues;

(c) A good basis had been established for comparing methods and findings between cities, and applying quantitative health impact assessment to other environmental health fields (i.e., the WHO Europe Environment and Health Information System (ENHIS)).

20. The representative also pointed out that public health findings continued to have a limited impact on effective policymaking, and more efforts were needed to translate scientific findings into policies and actions.

21. A representative from the Regional Environmental Centre for Central Asia provided information on the Centre’s activities in relation to air quality and health. Founded in 2001 with financial assistance from bilateral and multilateral institutions, the Centre’s efforts covered Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan. The work focused on five thematic areas around sustainable development, including the Environment and Health Programme. The reasons behind the establishment of the new Environment and Health Programme included the significant burden of disease attributable to environmental risk factors and the lack of abatement policies in the region. Specific work related to air

quality and health had already been carried out. Activities included an intervention package to protect children's health, a global solid fuel use database, health impact assessment tools for transport policies and a programme to improve child health and the environment in schools (School Environment and Respiratory Health of Children-Second Phase (SEARCH II)). The Centre also conducted research and published reports on air pollution-related topics, and sought to cooperate with other organizations in areas such as enhancement of air pollution monitoring, the modelling of the health impacts of particulate matter and research on the health effects of small dispersion dust, among others.

22. A representative of the European Lung Foundation presented approaches used by the Foundation to communicate the health risks and effects of air pollution to patients and the public. The Foundation aimed to spread the available information by organizing public awareness campaigns, producing fact sheets and guidelines, coordinating a patient organization network, carrying out advocacy at the European Union institutions and seeking patient input into European Respiratory Society's guidelines and activities. The European Lung Foundation had also launched a major campaign, Healthy Lungs for Life, across Europe in 2014 to promote prevention and public/patient education by linking air quality and lung health. The campaign consisted, among others, of opportunities for the public to have their lung function tested for free and to talk with health-care professionals; media messages; interactive games and quizzes; and an air pollution mapping and monitoring tool. The Foundation also supported events around the world and collaborated with other organizations to promote public health.

V. Review of the progress in research on health impact of air pollution

23. An expert from the United States Environmental Protection Agency's National Center for Environmental Assessment presented an overview of the process used to develop Integrated Science Assessments, and the scope for assessing the scientific evidence for health effects due to particulate matter sources and components, as well as ultrafine particles, in the upcoming particulate matter assessment. Integrated Science Assessments were a critical part of the review of the National Ambient Air Quality Standards and provided the scientific basis for establishing them. The most recent Integrated Science Assessments for particulate matter had been completed and released in December 2009. Within the assessments, a weight of evidence approach was used to assess causality, using a five-level hierarchy: causal relationship; likely to be causal relationship; suggestive, but not sufficient, to infer a causal relationship; inadequate to infer a causal relationship; and, not likely to be a causal relationship. Each level of the hierarchy was delineated by the ability to rule out, with reasonable confidence, chance, confounding and other biases in the exposure-effect relationship. For $PM_{2.5}$, the 2009 Integrated Science Assessment for particulate matter had concluded a causal relationship for mortality and cardiovascular effects, and a likely to be causal relationship for respiratory effects, for both short- and long-term exposures. The evaluation of sources and components in the 2009 assessment found that many components of $PM_{2.5}$ were linked with health effects, but the evidence was not yet sufficient to allow differentiation of those components or sources more closely related to specific health outcomes. For ultrafine particles, the overall evidence was more limited, resulting in the Integrated Science Assessment concluding "suggestive of a causal relationship or inadequate to infer a causal relationship" across the health outcome categories examined. In February 2015, the Environmental Protection Agency hosted a workshop on ultrafine particles where experts from academia, state and local governments, and federal agencies discussed a variety of topics on the current state of science on ultrafine particles in an attempt to help harmonize information across the research community,

including the possibility of developing consistency in the metric and indicator used to represent ultrafine particles in health studies. The workshop had recently been summarized in a publication.[13] The Environmental Protection Agency was currently developing materials for an upcoming first draft of a new Integrated Science Assessment for particulate matter that would build on the conclusions from the 2009 study (to be released in 2018).

24. A representative of WHO presented the process for updating the air quality guidelines and progress made. The development of the guidelines was following the procedures described in the *WHO Handbook for Guideline Development*,[14] to ensure objectivity, relevance and quality. Accordingly, WHO had organized an expert consultation in 2015 to help inform the decision to produce guidelines and provide an initial prioritization of topics.[15] Thereafter, a number of formal groups had been established, with different roles and responsibilities, including the WHO Steering Group, the Guideline Development Group, the External Review Group and the Systematic Review Team. A first meeting of the Guideline Development Group with the formal task of scoping the guideline, including the final selection of pollutants and health outcomes to be covered and development of key questions, had been held in Bonn, Germany, in September 2016. At that meeting, the scope of the key systematic reviews of health effects, needed to inform recommendations, had been identified. Reviews would focus on the health effects from exposure to particulate matter, nitrogen dioxide, sulphur dioxide, ozone and carbon monoxide for relevant averaging times and in relation to critical health outcomes, and on the health impacts from desert dust. The speaker also gave an overview of the methods that would be used to grade the evidence and develop recommendations, along with a note on how the guidelines might be useful for different stakeholders.

25. A representative of the Swiss Tropical and Public Health Institute presented LUDOK, a literature database that continuously collected articles on the health effects of ambient air pollution for the past 30 years, on behalf of the Swiss Federal Office for the Environment. So far, the database had over 8,500 entries.[16] At the request of WHO, LUDOK had redoubled its efforts to update its overview on national air quality standards on classical pollutants ($PM_{2.5}$, PM_{10}, nitrogen dioxide, sulphur dioxide, ozone and carbon monoxide). Published results showed that air quality standards varied greatly among countries and regions. More than 50 countries did not even have air quality standards. It was noted that WHO air quality guidelines were not well followed by many countries, possibly because of the variation in economic, political and technical situations and feasibility in different regions. According to the authors, it seemed that WHO air quality guidelines served as an important guidance for local and national governments, and the interim target values also helped the authorities set up incremental steps in a progressive reduction of air pollution in areas where pollution was high.

[13] Richard W. Baldauf and others, "Ultrafine Particle Metrics and Research Considerations: Review of the 2015 UFP Workshop", *International Journal of Environmental Research and Public Health*, vol. 13, No. 11 (October 2016), p. 1054. Available from https://doi.org/10.3390/ijerph13111054.

[14] World Health Organization, 2nd ed. (Geneva, 2014). Available from http://apps.who.int/medicinedocs/en/d/Js22083en/.

[15] World Health Organization Regional Office for Europe, *WHO Expert Consultation: Available Evidence for the Future Update of the WHO Global Air Quality Guidelines (AQGs)*, Meeting Report, Bonn, Germany, 29 September-1 October 2015 (Copenhagen, 2016). Available from http://www.euro.who.int/en/health-topics/environment-and-health/air-quality/publications.

[16] Swiss Tropical and Public Health Institute, "LUDOK – Dokumentationsstelle Luftverschmutzung und Gesundheit" (Pollution and Health Documentation Site), https://www.swisstph.ch/en/projects/ludok/ (accessed 29 August 2017).

26. The current development of the nitrogen oxide exposure assessment in Europe was presented by a representative of the Flemish Institute for Technological Research and King's College London. The aim of the project was to develop exposure assessment for a European health impact assessment in the near future. The Flemish Institute and King's College were carrying out the development of methods and tools that were compatible with currently used integrated assessment modelling tools of the European Union to improve tools for nitrogen dioxide exposure assessment. Sensitivity analysis showed that exposure assessment was most sensitive to concentration response functions (particularly their cut-offs), spatial resolution of air quality assessment and choice of population data set. The kernel method increased resolution and had been applied in the United Kingdom. Recommendations were made to apply nitrogen dioxide exposure methodology for the whole of Europe.

27. An update on activities of the Committee on the Medical Effects of Air Pollutants was given by a member of the Committee secretariat from Public Health England. The Committee had acknowledged the strengthening evidence for associations between nitrogen oxide and health effects. Its current work focused on mortality associated with long-term average nitrogen oxide concentrations and how to quantify that. Important points of the Committee's discussions were, firstly, issues related to the interpretation of associations derived using two-pollutant models and uncertainty about the extent to which those were useful when trying to apportion the mortality effect between different pollutants. Secondly, the Committee was concerned about uncertainties regarding the extent to which the reported relationships were causal: it was possible that, to some extent, nitrogen oxide acted as a marker of the effects of other traffic-related pollutants. The Committee had made interim recommendations in 2015, but had carried out a systematic review and meta-analysis to inform its final views. Other ongoing work focused on cardiovascular morbidity. Some initial observations of that work included:

(a) The majority of evidence related to health effects of particulate matter;

(b) Evidence for effects on the cardiovascular system has strengthened;

(c) There was a lack of studies on the effects of long-term exposure.

28. The speaker noted that much of the available evidence related to incidence and mortality, and there was less evidence on prevalence and case fatality. Future topics that the Committee proposed to consider included the health effects of air pollution on dementia and cognitive decline in the elderly, and the quantification of asthma associated with air pollution.

29. A representative of the Spanish Institute of Environmental Assessment and Water Research reported on the current situation of the exposure and emission of polycyclic aromatic hydrocarbons (PAHs) in Europe. The major sources of PAHs were solid fuels burning from domestic, institutional and commercial heating. PAHs were widely present in the ambient air in particulate phase and could be largely reduced by improving the combustion conditions. The Testing and Development of Air Quality Mitigation Measures in Southern Europe (AIRUSE)[17] project on biomass fuels and appliances was also presented. The particle emissions from residential combustion in traditional appliances (e.g., fireplaces and woodstoves) of several wood species widely used in Southern European countries had been compared with those from modern eco-labelled woodstoves and pellet stoves. The results of those combustion tests would help quantify changes in emissions as a result of the adoption of abatement strategies and, consequently, the

[17] See http://airuse.eu/en/.

reduction of ambient $PM_{2.5}$ or PM_{10} levels. Benzo[a]pyrene (BaP), which accounted for 37-70 per cent of carcinogenicity in PAHs, showed a downward trend at two thirds of the rural and urban monitoring stations. However, over 88 per cent of the European urban population was still exposed to more than 0.12 nanograms per cubic meter (ng/m^3) of BaP (WHO reference level) in 2014.[18] Finally, European Union or national scale modelling did not capture the effects of complex topography and depended on the quality of emission inventories.

VI. Experiences in using AirQ+ software to quantify the health impacts of air pollution

30. A representative of WHO presented the results of the analysis of the use of AirQ+. There had been 72 publications using AirQ for health impact assessment, more than half of them from Europe, with PM_{10} as the most commonly studied pollutant. The tool had been downloaded 664 times in 70 countries from June to December 2016. Responses to an online survey on AirQ+ showed that more than half of the users were from academia, and over 90 per cent were from the fields of environment or health. AirQ+ users appeared to be very interested in having an online user forum.

31. A representative from the Institute of Public Health of Serbia reported on a case study conducted with AirQ+ in Serbia. The Serbian Environmental Protection Agency had established 45 air quality monitoring stations in the country, which had been measuring particulate matter, nitrogen oxide, sulphur dioxide and ozone. Analysis of $PM_{2.5}$ and mortality with AirQ+ in Belgrade showed that 156 cases of lung cancer could be attributed to air pollution. Monitoring challenges included a lack of funding, which was the main reason for a lack of maintenance and operation of air quality monitoring stations in the country. In addition, PM_{10} measurement was only available at some of the stations, and $PM_{2.5}$ measurement was not available, which made it difficult to assess their health effects. From the perspective of an end user, the presenter proposed collaborations on health impact research of air pollution at both the national and international levels, a standardized registration procedure of health and air pollution data and further studies on the health and economic impacts of air pollution.

32. A representative from the National Public Health Institute of Hungary reported on a comprehensive case study on health impact assessment of air pollution conducted with AirQ+ in 13 major cities in Hungary. The results of the studies had been compared with WHO Global Burden of Disease data and Health Effects Institute Global Burden of Disease data, and had been presented at the Hungarian Public Health Conference in October 2016. The results had also been used to update the annual report of the Interministerial Committee on PM_{10} reduction, and in the 2017 national environmental health report. The study results showed annual mean concentrations of $PM_{2.5}$ well above the WHO air quality guidelines limit values in all 13 cities from 2005 to 2013. The study findings were currently in the process of publication in a scientific journal, and would be communicated to the general public through the media or Internet. In addition, the representative reported some technical issues that need to be debugged, requested more information in the AirQ+ manual on calculation methods and detailed suggestions on cut-off values. The representative also found the data source for solid fuel use problematic.

[18] European Environment Agency, *Air Quality in Europe – 2016 Report*, EEA Report No. 28/2016 (Luxembourg, Publications Office of the European Union, 2016). Available from https://www.eea.europa.eu/publications/air-quality-in-europe-2016 (accessed 6 June 2017).

33. A representative of WHO gave a progress report on the process of updating AirQ+ 1.0. A more user-friendly version with better graphical output, disability adjusted life years estimates and updated concentration response functions would be available in the near future. The prototype was currently going through technical testing. WHO planned a pilot testing of AirQ+ 1.1, based on various real data sets, once the prototype was finished. Future work included the implementation of additional modules, identification of priority updates and improvements with feedback from experts and users and development of the supporting documentation.

34. The WHO representative announced the tentative plan to provide capacity-building on health risk assessment of air pollution using AirQ+. Training modules could focus on the following objectives:

(a) Raising awareness of the adverse health effects of air pollution;

(b) Strengthening the capacity of health risk assessment among the WHO European Region member States;

(c) Promoting the use of AirQ+.

35. The target audience included public health practitioners and environmental experts, policymakers at the local, national and international levels, and research and advocacy groups, among others. The training would cover the general principles of air pollution and its health effects, health risk assessment using AirQ+, interpretation of health risk assessment results, the main policy frameworks of air quality in Europe and the gap between science and policy, upcoming functions in the updated version of AirQ+ and the intertwined connection between air pollution and climate change. The project was currently in the early design and curriculum development stage. WHO would send out an online survey to the Task Force on Health participants to collect ideas, comments and suggestions, and would use the feedback to modify the curriculum design to better serve the trainees. The possibility of launching a WHO summer school for the capacity-building project was under consideration.

36. The Task Force on Health welcomed the initiative on capacity-building for air quality and health proposed by WHO. The European Commission expressed interest, not only in activities relating to AirQ+ but also in general training on health risk assessment of air pollution. The European Commission had two grants to support capacity-building: one on more effective air pollution management and one on air quality monitoring. The Commission considered that the WHO initiative just announced was useful and encouraged WHO to continue and strengthen its capacity-building efforts. The representative from ECE noted that issues such as awareness-raising, drafting national policies and air pollution monitoring were also important, and could also be included in the training modules. An expert commented that health impact assessment was important too, as were air pollution monitoring and data accessibility.

VII. Revised mandate and workplan for Task Force for 2018-2019

37. The Task Force had been asked to revise its mandate by the Convention secretariat. WHO proposed nine functions for the Task Force, and initial deliberations took place. Following further discussions after the meeting, the final functions would be submitted to the Convention secretariat. The following functions were proposed:

(a) Quantify health impacts of long-range transboundary air pollution;

(b) Expand the knowledge base by consolidating existing evidence on health outcomes of exposure to air pollution and by identifying emerging issues of health relevance;

(c) Provide a forum for Parties and expertise to exchange recent research, experiences and suggestions on the health impact of air pollution;

(d) Assist Parties in quantifying the health impact of transboundary air pollution and defining priorities to guide future monitoring and abatement strategies;

(e) Facilitate communication of the health risks associated with air pollution exposure by Parties;

(f) Contribute to capacity-building on quantifying the health impacts of air pollution and assessing the health benefits from reducing air pollution in Eastern Europe, the Caucasus and Central Asia by developing a curriculum and supporting the use of the health impact quantification tool;

(g) Collaborate with EMEP to assess hazardous air pollutants in the region;

(h) Collaborate with other processes (the Paris Agreement, the United Nations Environment Assembly, the Sustainable Development Goals, the Environment and Health Process and Health 2020) to identify and realize synergies;

(i) Carry out other tasks assigned by the Working Group on Effects and the Executive Body for the Convention.

38. The Task Force also discussed a proposal for the 2018-2019 workplan, comprising three areas of work:

(a) Consolidating existing evidence on the health outcomes of exposure to air pollution;

(b) Further developing the methodologies for assessment and quantification of the direct and indirect effects of long-range transboundary air pollution on human health;

(c) Capacity-building for health impact assessment at the regional and subregional levels.

39. In addition, the meeting participants suggested working on the following issues:

(a) Reviewing the methods used for estimating the burden of disease attributable to air pollution;

(b) Reviewing new emerging issues and the methods for health risk assessment/health impact assessment and cost benefit analysis in relation to air pollution;

(c) Conducting a review of communication strategies for health messages related to air pollution, including on short-term episodes and for specific susceptible groups;

(d) Evaluating the current knowledge on PAHs and identifying critical gaps to assess whether and to what extent the work on that issue could be continued or not by the Task Force on Health.

40. The workplan would be finalized based on the feedback received from the Task Force members after the meeting.