



Vienna, 18 November 2020

Dear Members of the OSCE Parliamentary Assembly,

It is widely known that long-term exposure to high levels of particulate matter (PM) chronically impairs human health and influences the clinical course of infections acquired by already debilitated individuals, especially in the most vulnerable age groups. According to the Annual Report on Air Quality by the European Environment Agency, pollution is causing almost a half-million preventable deaths in Europe. Among other things, inhaling polluted air increases the risk of heart attack, pneumonia and, if infected by COVID-19, death.

Against the backdrop of increasing SARS-CoV-2 infection rates throughout the OSCE region, the Bureau of the General Committee on Economic Affairs, Science Technology and Environment and the Special Representative on Arctic Issues are pleased to **share with your national delegations some interesting findings which have been presented by the Italian Society of Environmental Medicine ([SIMA](#)) during an informative briefing** held on 23 October 2020.

Over the last few years, SIMA's scientists - in consultation and co-operation with a wide network of academic institutions from across the OSCE region - conducted extensive research on the impact of pollution on public health and, most recently, on the correlation between the high concentration of atmospheric particulate matter and COVID-19 infections, both in terms of airborne diffusion and health outcomes. Notably, such a correlation has been signalled by various research institutes, including the Max Planck Institute for Chemistry in Mainz and the Harvard T.H. Chan School of Public Health. To learn more about these developments, we plan to host a roundtable policy debate with the contribution of pertinent experts from across the region in the framework of our 2nd Committee work.

At this critical juncture, we are especially convinced that policymakers should respond to citizens' security needs through timely and well-calibrated environmental protection policies based on the latest scientific evidence. The far-fetched health and security implications of the ongoing crisis have, in fact, restated the urgency to effectively limit the detrimental effects of

pollution on human well-being and climate through strict regulations, both during and after the crisis.

We therefore **invite you to consider the annexed findings in your policymaking efforts aimed at mitigating the security impact of the current health crisis**. You may also circulate them among your respective parliaments, governments and scientific communities, as appropriate.

In conclusion, rest assured that we will continue to advocate for a more holistic and interdisciplinary approach to environmental security, whereby the protection of the environment becomes the precondition to effectively address both the public and the planet's health crisis. Our goal is to achieve a more balanced and forward-looking development strategy in response to growing public health concerns, as well as to the security expectations of current and future generations.

Yours sincerely,



Ms. Doris Barnett, Chair of the OSCE PA General Committee on Economic Affairs, Science, Technology and Environment



Mr. Artur Gerasymov, Vice-Chair of the OSCE PA General Committee on Economic Affairs, Science, Technology and Environment



Ms. Elona Gjebrea-Hoxha, Rapporteur of the OSCE PA General Committee on Economic Affairs, Science, Technology and Environment



Ms. Torill Eidsheim, OSCE PA Special Representative on Arctic Issues

Practical implications of the SIMA studies on COVID-19 containment for the attention of the OSCE Parliamentary Assembly

18 November 2020

This document outlines the recent scientific findings of the Italian Society of Environmental Medicine ([SIMA](#)) on the correlation between the high concentration of atmospheric particulate matter and SARS-CoV-2 virus transmission, presented to the Bureau of the OSCE PA General Committee on Economic Affairs, Science, Technology and Environment during an Informative Briefing on 23 October 2020. As such, the OSCE PA makes no claims nor warranties of any kind, expressed or implied, about the completeness and reliability of the data presented.

KEY FINDINGS

- **Particulate matter (e.g. PM2.5 and PM10) serve as “carriers” for several chemical and biological pollutants, including viruses, allowing long-term survival of viruses in the atmosphere for hours or even days. Thus, like many other micro-organisms and viruses, the new coronavirus Sars-Cov-2 can also spread through the air over large distances (the so-called airborne route transmission¹).**

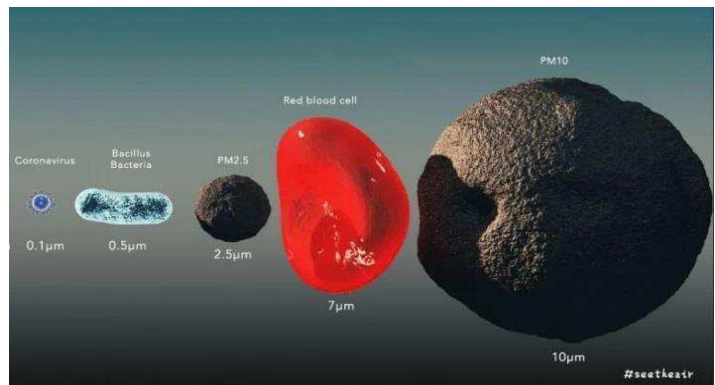


Figure 1. How Big Are Coronavirus Particles? Smart Air Filters, 4 February 2020, <https://smartairfilters.com/en/blog/can-masks-capture-coronavirus/>.

- **SIMA’s innovative research on the correlation between SARS-COV-2 virus transmission and the concentration of atmospheric particulate matter suggests that PM should be regarded as a contributing factor to COVID-19 infections, both in terms of airborne diffusion and health outcomes. A positive correlation between exposure to significant levels of air pollution and higher fatality rates has been signalled by various scientific efforts around the globe².**
- **As COVID-19 related deaths and the further spread of the coronavirus have been found to be associated with excess PM10 and PM2.5, the abundance of particulate matter in the air represents a significant predictor of COVID-19 infection - which reveals how the virus spreads more quickly in polluted areas, even when accounting for population density and the average number of daily travellers and tourists.**

¹ At the end of September 2020, the Centre for Disease Control in the USA have recognized the “Airborne Route” as another way of COVID-19 spreading in addition to direct interpersonal contagion.

² For instance, [a recent nationwide study from Harvard T.H. Chan School of Public Health](#) found that 1 unit increase in long-term average exposure to PM2.5 is associated with an 8% increase in the COVID-19 mortality rate in the USA. Moreover, an international research effort which included [the Max Planck Institute for Chemistry in Mainz](#) found that 15% of worldwide COVID-19 deaths can be traced back to long-term exposure to PM2.5

- In particular, **super-spread (or “high-way”) effects** are observable when, under stable weather conditions, the PM10 exceedances are repeated over time with frequencies beyond three consecutive days.³ This is a typical condition in many European cities where the temperature is around 5-10 degrees, the relative humidity is over 80% and the presence of emissions is high due to fossil or biomass combustion caused by vehicular traffic or domestic heating. In such conditions, **the virus may cover distances up to 10 meters from the emission source**. Notably, while one person can normally infect two individuals, in this “super-spread scenario,” one person may infect up to five individuals.
- **Sars-Cov-2 can also rapidly diffuse in any indoor environment** in the presence of one or more infected people, but there are different technologies that can be useful in reducing the risk of virus diffusion in indoor environments (e.g. schools, offices, and restaurants) to near zero. For instance, air conditioning systems play a decisive role in controlling the dispersion of droplets and aerosols produced by breathing in closed environments. Notably, **doubling the air conditioning flow rate inside a closed room reduces the concentration of contaminated particles by 99.6%**.
- **Air exchange is fundamental in the dilution of the virus** and its transfer to the outside. The reduction of airborne biological pollutants present in the droplets significantly decreases the concentration of the pathogen in the air. This, together with the today's use of barrier means (wearing face masks, social distancing and hand washing), represents the main tool in reducing the risk of contagion in closed environments.

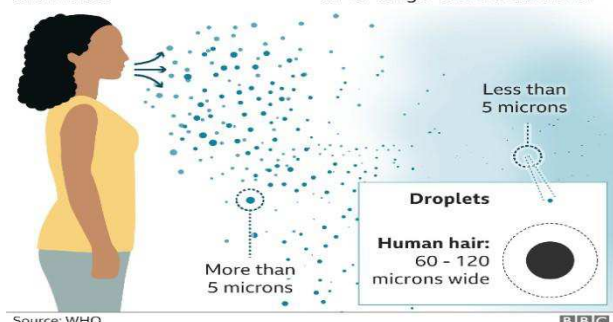
The difference between droplet and airborne transmission

Droplet transmission

Coughs and sneezes can spread droplets of saliva and mucus

Airborne transmission

Tiny particles, possibly produced by talking, are suspended in the air for longer and travel further



Source: WHO

BBC

Figure 2. The difference between droplet and airborne transmission. BBC News, 8 July 2020, <https://www.bbc.com/news/world-53329946>.

KEY RECOMMENDATIONS

- In order to **prevent the “super-spreading” effect induced by heavy air pollution** during the next European winter (when climatic conditions, humidity and temperature will be ideal for viral spreading), it is critical to reduce the levels of particulate matter by:
 - In the short-term: Temporarily halting all vehicular traffic and reducing heating combustion in cities experiencing more than two consecutive days of PM exceedances during a COVID-19 emergency context.
 - In the mid-term: Reducing the use of fossil fuels and biomass combustion while favouring the transition to renewable energy sources.
- To **avoid the detrimental impact of “super-spread” events** in the presence of prolonged PM exceedances, it is critical to:
 - Increase the interpersonal safety distance beyond two meters.
 - Close all windows and doors to avoid high concentrations of PM indoors.
 - Make the use of FFP2 face masks compulsory, both indoors and outdoors.
- **Monitoring the presence of Sars-COV-2 RNA on particulate matter**, both indoors and outdoors, should be used **as an early indicator of COVID-19 local epidemic recurrences**⁴.

³ Super-spread events are generally observed also for the seasonal flu, resulting in high healthcare-related costs each year.

⁴ In this context, SIMA has a specific project proposal which can be presented to interested OSCE PA delegations.

- **The use of air purification, or mechanical ventilation, should be actively implemented** to enhance safety in any indoor environment.
- **The interpersonal safety distance should be increased to at least two metres** to better protect citizens' health amid the coronavirus pandemic. In parallel, it is critical to **require all citizens to use face masks in every public place.**

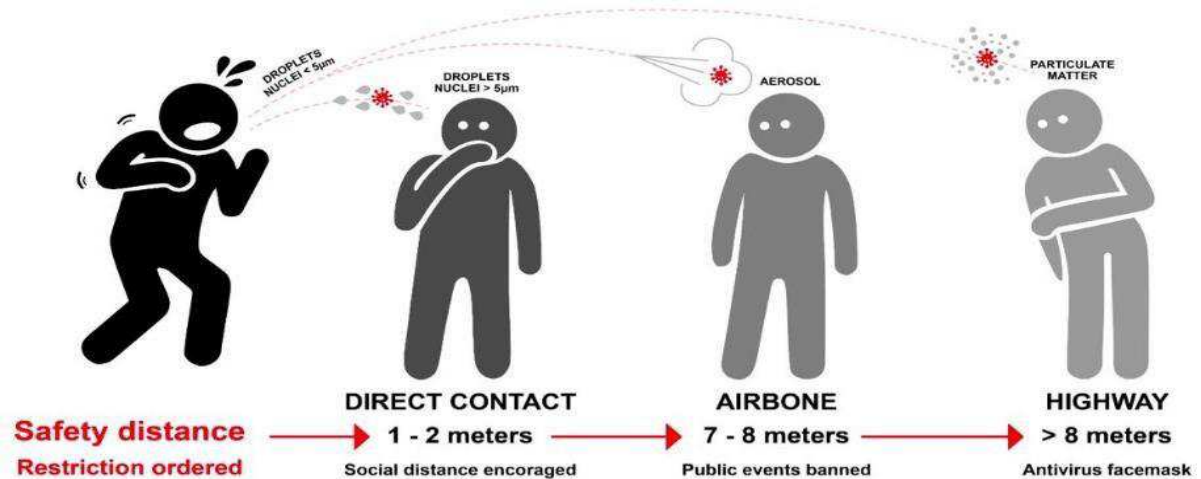


Figure 3 . SIMA's scheme of possible enhancement of viral transmission through stabilized human exhalation on PM.

- **The capacity of healthcare systems should be immediately boosted** by re-opening closed hospitals and making use of military infrastructures to efficiently manage the expected surge in COVID-19-related admissions. Simultaneously, **outpatient medical services** (those that can isolate and closely follow patients and direct contacts at home) **must be urgently reinforced.**

References to SIMA Publications

- Setti L, Passarini F, De Gennaro G, Barbieri P, Perrone MG, Borelli M, Palmisani J, Di Gilio A, Torboli V, Fontana F, Clemente L. *SARS-Cov-2RNA Found on Particulate Matter of Bergamo in Northern Italy: First Evidence.* Environmental Research. 2020 May 30:109754.
- Setti L, Passarini F, De Gennaro G, Barbieri P, Licen S, Perrone MG, Piazzalunga A, Borelli M, Palmisani J, Di Gilio A, Rizzo E. *Potential role of particulate matter in the spreading of COVID-19 in Northern Italy: first observational study based on initial epidemic diffusion.* British Medical Journal Open (BMJ Open). 2020 Sep 1;10(9): e039338.
- Borro L, Mazzei L, Raponi M, Piscitelli P, Miani A, Secinaro A. *The Role of Air Conditioning in the Diffusion of Sars-CoV-2 in Indoor Environments: a First Computational Fluid Dynamic Model, based on Investigations performed at the Vatican State Children's Hospital.* Environmental Research. 2020 Oct 15:110343.
- Distante C, Piscitelli P, Miani A. *Covid-19 outbreak progression in Italian regions: Approaching the peak by the end of March in northern Italy and first week of April in Southern Italy.* International Journal of Environmental Research and Public Health. 2020 Jan;17(9):3025.
- Setti L, Passarini F, De Gennaro G, Barbieri P, Perrone MG, Borelli M, Palmisani J, Di Gilio A, Piscitelli P, Miani A. *Airborne Transmission Route of COVID19: Why 2 Meters/6 Feet of Inter-Personal Distance Could Not Be Enough.* Int. J. Environ. Res. Public Health2020, 17, 2932.
- Leonardo Setti, Fabrizio Passarini, Gianluigi de Gennaro, Pierluigi Barbieri, Alberto Pallavicini, Maurizio Ruscio, Prisco Piscitelli, Annamaria Colao, Alessandro Miani. *Searching for SARS-COV-2 on Particulate Matter: A Possible Early Indicator of COVID-19 Epidemic Recurrence?* Int. J. Environ. Res. Public Health, 23 April 2020.
- Miani A, Burgio E, Piscitelli P, Lauro R, Colao A. *The Italian war-like measures to fight coronavirus spreading: Re-open closed hospitals now.* Lancet EClinical Medicine. 2020 Apr 1; 21.
- Piscitelli P, Miani A, Mazza A, Triassi M, De Donno A, Scala A, Pulimeno M, Distante A, Pollice F, Colao A. *Health-care inequalities in Italy: challenges for the Government.* Lancet Public Health. 2019 Dec 1;4(12): e605.
- Anelli F, Leoni G, Monaco R, Nume C, Rossi RC, Marinoni G, Spata G, De Giorgi D, Peccarisi L, Miani A, Burgio E. *Italian doctors call for protecting healthcare workers and boosting community surveillance during covid-19 outbreak.* British Medical Journal BMJ. 2020 Mar 26;368:m1254.
- Colao A, Piscitelli P, Pulimeno M, Colazzo S, Miani A, Giannini S. *Rethinking the role of the school after COVID-19.* Lancet Public Health. 2020 May 25.