Distr.: General
11 June 2024

Original: English

Economic Commission for Europe

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

Tenth joint session

Geneva, 9-13 September 2024

Items 4 (a) of the provisional agenda

Progress in activities in 2023 and further development of effects-oriented activities: air pollution effects on health

Effects of air pollution on health

Report of the Joint Task Force on the Health Aspects of Air Pollution on its twenty-seventh 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 both the 2024–2025 workplan for the implementation of the Convention (ECE/EB.AIR/154/Add.1) and the revised mandate for the Joint Task Force on the Health Aspects of Air Pollution (Executive Body decision 2019/21).[a]

The report presents the results of the discussions on the health impacts of ambient air pollution and other workplan items at the Joint Task Force's twenty-seventh meeting (in-person and online, 22 and 23 May 2024).

[a] Available at https://unece.org/DAM/env/documents/2019/AIR/EB_Decisions/Decision_2019_21.pdf

I. Introduction

1. The present report summarizes the discussions on the health impacts of ambient air pollution presented at the twenty-seventh 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 (ECEH) and the United Nations Economic Commission for Europe (ECE) Executive Body for the Convention on Long-Range Transboundary Air Pollution (in-person and online, 22 and 23 May 2023). The report also provides a summary of workplan items discussed at the meeting, in accordance with both the 2024–2025 workplan for the implementation of the Convention on Long-Range Transboundary Air Pollution (ECE/EB.AIR/2021/2, items 1.1.1.27, 1.1.1.28, 1.2.3, 1.3.5 and 1.3.6) and the revised mandate for the Task Force on the Health (Executive Body decision 2019/21).[1]

2. In total, 43 representatives from 41 Parties to the Convention attended the twenty-seventh meeting, as well as one representative of the Convention Secretariat. The meeting was further attended by one representative of the European Centre for Medium-Range Weather Forecast (ECMWF), one representative of the Department for Environment, Food & Rural Affairs (DEFRA), one representative of Health and Environment Alliance (HEAL), representatives of the United Nations Environment Programme (UNEP) and one representative of the International Institute for Applied Systems Analysis (IIASA). The European Union – a Party to the Convention – was represented by the European Commission. The meeting was co-chaired by Dr. Dorota Jarosińska and Mr Román Pérez Velasco (WHO European Centre for Environment and Health). Dr. Dennis Schmiege (WHO European Centre for Environment and Health) acted as rapporteur. Eleven temporary advisers participated in the meeting from the following organizations: Queensland University of Technology (Australia); CNRS Aix Marseille University (France); Santé publique France; German Aerospace Centre (DLR) Project Management Agency (Germany); German Environment Agency (Germany); Swiss Tropical and Public Health Institute (Switzerland); Ecometrics Research and Consulting (United Kingdom of Great Britain and Northern Ireland); Imperial College London (United Kingdom of Great Britain and Northern Ireland); Spadaro Environmental Research Consultants (United States of America). Seven observers participated in the meeting. The Governments of Germany and the Republic of Korea both provided financial support for the Task Force on Health activities and the meeting.

II. International policies and processes on air quality and health

3. A representative of the Convention Secretariat provided an update on recent developments under the Convention on Long-Range Transboundary Air Pollution. The Executive Body of the Convention, at its forty-third session (Geneva, 11-15 December 2023), approved the 2024-2025 workplan, and initiated a process to revise the Protocol to Abate Acidification, Eutrophication and Ground-level Ozone (Gothenburg Protocol), as amended in 2012, and to address other conclusions of its review (Decision 2023/5). In its 9th joint session[2], the Steering Body (SB) 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 (WGE) reviewed the progress of activities in 2023 and elected a new chair and vice-chair. The WGE expressed its appreciation for the work carried out in 2023, noted that the HRAPIE-2 project is an important priority for the Parties, recommended seeking synergies with the European Environment Agency (EEA) on health messaging and suggested exploring a potential collaboration with TFIAM on workplan item 1.1.1.33. The Joint Meeting of the Extended Bureaux of the EMEP SB and WGE (Geneva, 29 February–01 March 2024) discussed progress in the implementation of the 2024-2025 workplan and identified thematic sessions for the 10th meeting of the EMEP SB/WGE: uncertainty, nature restoration, climate change and air pollution. In addition, the representative presented two e-

[1] Available at www.unece.org/env/lrtap/executivebody/eb_decision.html.
[2] Meeting material available at https://unece.org/info/events/event/371556

learning courses to enhance the understanding of the Convention and its protocols[3], and support countries in their emission inventory reporting efforts[4].

4. A representative of the European Commission presented an update on EU clean air policy, focusing on the ongoing revision of the European Union rules on air quality (Ambient Air Quality Directive (AAQD)) and highlighting the 2019 European Green Deal commitment to improve air quality legislation. The Commission's proposal to revise the AAQD, which was presented in October 2022, has undergone extensive evaluation and discussion, leading to a political agreement between the co-legislators – European Parliament and Council – in February 2024. While some drafting details are still being finalized, the new directive is expected to set stricter air quality standards to be met by 2030, strengthen air quality monitoring and assessment provisions, and introduce new obligations on Member States to prevent exceedances and improve public information on air quality and health impacts. Namely, the agreement retains all the key elements of the original proposal of the Commission, including a zero-pollution objective for 2050, tighter air quality standards for various pollutants and updated average exposure metrics. It also introduces refined provisions on air quality monitoring and modelling, requirements to monitor emerging pollutants, and new governance and enforcement obligations. Member States will be required to provide up-to-date information on air quality and inform the public on impacts on health, in particular as regards sensitive and vulnerable populations. A review clause would require the Commission to regularly review the appropriateness of the standards every five years, starting in 2030, in relation to the latest AQGs and scientific evidence. In addition to the update on the revision of the AAQD, as part of the EU's implementation of the Gothenburg Protocol under the Air Convention, the ongoing evaluation of the National Emission Reduction Commitments (NEC) Directive was presented. The evaluation process includes public feedback, stakeholder consultations and the publication of a supporting study. The final evaluation, including a staff working paper, is expected by the end of 2025. The NEC Directive requires a review to ensure continued progress in reducing air pollution, taking into account scientific and technical progress and the implementation of climate and energy policies.

5. A representative of WHO headquarters provided an update on WHO activities, beginning with an overview of COP 28, which included the first-ever COP Health Day and culminated in a Ministerial Declaration on Climate and Health signed by 143 countries. This declaration highlights the crucial link between climate change and health and calls for action to strengthen resilience of the health sector against climate risks. Despite its comprehensive approach, it did not specifically address air pollution. As preparations for the upcoming World Health Assembly (WHA) continue, the goal is to translate the Ministerial Declaration into a WHA resolution on Climate Change and Health, which will emphasize the importance of environmental health in WHO's global health agenda. The representative also highlighted progress on the roadmap on air pollution and health. The first resolution in 2015 marked the first commitment by Ministries of Health to address air pollution. Building on this, a new WHO roadmap on Air Quality, Energy and Health is being developed for 2025. This process involves consultations with countries and experts, facilitated by an informal Friends of Clean Air for Health Working Group, led by the United Kingdom of Great Britain and Northern Ireland(UK). This working group will meet after the WHA to gather input and refine the roadmap. In addition, preparations are underway for the WHO Second Global Conference on Air Pollution and Health and a series of science and policy snapshots (SPS) will be developed to provide background information for Member States. Other initiatives include the revamp of the BreatheLife campaign, which integrates the climate, health and air pollution arguments to encourage countries to make commitments, and the rebranding of the WHO expert advisory group on air pollution and health, which presents the outputs of the Global Air Pollution and Health Technical Advisory Group (GAPH TAG) and outlines a comprehensive work plan with scientific, technical, and conference deliverables. Between 2023 and 2025, a webinar series entitled Clean Air and Energy for Health – From Evidence to Solutions will

[3] See https://unccelearn.org/course/view.php?id=150&page=overview
[4] See https://unccelearn.org/course/view.php?id=166&page=overview

highlight the links between air pollution, climate change and health and provide practical solutions based on the latest evidence.

6. A representative of the WHO ECEH reported on the outcomes and commitments of the Seventh Ministerial Conference on Environment and Health (Budapest, 5-7 July 2023). The European Environment and Health Process (EHP), including a series of Ministerial Conferences, aims to address the interface between environmental conditions and human health. The 7th Ministerial Conference in Budapest, hosted by the Government of Hungary, was attended by over 600 delegates, including high-level officials from 43 Member States. The conference focused on the triple environmental crisis: pollution, biodiversity loss and climate change, all in the context of recovery from the COVID-19 pandemic. The main outcome was the Budapest Declaration, which emphasizes accelerating the implementation of existing commitments rather than creating new ones. The Declaration includes a preamble, the main commitments, Annex 1 with a roadmap from 2023 to 2030, and Annex 2 detailing the EHP Partnerships. It specifically encourages the ratification and implementation of the Convention on Long-Range Transboundary Air Pollution and highlights the need for concrete action to improve air quality. The establishment of EHP Partnerships, a new flexible implementation mechanism, as an innovative aspect of the Budapest Declaration is outlined in Annex 2. EHP partnerships allow Member States to take the lead on issues and promote agile and collaborative approaches to achieving the conference's goals. Four initial partnerships were established in Budapest, focusing on different environmental health issues. These efforts are coordinated by the Environment and Health Task Force (EHTF), which will next meet in Utrecht on 26-27 June to review progress and share results. The Budapest conference serves as a critical midpoint on the road to the 2030 Agenda, highlighting the need for continued commitment and accelerated action to address the pressing environmental health challenges in the WHO European Region.

7. A representative of WHO ECEH provided an update on recent activities on air quality and health at the regional level. In 2023, a comprehensive report on selected air pollutants, including arsenic, benzene, cadmium, lead, mercury and nickel, was published as a valuable resource for policymakers and stakeholders in understanding and addressing air pollution challenges. The report concluded that there was generally insufficient new evidence to justify changes to existing WHO air quality guidelines (AQGs), and highlighted important gaps in knowledge that should guide future research. The ongoing HRAPIE-2 and EMAPEC projects aim to provide advice on the selection of concentration-response functions (CRFs) and associated information for health risk assessment (HRA). HRAPIE-2 focuses on mortality, while EMAPEC addresses morbidity and has a strong economic component. Both projects have made progress, with reviews expected to be published in 2024, and final reports anticipated in 2025. Efforts have also been made to update HRA tools. This includes the release of a Spanish version of AirQ+ and updates to the CLIMAQ-H tool to improve its utility in quantifying the health gains and economic benefits of climate change mitigation. Other initiatives to improve public understanding and professional capacity included the publication of a technical report and the development of communication factsheets on personal actions to reduce air pollution exposure, and policy considerations on sustainable behaviours for environment and health challenges[5] in partnership with the Behavioral and Cultural Insights (BCI) Unit. Capacity-building efforts included a successful training workshop for professionals from Kyrgyzstan and Kazakhstan including the update of the training curriculum. WHO ECEH is also supporting the forthcoming WHO Second Global Conference on Air Pollution and Health and continues to contribute to regional policy processes, particularly the Task Force on Health and the Environment and Health Process, to ensure that health effects of air pollution are appropriately addressed.

III. Sharing experiences from the Parties

8. A representative of Canada presented an update on health impacts quantification of air pollution and guidance on minimizing exposure to wildfire smoke. The comprehensive

[5] See https://www.who.int/europe/publications/i/item/WHO-EURO-2024-9205-48977-72979

report Health Impacts of Air Pollution in Canada in 2018[6] was recently published. It quantifies the air pollution health burden (for both mortality and morbidity outcomes) for 2018 and includes monetization of impacts. The report's methodology, including the use of the Air Quality Benefits Assessment Tool (AQBAT), ensures quantification of the health burden attributable to $PM_{2.5}$, NO_2 and O_3. The results show regional differences in the health impacts of air pollution, with higher health burdens estimated in the most populated or polluted regions. Overall, despite the relatively low levels of air pollutants in Canada compared to some other parts of the world, air pollution impacts the health of the Canadian population. The representative also presented updated guidance from Health Canada on minimizing exposure to wildfire smoke[7], which is particularly relevant given the statistics for the 2023 wildfire season. With an emphasis on preparedness measures, the aim is to provide a comprehensive evidence-based messaging for the upcoming 2024 wildfire season. The guidance relies on the use of the Air Quality Health Index (AQHI) to provide information on current and forecasted air quality, including during wildfire smoke events, with a specific focus on $PM_{2.5}$. The guidance provides detailed information about symptoms and health effects of wildfire smoke and which individuals and populations are considered at risk. In addition, it includes preparedness measures for wildfire smoke events such as strategies to prepare yourself, your home and your vehicle. Protecting physical and mental health is central to Health Canada's approach, with guidance tailored to reduce exposure to wildfire smoke and mitigate associated health risks in indoor and outdoor environments.

9. A representative of Belgium provided insights into monitoring and mitigating environmental health inequalities related to air quality. After an introduction to the Belgian context and political system, Belgium's National Environmental Health Action Plan was presented, highlighting the importance of coordinated efforts across federal, regional and community levels. Through collaborative initiatives, Belgium aimed to bridge governance gaps and facilitate data-driven decision-making to effectively mitigate the health impacts of air pollution. The representative presented exposure patterns to various air pollutants in Belgium through informative maps, highlighting the Belgian Index of Multiple Deprivation (BIMD) as a crucial tool for understanding socio-economic disparities and their relationship with environmental factors. By mapping neighborhood deprivation deciles based on local characteristics, the BIMD provided valuable insights into the interaction between socio-economic status and exposure to air pollution. In addition, the analysis explored patterns of co-exposure, highlighting areas of increased health risk and informing targeted intervention strategies to address environmental inequalities. The potential impact of interventions such as car-free days on health outcomes was also discussed, highlighting the importance of evidence-based policies in reducing health risks form air pollution. To raise public awareness and facilitate monitoring, an interactive tool on the project website was highlighted, providing stakeholders with access to real-time information on disease burden, exposure levels and health outcomes related to air pollution. This transparent approach aimed to promote public engagement and support informed decision-making to protect public health in Belgium.

IV. Update on health risk assessment methodologies on air pollution

10. An expert from Imperial College London (UK) provided an update on the work on methods for health impact assessment (HIA) of air pollution in the project Health Risks of Air Pollution in Europe (HRAPIE-2). In light of growing evidence since the report Health risks of air pollution in Europe – HRAPIE: Recommendations for CRFs for cost-benefit analysis of particulate matter, ozone and nitrogen dioxide, WHO decided on revising and updating CRFs supporting HRAs of air pollution, leading to the inception of HRAPIE-2. The scope of the project includes a systematic literature review and meta-analyses to inform CRFs, with a focus on long-term effects of air pollution. The longer list of pollutant-outcome pairs guided the systematic review and meta-analysis process, resulting in a significant

[6] See Health impacts of air pollution in Canada in 2018 - Canada.ca

[7] See Wildfire smoke, air quality and your health: Overview - Canada.ca

increase in the number of studies included in the systematic review/meta-analysis between 2020 and 2024. Led by a collaborative effort, the review process involved extensive data extraction, risk assessment, and evaluation of evidence certainty, using statistical methods to analyse a vast array of research papers published in recent years. The project aims to publish scientific articles based on systematic reviews in the coming months, providing valuable insights into the relationship between air pollution and various health outcomes. Despite continuing methodological challenges and resource limitations, the project demonstrated good progress, also due to the strong coordination with and practical lessons learnt from the EMAPEC project. The expert concluded by highlighting the substantial time and funding resources needed for this undertaking, and mentioning that the progress achieved depends on experts contributing their time and expertise to the HRAPIE-2 project.

11. An expert from Imperial College London (UK) presented an update on methods for assessing the effects of air pollution on morbidity in the project Estimation of Morbidity from Air Pollution and its Economic Costs (EMAPEC). The aim of the project was to compile CRFs for the incidence of several diseases from the existing systematic reviews and meta-analyses, which could be used in HRA. The four main stages were outlined, highlighting the meticulous process of evaluating systematic reviews and meta-analyses related to the relationship between air pollutants such as $PM_{2.5}$, NO_2 and ozone, and the incidence of different diseases. An important aspect was the careful selection of health outcomes based on the strength of the association between exposure to air pollutants and specific health conditions. This selection process ensured that only outcomes with robust evidence linking them to exposure to air pollution were considered for inclusion in the project, thereby increasing the reliability and relevance of the resulting CRFs. The quality of the systematic reviews was assessed using AMSTAR-2, a tool that was extended to include additional criteria specific for evaluations of air pollution studies (AMSTAR2EH). This meticulous assessment aimed to ensure consistency and rigor in the selection of studies and to address key gaps in previous evaluations. In addition, the classification of CRFs into three lists (List A, B+, and B-) based on the available evidence and its uncertainty, underlined the project's commitment to providing reliable advice for HRAs for air pollutants and the incidence of several diseases. The project recommends six CRFs for a reliable use in $PM_{2.5}$ risk assessment (asthma in children, chronic obstructive pulmonary disease, ischaemic heart disease events, stroke, hypertension, lung cancer), and three outcomes for NO_2 risk assessment (asthma in children and adults, acute lower respiratory infections in children). Three additional outcomes (diabetes, dementia, and autism spectrum disorders) for $PM_{2.5}$ were included in List B+, where the risk assessment is connected with a greater uncertainty.

12. An expert from CNRS Aix Marseille University (France) gave an overview of methods for valuation of impacts of air pollution on morbidity and demonstrated their application in a case study in France (within the EMAPEC project). The expert addressed the complex task of assessing the economic value of morbidity outcomes, highlighting the three components identified in HIA: tangible or marketable costs, including health costs (HC), and production losses (PL); and intangible costs (IC), reflecting the cost of disutility to patients or families. These components include both economic and non-economic impacts, highlighting the multifaceted nature of assessing the economic burden of morbidity. Challenges such as lifetime economic valuation, consideration of implementation timeframes and disease cessation lags, and selection of appropriate discount rates were highlighted, underlining the nuanced approach required for comprehensive impact assessment. The French case study focused on three diseases affected by long-term exposure to $PM_{2.5}$: lung cancer and stroke in adults, and asthma in children. Scenarios ranging from compliance with AQGs or interim targets were analysed, taking into account uncertainties and sensitivity analyses. The results of the case study showed that compliance with the WHO annual AQG level for $PM_{2.5}$ in France would result in health and welfare benefits of €4.44 billion yearly for the three diseases studied, with asthma in children having the largest share at 72%. Future work to extend the scope of the study, address uncertainties and reduce problems of double counting were also outlined, underscoring the importance of continued research in this important area.

V. Progress in research on air quality and health

13. An expert from Ecometrics Research and Consulting (EMRC; UK) and vice-chair of the EMEP discussed factors to be considered in setting health-based targets for the revision of the Gothenburg Protocol. Currently, there are no health-based targets in the Gothenburg Protocol under the UNECE Convention on Long-Range Transboundary Air Pollution. Proposals from the 7th Saltsjöbaden meeting were discussed, recognizing the need for such targets, inspired by global initiatives seen in the climate change and biodiversity conventions. The importance of integrating health-based targets into Gothenburg Protocol revision process was highlighted, to effectively guide policy decisions. Ongoing activities for the revision of the Gothenburg Protocol were outlined, with a focus on the analytical work of the Working Group on Strategies and Review (WGSR). Possible forms of health-based targets were presented, illustrating the increasing complexity from exposure metrics to morbidity considerations and multiple pollutants. Questions were posed on the choice of mortality metrics, inclusion of morbidity outcomes, shape of the CRFs, selecting counterfactuals, sources of health data, accounting for deprivation, and the inclusion of different pollutants, reflecting the technical challenges of setting these targets. The implications of moving away from linearity in response functions were mentioned, underscoring the complexity of concentration modelling and integrated assessment. The presentation concluded by highlighting the need for advice from health experts to effectively define and assess health-based targets. Key issues for collaboration were identified, emphasizing the importance of timely input to the ongoing revision of the Gothenburg Protocol and its impact on public health throughout the UNECE region.

14. A representative from the International Institute for Applied Systems Analysis (IIASA) and Center for Integrated Assessment Modelling (CIAM) presented an overview of the source contributions to ambient $PM_{2.5}$ in the UNECE region and the development of possible cost-effective mitigation strategies for the revision of the Gothenburg Protocol using the GAINS model. The methodology behind the GAINS model was outlined, detailing its use in atmospheric calculations and HIAs, with a particular focus on long-term exposure to $PM_{2.5}$. Different emission scenarios developed for the Gothenburg Protocol revision were considered, including baseline conditions, maximum technically feasible reduction, and an alternative low scenario, which includes more ambitious greenhouse gas mitigation targets and diet shifts. The expert emphasized the importance of understanding source contributions to ambient concentrations and the implications for target setting, highlighting the potential for reducing premature deaths, particularly in non-EU countries. Different approaches to setting health-based or risk-based targets were discussed, including fixed targets, gap closure approaches, and domain-wide targets. Cost curves were presented to illustrate the financial implications of different target-setting methods, emphasizing the need for careful consideration of indicators and demographic factors. The expert concluded by highlighting the importance of timely input and advice from health experts to refine target-setting methodologies and to provide optimized scenarios to the Air Convention.

15. An expert from the German Aerospace Centre (DLR) Project Management Agency gave an overview of the research project Air Pollution From Agricultural Emissions and Dietary Change on Public Health in the UK (AMPHoRA), for which he had been the principal investigator in his previous affiliation with the UK Centre for Ecology & Hydrology (UKCEH). It aimed to investigate the impact of air pollution from agricultural emissions and dietary change on public health in the UK. The main objectives were to assess the impacts of agricultural ammonia emissions and dietary changes on $PM_{2.5}$ levels, public health benefits, socioeconomic factors and greenhouse gas emissions to 2030 and beyond. For the health modelling, parameters were set to assess chronic and acute health outcomes related to $PM_{2.5}$ exposure and dietary patterns. A model-based approach was used, drawing on existing data and stakeholder engagement, including policymakers, health experts, farming communities and dietary specialists. The results indicate that combining technical measures to reduce ammonia emissions with dietary changes can significantly reduce $PM_{2.5}$ levels and improve public health outcomes. In particular, dietary changes, even modest ones, could help meet environmental objectives and provide substantial health benefits, highlighting the potential of integrated policy measures. Key findings and conclusions showed that dietary changes could provide greater human health benefits than reductions in PM exposure associated with

agricultural ammonia emissions. The project highlighted the importance of considering both environmental and health impacts in policy interventions. In addition, the involvement of different stakeholders, including community and civil society groups, proved crucial to the success and relevance of the study. This comprehensive approach underlines the need for interdisciplinary collaboration to address complex issues such as air pollution, agricultural practices and public health.

16. A representative of the United States of America provided an overview of recent revisions to the National Ambient Air Quality Standards (NAAQS) for particulate matter (PM) in the United States. In February 2024, the Environmental Protection Agency (EPA) announced a revision of the primary annual standard for $PM_{2.5}$, reducing it from 12 to 9 $\mu g/m^3$. This adjustment reflects the latest scientific evidence on health effects, particularly premature mortality and cardiovascular effects. EPA maintained other PM standards, including the primary 24-hour $PM_{2.5}$ standard, the primary and secondary 24-hour PM_{10} standards and the secondary $PM_{2.5}$ standards, while updating the Air Quality Index to improve public communication about the health risks associated with $PM_{2.5}$ exposure. The representative emphasized that EPA's decision-making process is based on extensive scientific assessments, including the 2019 Integrated Science Assessment (ISA) and 2022 ISA supplement. The 2019 ISA reports a causal relationship between $PM_{2.5}$ exposure and premature mortality and cardiovascular effects and identifies populations most at-risk of experiencing $PM_{2.5}$-related health effects, including children, older adults, and those with pre-existing cardiovascular and respiratory disease. The Clean Air Scientific Advisory Committee (CASAC) plays a crucial role in reviewing the scientific evidence and advising the EPA Administrator on appropriate standards. The revised annual $PM_{2.5}$ standard provides requisite protection for at-risk populations with an adequate margin of safety. The representative also highlighted how the scientific evidence is translated into standards and how the rationale for the Administrator's 2024 decision on PM levels was developed. In addition to revising the PM standards, EPA's approach includes a comprehensive implementation strategy that requires states to adopt measures and programs to meet the new standards. This includes revising state implementation plans and designating attainment and non-attainment areas. The representative highlighted the international dimension of the revised PM standards, noting the U.S. commitment to the UNECE Convention on Long-Range Transboundary Air Pollution and potential updates to the Gothenburg Protocol and the U.S.-Canada Air Quality Agreement (AQA).

17. A representative of the European Centre for Medium-Range Weather Forecasts (ECMWF) gave an insight into the Copernicus Atmosphere Monitoring Service (CAMS) and its support to climate change and air quality efforts. ECMWF manages CAMS and the Copernicus Climate Change Service (C3S). CAMS is a European program that integrates Earth observation data from satellites and in-situ networks with advanced operational numerical models to provide comprehensive monitoring services. It provides high quality, controlled information on the chemical composition of the atmosphere, which affects air pollution, health, solar energy, greenhouse gas emissions and climate forcing at global and European scales. CAMS offers daily forecasts of regional air quality, annual analyses, and historical reanalyses of atmospheric composition using an integrated framework that combines satellite data, regulatory networks, and advanced numerical models at a resolution of 10 km for Europe and 40 km globally. CAMS maximizes in-situ observations from the European Environment Agency and research networks such as EMEP and the Aerosol, Clouds and Trace Gases Research Infrastructure (ACTRIS). Upcoming satellite missions, including Sentinel-4 and Sentinel-5, will further improve air quality monitoring, with Sentinel-4 being the first dedicated geostationary satellite over Europe. CAMS provides comprehensive data on air pollutants, pollen, UV indexes and more, supporting users with real-time and historical analysis of dust and fire plumes. The service operates under an open data access policy, making its data easily accessible through the Atmosphere Data Store and the European Climate and Health Observatory. In addition, the Copernicus Health Hub is an open platform with case studies and use cases to demonstrate practical applications of CAMS data, demonstrating the commitment to provide actionable information derived from atmospheric and climate data. This initiative ensures that CAMS data are accessible and useful for addressing health issues related to air pollution and climate change.

VI. Update of WHO tools to assess the health risk of air pollution

18. A representative of WHO ECEH provided an overview of recent and future activities related to the AirQ+ software, which was initially developed in 2016. AirQ+ is a user-friendly software tool for assessing the impact of air pollution on health, using population data, exposure levels, and risk functions, incorporating mortality and morbidity conditions. This tool is part of a larger set of tools, both available and under development that aim to support the integration of public health and environmental data for comprehensive analysis. It facilitates informed discussions between public health and environmental professionals by providing accessible data. AirQ+ has been developed over eight years and has now a user-friendly interface and customizable data entry options. An online survey has provided valuable input from users, informing ongoing updates and improvements. The software is freely downloadable, increasing its accessibility and promoting its use in different regions and sectors, including academia, public health and NGOs. The widespread adoption of AirQ+ is evidenced by its use in 117 countries and over 369 cities, with a notable increase in users from regions such as West Africa, North America and Latin America[8]. The software supports multi-scale analysis, from city to national level, and is adaptable to different pollutants, with a shift towards $PM_{2.5}$ and NO_2. Recent updates include the release of version 2.2 with updated features, and new information for HRA in 2024, including a publication on the use of AirQ+ and a draft report. Future plans include the development of AirQ+ 2.3, among other advancements. AirQ+ is an example of a collaborative effort to bridge the gap between quantitative environmental data and public health policy-making, promoting informed decision-making across sectors.

19. An expert from Santé publique France shared insights into the use of AirQ+ software to assist local stakeholders make decisions about air pollution and health. This effort is part of the French program for monitoring the health effects of air pollution (PSAS), established in 1997 under the national air quality law. This law requires the monitoring of air quality and its effect on health in order to estimate health risks, track changes over time, and carry out quantitative health risk assessment (QHRA) to inform local authorities. AirQ+ has been adapted to the French context to simplify its use for local stakeholders. Guidelines and tools were developed and updated in 2019, with further updates planned for next year. Training programs, initially led by ADEME and now held annually at the National School of Public Health in Rennes, aim to build local expertise in QHRA through both distance learning and in-person practical case studies, covering economic evaluations and data processing with AirQ+. Santé publique France, together with its partners, continues to improve and disseminate the QHRA approach using AirQ+, adapting it to local conditions and developing supporting guidelines. The aim is to make QHRAs widely available to local authorities and stakeholders to facilitate informed decision-making to reduce air pollution and improve public health. The effort involves continuous feedback and adaptation to keep the tools and methodologies relevant for different applications, including urban planning and low emission zones. The third edition of the training course, quantitative health impact assessment (QHIA), a decision-making tool in the context of a policy to improve ambient air quality, is now open to all and free of charge. This course supports the mission to strengthen local and regional capacity to manage air quality and its impacts on health by providing comprehensive training to ensure effective implementation of QHRAs.

20. An expert from Spadaro Environmental Research Consultants (United States of America) presented an overview of the CLIMAQ-H tool, which addresses climate change mitigation, air quality and health. CLIMAQ-H, developed by WHO ECEH in Bonn, helps to calculate the expected health impacts of achieving the Nationally Determined Contributions (NDCs) of the Paris Agreement by 2030. The tool provides science-based evidence to support policy-making, health planning, and investment decisions. Its economic analysis component emphasizes the importance of balancing costs and health benefits in order to make sustainable and economically viable decisions. The model requires demographic, mortality, morbidity, and economic data, which can be modified to meet specific needs. Outputs include air quality

[8] Amini et al., Two Decades of Air Pollution Health Risk Assessment: Insights From the Use of WHO's AirQ and AirQ+ Tools. Public Health Reviews 2024; 45: 1606969 doi: 10.3389/phrs.2024.1606969

improvements, health gains in morbidity and mortality, and economic benefits. CLIMAQ-H promotes data collection for HIAs and serves as an educational tool to build local capacity. It is aimed at a wide range of stakeholders, including policy-makers, government agencies, NGOs, research organizations, and the general public. Although currently developed for the WHO European Region, it can be adapted to other areas with additional data. Key differences between CLIMAQ-H and AirQ+ include the spatial scale, type of analysis, pollutant types, and data requirements. CLIMAQ-H provides robust uncertainty analysis to support a comprehensive understanding of health and economic impacts. The application of the tool in various global studies demonstrates its versatility and utility in informing climate and health policy. A demonstration of the tool showed the health and economic benefits of phasing-out of fossil fuels in Europe. For this example, the necessary concentration changes, demographic data, and economic parameters were entered for 35 European countries. The results indicate significant benefits: reducing fossil fuel use could prevent 290,000 premature deaths, equivalent to an economic gain of US$1.06 trillion. These results underline the critical role of CLIMAQ-H in guiding effective climate policy and maximizing health benefits.

21. A representative of Germany gave an overview of the 30 years of work on the inter-comparison of air quality data and its reliability. The WHO Collaborating Centre for Air Quality Management & Air Pollution Control at the German Environment Agency, established in 1986, has been active in improving the reliability of air quality data through inter-comparison exercises as part of a quality assurance/quality control (QA/QC) harmonization programme. These efforts included 20 workshops conducted by the German Air Quality Reference Laboratory in Langen, Germany, on automated and semi-automated measurements of inorganic gases between 1994 and 2018, organized to ensure comparability of data between countries, particularly in Europe. This collaboration involved reference laboratories from 31 countries across Europe, supported by grants from the German Federal Ministry for the Environment, facilitating the participation of countries with limited resources. Since 2007, this QA/QC programme runs as joint cooperation with the European Reference Laboratory of the European Commission's Joint Research Centre in Ispra, Italy. A series of reports on the results has been published, which has harmonized these efforts and shared responsibilities between the EU Member States and non-EU countries in Central and Eastern Europe, and Central Asia. In total, 51 laboratories from 31 Member States of the WHO European Region have participated. Initially, the public health sector took the lead in air quality monitoring in Central and Eastern Europe and Central Asia, but over time, the environmental sector has taken a greater role. This shift reflects the political and institutional changes over the past 30 years. The inter-comparison exercises have significantly improved the data accuracy, precision, and reliability to meet high standards set by the AAQD. In October/November 2023, the first interlaboratory field measurement campaign on particulate matter ($PM_{2.5}$ and PM_{10}) was conducted in Wiesbaden, Germany with the participation of several European countries. These efforts underline the importance of continued capacity building and cooperation to improve air quality monitoring and assessment. However, it is also important to focus on the comparability and quality assurance of health data, which remains a challenge due to differences in collection and coding practices.

VII. Health aspects of air pollution in the wider context of the Air Convention

22. An expert from the Swiss Tropical and Public Health Institute (Switzerland) reported on Switzerland's recommendations for new air quality standards. The Swiss Federal Commission for Air Hygiene (FCAH), composed of 13 experts appointed by the Federal Council. The Commission advises the Federal Department of the Environment, Transport, Energy and Communication (DETEC) and also the Federal Office for the Environment (FOEN) on scientific and methodological questions relating to air pollution control and on the effects of air pollution on human health and ecosystems. Its most recent task was to advise upon the implications of the latest AQGs regarding Swiss air quality standards. In a recent report, published in German, French, and Italian with an English summary, the FCAH provided detailed recommendations for each pollutant discussed in the AQG. The report outlines the sources, health effects, and historical and current exposure levels of these pollutants in Switzerland in relation to the Swiss standards and the AQG values. The

recommendations are largely in line with the AQGs, with a few exceptions based on specific Swiss considerations. For ozone, the historical metric of 1 h mean should be kept. This metric provides the same protection level as the AQG for 8 hours. For SO_2, an annual mean of 20 $\mu g/m^3$ is proposed, considering ecosystem protection. The report also highlights the need for standardized measurement methods, particularly for ultrafine particles, for which there is currently no standardized approach. Following the publication of the report, the next steps will be for the Federal Office for the Environment to assess emission trends, necessary measures and technological options to implement these recommendations. This process will include an economic assessment and consultations with cantonal authorities, NGOs, and stakeholders. The political process to discuss the new recommendations and possible amendments will take time but has begun.

23. An expert from the Queensland University of Technology (Australia) presented the advances in monitoring ultrafine particles (UFPs) that may support the AQGs, highlighting the progress made in addressing the complex challenges of monitoring UFPs, the methods used, and the key advances made. The 2021 AQGs included good practice statements on black carbon/elemental carbon, UFPs, and dust and sandstorms. Due to insufficient evidence to derive quantitative guidelines, the focus was on highlighting health effects and the need for additional monitoring. UFPs, mainly originating from combustion and secondary processes, present a complex monitoring challenge. The work included the production of a comprehensive document to assist decision-makers and the provision of typical concentration ranges to help distinguish between low and high particle number concentrations. A key recommendation was to expand real-time monitoring to distinguish between primary and secondary particles, despite existing technological and financial constraints. The expert outlined a project to monitor UFPs over a year in different locations around the world using a newly available instrument. This instrument provides multi-channel measurements down to 10 nm, which is essential for accurate UFP monitoring. A deployment protocol has been established, calibrations finalized and a shared database for data analysis established. With 24 participating organizations voluntarily contributing to this effort, there is reason to be optimistic about obtaining robust and comparable data. This initiative, which will be discussed at monthly meetings and set to be presented at the European Aerosol Conference, promises to pave the way for future exposure-response studies, with a particular focus on brain health, an emerging and critical area of research.

24. A representative of WHO headquarters provided information on upcoming global events, focusing on the WHO Second Global Conference on Air Pollution and Health, scheduled for 25-27 March 2025. This event aims to capitalize on the current momentum for air pollution initiatives, including recent United Nations Environment Programme (UNEP) resolutions and the upcoming fifth anniversary of the International Day of Clean Air for Blue Skies. The conference was scheduled to align with global commitments and ensure the participation of key stakeholders. The scope and purpose of the conference is to focus on the role of the health sector, share the latest evidence, and highlight progress since previous resolutions, emphasizing the triple win for health, air pollution, and climate change. The conference will serve as a platform to mobilize health professionals for action on air pollution, highlight the importance of multisectoral cooperation, and bring health arguments into policy discussions. In addition, the event will feature SPS, involving UN agencies, national institutions, and key stakeholders to provide comprehensive overviews on various topics such as exposure, health effects, air quality monitoring, and public health responses to emergencies. These SPS documents are intended to be stand-alone resources, so there may be some overlap. Examples include regional SPS and topics such as conventions and treaties on transboundary air pollution. The conference program will include sessions on health evidence, solutions and policies, governance, and advocacy, with regional sessions reflecting specific air pollution and climate challenges. Pre-conference workshops and side events will facilitate in-depth discussions and partnerships. WHO is also considering a pledging mechanism as part of the Year of Clean Air Commitments – 2024 and Beyond to encourage countries to commit to meeting AQGs and protecting health. The Friends of Clean Air for Health group, a voluntary engagement led by the UK, will play a key role in accelerating global action, providing strategic feedback, and mobilizing resources for the conference and beyond. The official announcement of the conference will be made during the World Health Assembly's discussion on the resolution on climate and health.

25. A representative of Azerbaijan provided preliminary information on the initiatives for the upcoming COP 29, which are to be confirmed and announced in early June. Azerbaijan is committed to a green transition, which is envisioned as a strategic and gradual process, reflecting its commitment to sustainable development despite being an oil and gas exporter. Azerbaijan ratified the UN Framework Convention on Climate Change in 1991, followed by the Kyoto Protocol and the Paris Agreement. It is committed to reducing greenhouse gas emissions by 35% by 2030 and 40% by 2050, and to generating 30% of its electricity from renewable sources. Efforts include environmentally sustainable projects, smart city and smart village initiatives, and legislative measures to support renewable energy. The declaration of 2024 as the Year of Clean Air further emphasizes the national commitment to green energy and raising public awareness of the importance of environmental sustainability. COP 29 in Azerbaijan is expected to attract between 70,000 and 80,000 participants. Hosting COP 29 is a unique opportunity for Azerbaijan to demonstrate its green energy transition, learn from other countries' experiences, and promote global environmental action. The guiding principles for COP 29 focus on collaboration, inclusivity, enhanced commitments, and collective action. They have engaged in bilateral meetings with WHO and other international organizations to develop effective and inclusive initiatives for the conference. Key proposed initiatives include a Health Action Day, a Health Pavilion hosted by WHO, and proposals for innovative climate finance solutions to address climate and health challenges. The aim is to raise awareness and integrate health considerations into climate action and urban planning to promote a sustainable and equitable future.

26. A representative of the United Nations Environment Programme (UNEP) gave an overview of capacity-building activities on air pollution in Europe and Central Asia. UNEP's core mandate is to bridge science and policy on environmental issues, in particular air quality assessments. UNEP works with leading institutions, such as the Finnish Meteorological Institute (FMI), to conduct city-level assessments and capacity-building. These studies engage national stakeholders, government agencies, and civil society to identify sources and impacts of air pollution. In Bishkek, Kyrgyzstan, for example, a collaboration with the FMI and the United Nations Development Programme (UNDP) has raised public awareness of air pollution and led to a major investment project by the World Bank. The focus also extends to developing air quality monitoring capacity, working with government agencies, NGOs, and civil society organizations. UNEP promotes citizen science applications to increase public participation and awareness. In Central Asia, it has supported local actors to develop sensor networks in Kazakhstan, Kyrgyzstan, and Uzbekistan. In addition, UNEP has also collaborated with the World Meteorological Organization (WMO) on technical reports and support local authorities in developing standards for deploying these sensors. Activities include piloting mobile sensor technologies in Kyrgyzstan, collecting data to identify air pollution hotspots, and coordinating efforts for significant investments in air quality management. UNEP continues to advocate and share knowledge to mobilize action for clean air through various stakeholder engagements and capacity-building projects.

VIII. Communication and health messaging

27. A representative from WHO headquarters provided insights into building the health workforce capacity, a WHO Air Pollution and Health Training Toolkit (APHT). Historically, the health sector has been overlooked in guidance on air pollution, which has primarily targeted other sectors. Since 2018, when air pollution was recognized as a significant risk factor for non-communicable diseases (NCDs), WHO has been working to equip the health sector with the necessary competencies to address the issue. To this end, it has developed the APHT, which consists of three main components: training modules, a training-the-trainers manual, and clinical case scenarios. These materials are designed to improve understanding, communication and mitigation of the health risks associated with air pollution. The clinical case scenarios are particularly innovative, improving reasoning and decision-making skills by exposing clinicians to real-life situations. In addition, WHO has also launched the OpenWHO online course, AP and Health: An Introduction to Health Workers, which provides a free, four-hour training program on the health effects of air pollution. The course has received a significant number of registrations from health professionals, students, and government representatives, demonstrating its wide reach and relevance. Furthermore, WHO

has also piloted the APHT in Ghana in-person and is planning similar experiences in other countries, such as Rwanda, to refine and expand our training efforts.

28. An expert from the Imperial College London (UK) discussed the emotional aspects of risk communication, particularly in relation to air pollution. Despite significant advances in understanding and addressing the health impacts of air pollution, policies aimed at mitigating these problems sometimes face public backlash. This backlash, illustrated by the recent protests against London's ultra-low emission zones, highlights a disconnect between scientific evidence and public perception. The current air quality index system, which often shows green dots, fails to communicate the chronic health risks, contributing to scepticism. This system is primarily an acute health index that does not adequately reflect the daily exposure to pollution that exceeds WHO standards. Various methods have been implemented to improve air quality communication, such as monitoring networks, apps and alerts at bus stops, but these authority-led initiatives only reach an engaged portion of citizens. Under the umbrella of Breathe London, several community-led initiatives have had notable impact. The Breathe London wearables project equipped children with backpacks containing air quality sensors, engaging entire schools in the process. The project not only raised awareness but also led to significant behavioural changes, such as a 34% decrease in car travel to participating schools. Interestingly, the school environment was typically found to be the cleanest place these children encountered during their day. This upward education approach empowers communities to understand and act on air quality data from their neighbourhoods and effectively communicates actionable locally relevant risk reduction strategies. Another initiative, the Breathe London Community Programme, distributed free air quality sensors to diverse community groups across London, selected to represent different socio-spatial situations. These groups used their sensors to monitor local air quality and communicate the results in their own way, demonstrating the power of localized, citizen-led science to communicate health risks and influence public behaviour. For example, one community created knitted air blankets to visually represent air quality data over a year. Such innovative, community-driven approaches ensure that communities communicate with each other while science provides robust evidence. To ensure the success of these efforts, it is vital that universities, local authorities, and NGOs provide technical and financial support to ensure the accuracy and credibility of the data used.

29. An expert from the German Environment Agency (Germany) provided an update on the revision of the German air quality index (AQI), which classifies air quality into five classes from very good to very poor and provides corresponding health advice. The index, available on mobile phones and the agency's website, uses data on pollutants such as NO_2, PM_{10}, $PM_{2.5}$ and ozone. The classification system is based on the evidence of the AQGs. However, updating the German AQI has presented challenges, including the need for harmonization across different regions and the requirement for hourly updates, although most epidemiological studies provide 24-hour average risk estimates. To address these challenges, two approaches were considered: a pragmatic approach and a risk-based approach. The latter method aligns the relative risks for different pollutants with $PM_{2.5}$ as the reference, ensuring consistent health advice across pollutants. The update process also includes consideration of long-term effects in the setting of class limits for $PM_{2.5}$. Equivalent class limits have been calculated for other pollutants, and the new classes have been assessed against actual monitoring data to ensure that they accurately reflect real-time air quality conditions. The revised AQI also includes tailored health recommendations for the general public and vulnerable groups, using a tiered approach. For example, during moderate air quality conditions, vulnerable groups are advised to pay attention to symptoms and possibly adjust medication, while the general public receives no specific advice. As air quality deteriorates, recommendations become more specific, advising vulnerable populations to avoid highly polluted areas or to limit outdoor activities during periods of very poor air quality. This structured, evidence-based approach ensures that the AQI provides actionable and accurate health advice, promoting public health without causing undue alarm.

30. A representative of the Health and Environment Alliance (HEAL) highlighted the significant progress and activities in health communication in air quality policy deliberations in recent years. This period has seen unprecedented engagement by health organizations, public health professionals and individuals, particularly in the revision of the AAQD. The representative highlighted a wide range of communication strategies and messages reflecting

the different perspectives of the health community, from national public health institutes to European networks such as the European Respiratory Society and the European Cancer Leagues. These efforts are crucial for the implementation and communication of the ongoing revision of the AAQD. Six health communication frames used throughout the revision process were discussed, emphasizing the importance of science-based messaging. A key frame was the push for full alignment of the EU air quality standards with AQGs, a stance supported by the European Parliament (with the Parliament's environment and health committee (ENVI) supporting full alignment by 2030, and by the EP plenary supporting by 2035). Working with patients was also pivotal, as their personal stories highlighted the real-world impacts of poor air quality. These testimonies underlined the human cost and the energy required for patients to engage in these discussions. Another important frame was the economic argument, with data from health insurers in Belgium illustrating the significant health costs of inaction on air pollution, estimating potential annual savings of €45 million if AQGs were met. Throughout the process, communication strategies included visualizations, joint letters, social media campaigns and direct engagement with policymakers. This multifaceted approach ensured that health messages reached a broad audience and had a significant impact on the legislative process. The representative concluded by highlighting the lessons learned for effective health communication in policy processes. Continuous and collaborative communication involving different stakeholders, from scientists to health professionals and economists, is essential. This sustained effort has been critical in reaching the current stage of the AAQD revision and will be crucial for its future implementation and enforcement, ensuring cleaner air for all.

31. A representative of the WHO Regional Office for Europe presented the work of the Behavioral and Cultural Insights (BCI) Unit as a flagship priority within WHO and the UN, both regionally and globally. Understanding the contextual and individual factors that influence behavior is important, emphasizing the need for a people-centered and evidence-based approach to address environmental and health challenges. Collaborative efforts among various stakeholders, including academic institutions and UN agencies, have brought BCI to the forefront of policy discussions and intervention strategies. WHO ECEH and the BCI Unit together with academic partners conducted a scoping review on the use of urban green and blue spaces as a means to promote health-enhancing behaviors as well as on adaptive behaviours to air pollution. The reviews aimed to identify drivers and barriers to such behaviors and to assess the effectiveness of tested interventions. Case examples were presented to illustrate this approach, including an app-based informational support system and an employer-supported multicomponent intervention. These examples highlighted the importance of tailored interventions that take into account both individual preferences and environmental contexts. The scoping reviews identified a gap in the evidence related to effective interventions to enable, support and promote life-saving air quality-related behaviors. While interventions often focused on raising awareness and providing information, their impact was limited without addressing underlying contextual barriers and facilitating supportive environments. By incorporating evidence from diverse geographical and cultural perspectives, ongoing projects aim to inform evidence-based interventions that promote health-promoting behaviors in a holistic manner.

IX. TFH workplan 2024-2025 – current activities and the next steps

32. A representative of WHO ECEH invited participants to review the first draft of the European Regional SPS in the context of the upcoming WHO Second Global Conference on Air Pollution and Health, including a case study on the Task Force on Health. The draft summarized relevant information and data as well as relevant regional processes such as the UNECE Air Convention and other initiatives. Active participation in the review process was encouraged, with members of the Task Force on Health invited to provide feedback and/or suggest experts to enrich the regional SPS with different perspectives. Beyond the SPS, submission of case studies was requested by WHO Headquarters, to ensure that the Global Conference featured good practices in the European Region.

33. A representative of WHO ECEH provided an overview of the implementation of the Task Force on Health workplan for 2024-2025. The planned activities include consolidating evidence on health outcomes, with a report on methods for health risk/impact assessment of air pollution and cost-benefit analysis (1.1.1.32), updating tools for quantification of health impacts of air pollution, including links to climate change mitigation (1.1.1.33), developing and implementing capacity-building curriculum (1.2.1), and formulating health messages on air pollution, including on personal-level interventions (1.3.6). The need for financial resources and capacities to undertake actions in the workplan was highlighted. The representative informed about the intension to establish a pool of professionals experienced in the use of AirQ+, to support capacity building work with Member States. WHO ECEH would work to mobilize resources to organize a train the trainers session to interested experts. In addition, there was a discussion about addressing several questions raised during the meeting, regarding setting health-based targets in the context of the revision of the Gothenburg Protocol. While some of them were being addressed by ongoing WHO projects (being also activities included in the TFH workplan), embarking on addressing other more complex questions would need additional resources. The importance of realistic time planning, coordination, and mobilization of sufficient financial and human resource to advance in that direction was underlined.