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SUMMARY REPORT

RAPID EXPERT CONSULTATION ON ENVIRONMENTAL SURVEILLANCE OF SARS-CoV-2 IN WASTEWATER

VIRTUAL MEETING, 23 JULY 2020

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Rapid expert consultation on environmental surveillance of SARS-CoV-2 in wastewater

Summary report

Virtual meeting, 23 July 2020

ABSTRACT

This report summarizes the findings of the *Rapid expert consultation on environmental surveillance of SARS-CoV-2 in wastewater* that was organized by the WHO European Centre for Environment and Health on 23 July 2020 in a virtual format. It aimed to facilitate a rapid exchange of current knowledge, experience and practices among countries that are in the forefront of research and environmental surveillance of SARS-CoV-2 in wastewater. Such surveillance can be employed as a complementary tool to clinical surveillance of COVID-19. It provides supporting information to obtain an ample picture of occurrence of infection and take decisive public health response actions. While the consultation was able to take a valuable "snapshot" of current knowledge, approaches and experiences, there are a number of open or emerging practical questions that need to be looked at before promoting environmental surveillance at scale.

Keywords

COVID-19
ENVIRONMENTAL SURVEILLANCE
WASTEWATER

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Background and introduction

Environmental surveillance of pathogens in wastewater is a proven concept in public health (e.g. with respect to poliovirus and enteroviruses). The coronavirus disease (COVID-19) pandemic has triggered research in a number of countries across the WHO European Region to detect non-infective RNA fragments of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) in communal wastewater and sludge. Such surveillance has been suggested to provide an early warning method for detecting the occurrence of COVID-19 in the community, to monitor its circulation in order to assess trends, to screen for absence in populations and/or to track hot spots.

The WHO European Centre for Environment and Health (ECEH) organized a rapid expert consultation in a virtual format on 23 July 2020. It aimed to facilitate a rapid exchange of current knowledge, experience and practices among countries that are in the forefront of research and environmental surveillance of SARS-CoV-2. In particular, the objectives of the consultation were to:

- review available scientific evidence on the environmental presence of SARS-CoV-2;
- gather information about ongoing initiatives on wastewater surveillance of SARS-CoV-2, including research activities led by the European Commission through an umbrella study;
- facilitate exchange of country experiences in surveillance of wastewater for SARS-CoV-2;
- discuss opportunities to link tracking of past or ongoing circulation of SARS-CoV-2 with environmental surveillance of poliovirus;
- discuss the feasibility, opportunities and possible limitations of scaling up wastewater surveillance in view of available institutional, laboratory and financial capacities at national and local levels;
- confirm the possible use cases for wastewater surveillance and its value as a complementary measure to public health surveillance.

The consultation was attended by 30 experts representing the ministries of health, and national public health and academic institutions of Member States (Finland, Israel, Italy, the Netherlands, Portugal, Switzerland and the United Kingdom), the European Commission, the United Nations Economic Commission for Europe (UNECE) and WHO (see Annex 1 for the list of participants).

Welcome and proceedings

Oliver Schmoll, Programme Manager for Water and Climate at WHO ECEH moderated the meeting.

Ranieri Guerra, WHO Assistant-Director General, welcomed participants, provided background information and introduced the expected outcomes of the consultation. He noted that this meeting offered an important opportunity to collate learnings from Member States of the WHO European Region from initiatives on research and environmental surveillance. A critical discourse of experts was needed to assess the following questions, among others:

- To what extent can environmental surveillance provide an early warning function for the occurrence of COVID-19 in communities?

- What role could environmental surveillance play in building effective preparedness actions for potential next waves of infection?
- How far can semi-quantification techniques support an understanding of virus circulation in the population?
- What are the basic barriers that need to be addressed in translating research to actual surveillance activities?
- What are the resource implications of full-scale implementation of environmental surveillance?

Francesca Racioppi, Head of the WHO ECEH, thanked all participants for joining the meeting. She emphasized the relevance and urgency of this topic and that this consultation, in the context of the WHO European Region, will help to develop further understanding of which areas we have solid evidence in and which areas we have knowledge gaps in, and raise questions that need to be addressed collectively to advance work in this area.

Dorit Nitzan, WHO Regional Emergency Director, outlined the COVID-19 situation in the European Region. She highlighted the progress of response activities, including different restriction measures taken by countries in controlling the disease, and limitations related to the reporting of cases. She emphasized the need to remain vigilant, particularly since the majority of countries in the Region are going "back to normal". She requested the expert group to provide an assessment of the potential use of environmental surveillance in retrospective tracking of COVID-19 and the impact of hygiene and sanitary measures in preventing the transmission of infection, in particular in schools and other vulnerable settings.

Subsequently, the consultation discussed ongoing research initiatives in the European Region and globally, country experiences and reflections, experiences and lessons learned from the application of environmental surveillance of poliovirus, and technical aspects related to use cases for environmental surveillance of SARS-CoV-2 (see Annex 2 for the meeting programme). The main outcomes of these thematic discussions are summarized below

Considerations for environmental surveillance of SARS-CoV-2

The essential role of water, sanitation and hygiene (WASH) interventions in the COVID-19 response and recovery was highlighted. WHO has published interim guidance on water, sanitation, hygiene and waste management for SARS-CoV-2 (with the latest edition published after the meeting on 29 July 2020).1 At the same time, COVID-19 may provide an opportunity to bring some attention to under-attended issues, such as hand hygiene, now being promoted at scale through the WHO/United Nations Children's Fund global initiative on hand hygiene for all. Five key WASH-COVID-19 strategies should be pursued regardless of the application of environmental surveillance: promotion of universal hand hygiene; improving environmental hygiene; safe operation of water and sanitation systems; increasing WASH investments; and capitalizing on their co-benefits. In addition, it was emphasized that to date, no infectious SARS-CoV-2 has been detected in either drinking-water supplies or in untreated or treated sewage. Therefore, it appears that there is a low health risk for drinking-water and sanitation workers and users.

[1] Water, sanitation, hygiene, and waste management for SARS-CoV-2, the virus that causes COVID-19. Interim guidance. Geneva: World Health Organization and United Nations Children's Fund; 2020 (https://www.who.int/publications/i/item/water-sanitation-hygiene-and-waste-management-for-the-covid-19-virus-interim-guidance, accessed 31 August 2020).

WHO has developed a scientific brief on the status of environmental surveillance for SARS-CoV-2 (published after the meeting on 5 August 2020).2 It explores potential use cases and research needs for the environmental surveillance of SARS-CoV-2 in wastewater. Potential use cases include early warning, undertaken in low-resource settings where clinical surveillance is poor, or monitoring of virus circulation and detection of silent transmission. Detection of non-infective RNA fragments of SARS-CoV-2 in untreated wastewater and sludge has been reported in several countries, and some studies demonstrated that the RNA concentrations could be detected at 4–7 days ahead of case detection. In accordance with the current state of knowledge, however, there is insufficient evidence to broadly recommend environmental surveillance as a standard approach for COVID-19 surveillance; to date, most of the experience is from high-resource settings. Research needs can be categorized into several areas: biological (e.g. understanding of the association between virus shedding, clinical disease and detection by environmental surveillance; persistence of SARS-CoV-2 RNA fragments in sewage); epidemiological (e.g. optimum site selection and sampling; modelling and interpretation of data; triggers for action); technical (e.g. standardization of protocols; optimum molecular methods of detection; limits of detection and quantification); and economic (e.g. costs vs. benefits).

Research initiatives in the WHO European Region and globally

The European Commission initiated a European Union (EU) umbrella study that aims to demonstrate the feasibility and value of an EU SARS-CoV-2 sentinel system employing sewers. Currently it covers 17 EU Member States and an additional 8 are expected to join. Activities are organized around three pillars: harmonization of measurement and testing, knowledge transfer and decision support. Concrete outcomes include the recent release of a “methodology warp” showing a variety of approaches used in sampling and detection, and development of a sewer sentinel guide. The Commission noted that environmental surveillance provides useful supplementary information but should not take away attention from securing essential WASH services and clinical surveillance of COVID-19. The Commission is interested in expanding collaboration with WHO, in particular in relation to knowledge transfer.

An expert from KWR Water Research Institute, the Netherlands, presented initial findings from the umbrella study and global research group. SARS-CoV-2 was detected in 28 out of 52 wastewater treatment plants that were tested in the first round. Additional use cases for environmental surveillance of SARS-CoV-2 in wastewater were discussed, including different spatial scales (country/region and region/city) for frequent surveillance in the total population or sampling within cities; composite sampling for hospitals, nursing homes and campuses; and sampling of public transport hubs. Finally, issues around scaling-up environmental surveillance efforts were flagged, including questions around responsibility for and payment of the costs entailed in setting up a sustainable environmental surveillance system at the national and/or subnational or local level, capacities for national scale surveillance, data quality and consistency, and how to integrate environmental surveillance with epidemiological and clinical information and translate environmental data into policy decisions.

Ongoing country activities, experiences and reflections

In Italy, enterovirus testing has been carried out since 2007. Analyses of archived sewage samples show that SARS-CoV-2 RNA has been circulating in wastewater in northern Italy since

[2] Status of environmental surveillance for SARS-CoV-2 virus. Scientific Brief. Geneva: World Health Organization; 2020 (https://www.who.int/publications/i/item/WHO-2019-nCoV-sci-brief-environmentalSampling-2020-1, accessed 31 August 2020).

mid-December 2019 and that there is no evidence for earlier circulation. Wastewater-based epidemiology could specifically be useful for detecting the onset of a potential second wave of infection. Data can be used during epidemic periods to analyse trends and in non-epidemic periods for early warning of resurgence. A project on scaling up environmental surveillance nationally is expected to begin in October 2020 with the aim of covering all Italian regions, harmonizing sampling and laboratory methods and creating a nationwide network of wastewater surveillance.

Five large cities in Finland have been tested weekly since mid-April 2020 and another 28 wastewater treatment plants, covering 60% of the Finnish population, are monitored monthly; however, the data has not yet been analysed. The surveillance system is still in the research phase but there is interest towards a real-time dashboard of wastewater surveillance results to show spatial and temporal trends. Scaling-up of surveillance requires additional costs and comes with practical challenges (e.g. minimizing delays due to distance from sampling to laboratory; local laboratories do not have real-time quantitative polymerase chain reaction (RT-qPCR) capacity). Resources would need to be used more efficiently in order to be able to keep up the high levels of testing or to even increase them.

In the Netherlands, there is previous experience with wastewater surveillance for a wide range of reasons, including surveillance of antimicrobial resistance. The first studies related to SARS-CoV-2 in February 2020 detected virus fragments in faeces. While the surveillance of wastewater for SARS-CoV-2, in some instances, can provide important information as part of overall COVID-19 surveillance efforts, transmission of the virus by wastewater seems to be less relevant for the spread of SARS-CoV-2. Current efforts focus on the scaling-up of sewage surveillance to cover approximately 10 million people across all provinces. Complex modelling is required to determine how many people are actually captured when a RNA signal is found in wastewater. Important next steps include updating national figures with inclusion of subnational data; development of a protocol for response when a certain RNA signal value is exceeded; piloting and in-depth studies of risk settings (e.g. hospitals, secondary schools); and scaling up to cover all wastewater treatment plants (more than 300). The bio-banking of current samples should also be considered, as this might prove effective for retrospective investigation of pathogens emerging in the future. The integration of environmental surveillance for SARS-CoV-2 with that for other pathogens (e.g. polio, antibiotic-resistant bacteria) should be advanced.

In Portugal, a few small, locally confined studies and one large collaborative study on environmental surveillance have been conducted, covering around 20–25% of the population. It is crucial to maintain close intergovernmental coordination, and cooperation between researchers, epidemiologists, water utilities, and health and environmental authorities. Current barriers and problems mainly relate to sample transport time, availability of laboratory equipment, costs of sample transport and analysis (i.e. transportation of samples from the wastewater treatment plants in the north of the country costs €400 per day), and the lack of standardized methods for quality control. Particularly interesting use cases include surveillance of large buildings (e.g. universities, companies, nursing homes, hospitals) and larger gatherings, and smaller scale investigations (e.g. neighbourhoods).

Switzerland investigated temporal and spatial trends in three affected areas. A key issue under discussion is related to the catchment area of the sampling points, in particular whether or not hospitals should be included, given their impact on the RNA signal. Potential use cases, and associated information expected, vary depending on the different interests of stakeholders involved, ranging from the general public to wastewater treatment plant operators, cities and

cantons up to the federal level. At the subnational level, the application of sewer surveillance will be most useful for early warning purposes, “validation” of random testing and seroprevalence surveys, identification of hotspots, and the retrospective analysis of response.

In the United Kingdom, several national programmes were set up at the same time. Close coordination between those programmes helped to create synergies in terms of sample exchanges for protocol validation and the standardization of methods in order to maximize comparability, but also to compare models and evaluate uncertainties and predictions. Currently, 44 sites are tested in England, 28 sites in Scotland and 21 locations in Wales. Open questions remain in relation to optimal method protocols, the best bioindicators for estimating the population from which the viral RNA was recovered, the behaviour of SARS-CoV-2 in the sewer network, and uncertainties over human shedding rates.

In summary, countries are taking different approaches in implementing environmental surveillance of SARS-CoV-2 depending on their interest, capacities and local circumstances. Some countries have already introduced regular surveillance in wastewater (e.g. the Netherlands), some are striving towards nationwide scale-up based on successful piloting (e.g. Italy) and others are carrying out research to assess virus circulation in the environment and analyse epidemiological patterns.

Environmental surveillance of SARS-CoV-2 in wastewater requires the establishment of cooperation and collaboration mechanisms between the environmental and health sectors, and dialogue between water utilities and health authorities. It also requires allocation of appropriate resources, which are in addition to those necessary to further expand epidemiological surveillance at the population level. The retrospective investigation of SARS-CoV-2 in wastewater samples that were collected and preserved as part of polio eradication programmes offers the opportunity to track back occurrences of the virus in communities. However, further research and capacity-building are needed on analytical methods (particularly for settings with low sewerage coverage), modelling and interpretation, and use of such data to inform decision-making.

Experiences and lessons learned from poliovirus surveillance

Environmental surveillance has played an important role in poliovirus eradication programmes. Globally, there is a complex infrastructure of laboratories conducting environmental surveillance for poliovirus, and surveillance for SARS-CoV-2 could easily be integrated using common sample processing and molecular detection methods. It appears that SARS-CoV-2 RNA can be easily detected in untreated sewage and correlates with findings from clinical cases. Coronavirus is inactivated in sewage, not requiring virus strain isolation in cell culture. This is a major difference compared to poliovirus. Regarding next steps, concentration and detection methods need to be optimized in order to ensure the sensitive detection of virus transmission to enable timely public health interventions.

In Israel, the last polio outbreak in 2013 was declared on the basis of environmental findings and not clinical cases, highlighting the potential value of environmental surveillance. Currently, about 50% of the population of Israel are covered by such surveillance. This existing network could be used and extended to also include SARS-CoV-2. Sampling sites need to be carefully selected to account for different population sizes and population dynamics (e.g. borders, tourism), but also keeping in mind aspects around transportation and storage of the samples.

Potential use cases and knowledge gaps

Several use cases for environmental surveillance of SARS-CoV-2 in wastewater were highlighted, including:

- early warning of community transmission, including in settings with weak clinical surveillance, to trigger intensified clinical testing and case finding;
- surveillance of high-risk populations (such as in prisons, hospitals, schools, nursing homes, refugee camps, transport hubs or large public events) to trigger intensified clinical testing and case finding;
- monitoring of disease circulation and trends, including identification of hot spots;
- retrospective analysis of archived samples to track back SARS-CoV-2 occurrence (as reported by Finland, Italy, the Netherlands, Portugal and the United Kingdom);
- analysis of SARS-CoV-2 RNA sequences from wastewater and comparison with those from clinical samples to confirm whether environmental surveillance closely reflects circulation in humans, detect importation of virus variants and identify possible gaps in clinical surveillance.

While environmental surveillance of SARS-CoV-2 in wastewater can have benefits in both low- and high-income countries, it should be positioned as a complementary instrument to clinical surveillance, and not as an alternative. In particular, environmental surveillance should not draw attention and resources away from essential health responses, in particular in low-resource settings.

Different use cases, however, raise questions around feasibility, cost–effectiveness, reliability and efficacy of methods, in particular in view of scaling up application. Meeting participants identified the main barriers and raised the following questions that need to be resolved before moving from a research and/or experimental phase to recommending wider implementation of environmental surveillance.

- **Representativeness and granularity of surveillance.** The use case and objectives of environmental surveillance of SARS-CoV-2 in wastewater need to be well defined at the outset of any programme, as does an associated testing strategy that generates representative and robust data. Associated questions raised include:
  - How can we define and prioritize settings where environmental surveillance may be useful?
  - What are the elements/criteria for establishing a sound monitoring strategy that produces representative information (taking account of geographical scale, site selection, frequency of testing, etc.)?
  - How can we account for the variability of shedding in individuals? For example, does a certain signal indicate/detect one high-load shedder or 10–100 average or 10 000 low-level shedders?
  - How can we normalize the data from different types of catchments (e.g. different shares of non-communal wastewater) to allow for comparison?
  - Should catchment areas with hospitals be included or would this falsify the signal?

- **RNA threshold values for action.** The detection of RNA in wastewater could be a 4–7-day leading indicator ahead of clinical data. Such an early warning signal, however, would need

to be translated into concrete operational actions based on thresholds in order to provide added value. Setting RNA signal thresholds and triggers, as well as developing protocols for responses when these thresholds are exceeded, remains one of the key areas to be addressed. Associated questions raised include:

- How does an RNA signal in wastewater relate to SARS-CoV-2 circulation in the community? What are the correlations between clinical cases and RNA signals in wastewater?
- What level of RNA rise is informative/credible for triggering action, such as intensified clinical testing, and which criteria are used for establishing a (localized or general) signal value/threshold distinct from "background noise" levels?
- How can we integrate the findings from environmental surveillance with those from clinical surveillance?
- How can we translate environmental data into decisions to control COVID-19?
- What concentration does the RNA signal need to be to indicate either localized or more widespread community transmission?

- **Integration with existing surveillance systems and cost implications.** To inform possible scaling-up of environmental surveillance of SARS-CoV-2 in wastewater at the national level, issues related to additional investments and integration with existing surveillance systems were flagged. Associated questions raised include:
  - Is it possible to integrate environmental surveillance of SARS-CoV-2 with existing surveillance systems, in particular poliovirus sampling?
  - How can environmental surveillance efforts of SARS-CoV-2 in wastewater benefit from the experience of existing surveillance networks (e.g. polio)?
  - What are the costs associated with routine sampling and analyses in urban areas?
  - What are the costs associated with building necessary laboratory and testing capacity?
  - What investments are needed to move from the research mode to pilot testing, and from pilot testing to full-scale application?

- **Laboratory and testing capacity and quality assurance.** Scaling up national efforts of environmental surveillance of SARS-CoV-2 in wastewater ultimately requires an increase in availability of laboratory and testing capacity. If samples are handled in more than one laboratory and are, in addition, meant to be comparable within and across countries, appropriate quality assurance and quality control procedures are of utmost importance to deal with measurement uncertainty and sampling effects. Associated questions raised include:
  - How can methods and techniques be standardized and harmonized (e.g. coverage area, sample collection, storage, transport, and sampling and analysis of samples from non-sewage sanitation systems) to ensure comparability?
  - What are best sampling procedures in relation to type of sample, number of parallel/independent samples, aliquots, sampling volumes, etc.?
  - What are the main elements of quality assurance? What is needed to ensure data quality/consistency?
  - How can we ensure interlaboratory comparability? Are there specific aspects of the testing that are most variable between laboratories?
  - What guiding principles apply to assessing and comparing different methods?

  - In countries with open drains, is there a need to account for the effects of sunlight on the sample?

- **Application in lower- and middle-income countries.** Whereas environmental surveillance of SARS-CoV-2 in wastewater appears to be a very promising approach for well-resourced countries, it may prove difficult to apply in countries which are not as-well equipped and may not have RT-qPCR capacity. Associated questions raised include:
  - Is it possible to develop tests that can be locally applied and/or for which capacity can be built locally to provide information where it is needed to inform targeted measures?
  - How can we control travel-related cost in countries where travel times are likely to be long and laboratory capacity low?
  - What would be viable testing strategies for countries with a high proportion of on-site sanitation?

- **Risk communication.** Different stakeholders (e.g. the public, service providers, health and environment authorities) may have different understanding and perceptions of environmental surveillance of SARS-CoV-2 in wastewater. In risk communication with the public and wastewater service providers, it is of particular importance that messages should be clear, using terms like “non-infective virus fragments”, “traces of SARS-CoV-2” or “RNA signal” instead of the more ambiguous and often used term “the virus was found”. Associated questions raised include:
  - How can messages around environmental surveillance of SARS-CoV-2 in wastewater be framed (e.g. “RNA signal” vis-à-vis “virus”) to avoid misunderstandings regarding risks of transmission from faeces and wastewater for the general public but also staff of sanitation/wastewater service providers?
  - How can we explain the added value of SARS-CoV-2 RNA monitoring in sewage to clinicians?
  - How can we ensure close dialogue between wastewater service providers and health authorities?

Conclusion and ways forward

Environmental surveillance of SARS-CoV-2 in wastewater can be employed as a complementary tool to clinical surveillance of COVID-19. It provides supporting information to obtain an ample picture of occurrence of infection and take decisive public health response actions. Several high-income countries in the WHO European Region have rapidly taken on environmental surveillance approaches – ranging from specific research initiatives to routine use by public/ environmental health authorities as an integral part of wider COVID-19 surveillance. It appears prudent to explore further opportunities to make use of ongoing poliovirus sampling programmes and capitalize on experiences with their implementation.

On the other hand, the uptake of environmental surveillance must not divert attention and resources away from clinical surveillance, essential public health response measures and maintaining safe operation of water supply, sanitation and hygiene services in communities and institutional settings. Furthermore, there is a need for clear and differentiated messaging to public health actors and the public to avoid misinterpretation of the risk of infection from faeces.

Environmental surveillance of SARS-CoV-2 in wastewater is a very dynamic field of work. While this rapid expert consultation was able to take a valuable “snapshot” of current

knowledge, approaches and experiences, there are a number of open or emerging practical questions that need to be looked at before promoting environmental surveillance at scale. It remains, therefore, important to review progress and experiences gained through continued networking and exchange across countries in the Region and between researchers and the public health community. To this end, the WHO Regional Office for Europe, in close cooperation with WHO headquarters, can offer further support (provided sufficient resources are available) by:

- facilitating topical "mini-consultations" with expert group members to collate answers to the emerging, open questions (as listed in the previous section of the report) as a contribution to advancing scientific and practical aspects related to environmental surveillance of SARS-CoV-2;
- offering a platform to facilitate exchange of information and experiences and promote cooperation between research and public health communities, including through maintaining close collaboration with the European Commission umbrella study initiative;
- organizing broad outreach among Member States of the WHO European Region through the UNECE/WHO Protocol on Water and Health to support countries in appreciating the added value, current gaps and open questions related to environmental surveillance; in building associated capacities; and in promoting exchange between health, environment and water sectors;
- providing a clearing house function of technical resources to support access to updated knowledge and information (including offering a question and answer section).

ANNEX 1: LIST OF PARTICIPANTS

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ANNEX 2: PROGRAMME

10:00 – 10:10 Welcome and background to the consultation

Ranieri Guerra, WHO Assistant-Director General

Francesca Racioppi, Head of Office, WHO European Centre for Environment and Health

10:10 – 10:20 Setting the scene

COVID-19 situation in the WHO European Region
(Dorit Nitzan, Regional Emergency Director)

10:20 – 10:40 Considerations for environmental surveillance of SARS-CoV-2 virus

Priority water, sanitation and hygiene activities in the context of COVID-19 prevention
(Kate Medlicott, WHO)

Introduction to WHO scientific brief: environmental surveillance for SARS-CoV-2 virus
(Boris Pavlin, WHO)

10:40 – 11:00 Research initiatives in the European Region and globally

Introduction to the scope and objectives of the European Union umbrella study
(Bernd Gawlik, European Commission)

Initial findings from the umbrella study and global initiatives
(Gertjan Medema, KWR Water Research Institute, The Netherlands)

11:00 – 11:55 Sharing of ongoing activities, country experiences and reflections

Presenters are invited to address in their contributions the following points:

1. *What are the expected use cases of environmental surveillance of SARS-CoV-2 in your country's context?*
2. *Which could be the role of environmental surveillance of SARS-CoV-2 in the context of overall public health surveillance programming?*

Italy *(Giuseppina La Rosa, National Institute of Health)*

Finland *(Tarja Pitkänen, Finnish Institute for Health and Welfare)*

Netherlands *(Ana M. de Roda Husman, National Institute for Public Health and the Environment)*

Portugal *(Ricardo Santos, Instituto Superior Técnico)*

Switzerland *(Tamar Kohn, Ecole Polytechnique Fédérale de Lausanne*)

United Kingdom *(Andrew Singer, UK Centre for Ecology & Hydrology)*

11:55 – 12:05 Health break

12:05 – 12:25 Links of environmental surveillance of SARS-CoV-2 to polio virus surveillance

Experiences and lessons learnt from the WHO Global Specialised Polio Laboratory
(Javier Martin, National Institute for Biological Standards and Control, United Kingdom)

Experiences and lessons learnt from polio virus surveillance in Israel
(Itay Bar-Or, Central Virology Laboratory at Sheba Medical Center, Israel)

12:25 – 12:50 Discussing the use cases for environmental surveillance of SARS-CoV-2 virus

Participants will discuss opportunities, limitations and further developments needed with respect to environmental surveillance of SARS-CoV-2. In particular, the discussion aims to address the following questions:

1. *What are the most important learnings to date from activities?*
2. *Which could be the role of environmental surveillance in formulating response and preparedness action?*
3. *What are the main barriers/research questions that need to be resolved before moving from the research and experimental phase to recommending wider implementation of environmental surveillance?*
4. *What are anticipated costs, difficulties and challenges associated with implementing and interpretation of results?*

12:50 – 13:00 Summary conclusions and way forward

THE WHO REGIONAL OFFICE FOR EUROPE

The World Health Organization (WHO) is a specialized agency of the United Nations created in 1948 with the primary responsibility for international health matters and public health. The WHO Regional Office for Europe is one of six regional offices throughout the world, each with its own programme geared to the particular health conditions of the countries it serves.

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Kyrgyzstan
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