World Health Organization

Global genomic surveillance strategy

for pathogens with pandemic and epidemic potential

2022–2032

Consultation meeting report
8 December 2021

World Health Organization

Global genomic surveillance strategy

for pathogens with pandemic and epidemic potential

2022–2032

Consultation meeting report
8 December 2021

Global genomic surveillance strategy for pathogens with pandemic and epidemic potential 2022-2032: consultation meeting report, 8 December 2021

ISBN 978-92-4-005740-1 (electronic version)
ISBN 978-92-4-005741-8 (print version)

Suggested citation. Global genomic surveillance strategy for pathogens with pandemic and epidemic potential 2022-2032: consultation meeting report, 8 December 2021. Geneva: World Health Organization; 2022. Licence: **CC BY-NC-SA 3.0 IGO**.

Cataloguing-in-Publication (CIP) data. CIP data are available at **http://apps.who.int/iris**.

Contents

Acknowledgements

In May 2021, during the course of the COVID-19 pandemic, the 74th World Health Assembly adopted Resolution 74.7 on Strengthening WHO preparedness for and response to health emergencies. The Resolution urged WHO Member States to increase their capacity to detect new threats, including through laboratory techniques, such as genomic sequencing.

To support Member States in this endeavor, WHO led a global multi-step consultative process in an inclusive and transparent spirit, to develop the Global genomic surveillance strategy for pathogens of pandemic and epidemic potential 2022–2032. The consultation in December 2021 brought stakeholders together to discuss the draft Global Strategy and to support its finalization.

WHO would like to acknowledge the stakeholders who took the time to provide comments and support the process.

This includes representatives from Member States, global disease networks, international organizations, civil society organizations, private sector, academia and research institutions, and staff of WHO headquarters, regional offices and country offices.

Acronyms and abbreviations

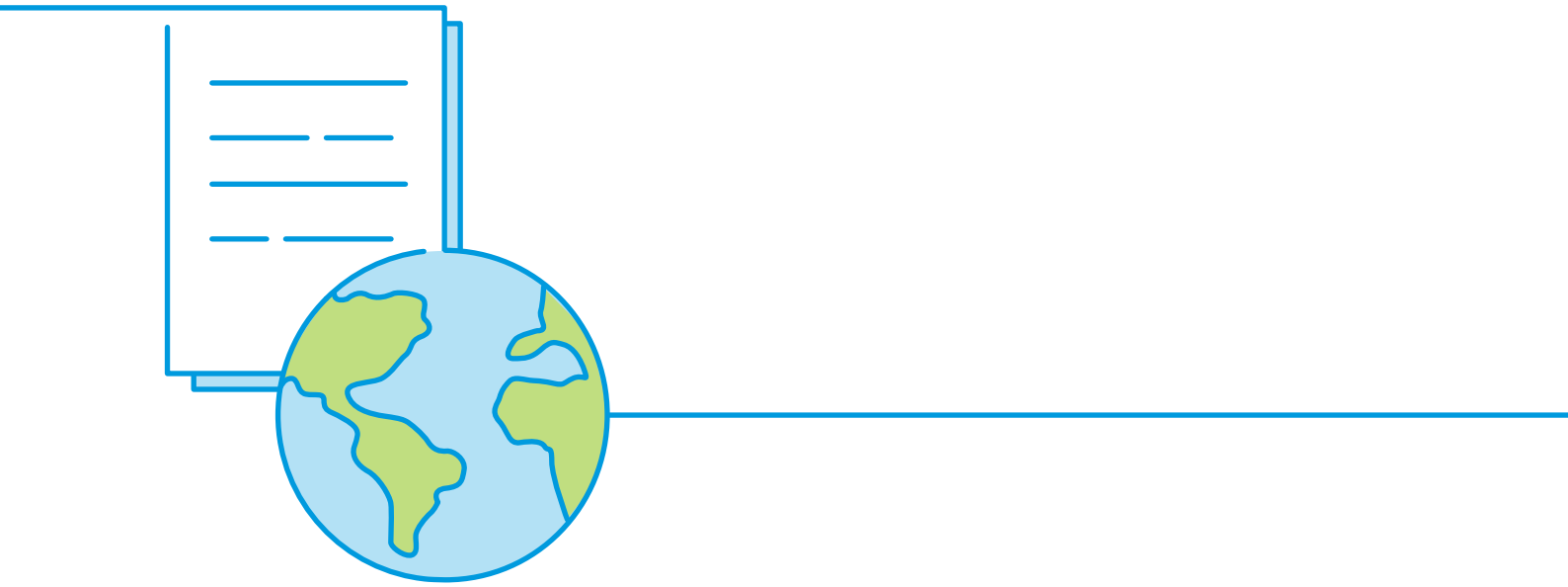
AMR	Antimicrobial resistance
CDC	Centers for Disease Control and Prevention
EQA	External quality assurance
LMIC	Low- and middle-income countries
SARS-CoV-2	Severe acute respiratory coronavirus 2
VECTOR	State Research Center of Virology and Biotechnology
WHO	World Health Organization

Executive summary

There is global impetus to strengthen continuous surveillance, rapid identification and real-time tracking of pathogens with pandemic and epidemic potential. Recognizing the need for stronger cross cutting, sequencing and bioinformatics, WHO commenced a process for developing a Global genomic surveillance strategy for pathogens of pandemic and epidemic potential, hereafter the Global Strategy. The Global Strategy aims to be country-focused, pathogen agnostic and leverages existing capacities and systems. It comprises an overarching goal, five strategy objectives, a set of key principles and enabling factors to underpin action taken at the national, regional and global level, while emphasizing the value of partnerships and collaboration for its success.

This virtual consultation aimed to provide a forum for the exchange of information and ideas on the Global Strategy. The consultation, which took place on 8 December 2021, brought together 20 experts for discussions in moderated sessions. The consultation was attended by 853 participants from 117 countries representing Member States, national health authorities, donors and partners including international organizations, academia, industry and civil society.

The consultation began with opening remarks from Dr Sylvie Briand (WHO), who highlighted that the COVID-19 pandemic is a watershed moment for developing a pathogen-agnostic strategy. This Global Strategy can guide a high-level agenda, as well as the development of capacities to meet country needs in a right-sized and consistent way. Dr Gina Samaan (WHO) then provided key information to set the scene describing the gains made in genomic surveillance data sharing during the COVID-19 pandemic, as well as barriers, gaps and challenges to be addressed.



Consultation panel discussions were organized around the five proposed objectives of the Global Strategy.

Objective 1: Improve access to tools for better geographic representation

Panellists discussed the complexity and importance of systems thinking when scaling up global genomic surveillance. Panellists emphasized the need for contextual considerations, geographic representation and creating sustainability both by leveraging new tools and strengthening existing capacities.

Objective 2: Strengthen the workforce to deliver at speed, scale and quality

Panellists described the importance of developing a multidisciplinary workforce when strengthening genomic surveillance. Workforce development must begin with science education leading to further training opportunities and career advancement. The existing workforce must be retained and offered opportunities for talent development such as training packages, quality assurance, as well as communities of practice and knowledge sharing. The panel offered HIVResNet as one example of successful workforce strengthening.

Objective 3: Enhance data utility for streamlined local to global public health decision making and action

Panellists reflected on the ways in which data utility contributes to real time public health decision-making. However, challenges to data utility learned from the United Kingdom's New Variant Assessment Platform (NVAP) include sharing of metadata, data linkages, workforce development and data ownership. Genomic surveillance relies on an integrated system of appropriate sampling, specimen sharing, methods, algorithms, analysis tools and data sharing to identify pathogens.

Objective 4: Maximize connectivity for timely value add in the broader surveillance architecture

Panellists explored how genomic sequencing can be better connected to epidemiological and clinical work with a focus on public health impact. Panellists offered examples from Bangladesh, the United States Centers for Disease Control and Prevention (CDC), the State Research Center of Virology and Biotechnology (VECTOR) in the Russian Federation, as well as examples from One Health partners.

Objective 5: Maintain a readiness posture for emergencies

Panellists discussed the importance of building capacity across genomic sequencing networks to maintain a readiness posture. Panellists shared examples from the Africa Pathogen Genomics Institute, the use of multidisciplinary teams and peace time exercises in Singapore, as well as lessons learned in Brazil that highlight the need for ongoing collaborative relationships to link stakeholders. Panellists emphasized the need for sustainable financial support and greater collaboration with the animal health sector to maintain a readiness posture.

Dr Mike Ryan (WHO) offered closing remarks and underscored the need to build surveillance from the bottom up in ways that mainstream genomic surveillance into public health infrastructure and processes. Local solutions must be developed that connect to a global genomic surveillance infrastructure. Resources, tools, data and insights must be shared with a spirit of equity.

The Global genomic surveillance strategy for pathogens with pandemic and epidemic potential, 2022–2032 was launched in March 2022. Next steps include developing an implementation plan in line with the five key objectives outlined in this report.

Background

The COVID-19 pandemic has exposed weaknesses in public health systems and highlighted a clear need for continuous surveillance, rapid identification and real-time tracking of pathogens with pandemic and epidemic potential. As waves of COVID-19 transmission continue, there is global impetus to strengthen genomic surveillance as a key component of public health systems globally.

About the Global genomic surveillance strategy for pathogens with pandemic and epidemic potential 2022–2032

The International Health Regulations (IHR) 2005 Emergency Committee for COVID-19 continues to make recommendations to increase genomic sequencing and sharing of sequences and metadata in response to the continued evolution of the SARS-CoV-2 virus and potential emergence of novel variants. In May 2021, World Health Assembly Resolution 74.7 Strengthening WHO preparedness for and response to health emergencies created greater impetus to develop a global surveillance strategy for pathogens with pandemic and epidemic potential. Recognizing the global momentum and clear need for stronger cross cutting, sequencing and bioinformatics, WHO commenced a process for developing a Global genomic surveillance strategy for pathogens of pandemic and epidemic potential, subsequently referred to in this text as the Global Strategy.

The Global Strategy aims to be country-focused, pathogen agnostic and leverages existing capacities and systems. It comprises an overarching goal, five strategy objectives, a set of key principles and enabling factors to underpin action taken at the national, regional and global level, while emphasizing the value of partnerships and collaboration for its success. The Global Strategy encourages countries to strengthen cross-cutting genomic surveillance capacities and highlights how sequencing strengthens both horizontal and vertical public health programming. During the Global Strategy development process, WHO convened stakeholders to ensure a collective and comprehensive effort towards global genomic surveillance.

Aims and objectives of the consultation

The virtual consultation aimed to provide a forum for the exchange of information and ideas on the Global Strategy (Annex I).

Key objectives of the consultation included:

- To present the outline of the 10-year Global genomic surveillance strategy for pathogens of pandemic and epidemic potential
- To discuss the landscape, challenges and opportunities for the Global Strategy from different stakeholder perspectives.

Summary of presentations and discussions

The virtual consultation took place on 8 December 2021 and convened 20 experts in moderated sessions. The consultation was attended by 853 participants from 117 countries representing Member States, national health authorities, donors and partners including international organizations, academia, industry and civil society (Annex II).

The consultation discussions were organized around the five proposed objectives of the Global Strategy for genomic surveillance:

Objective 1: Improve access to tools for better geographic representation

Objective 2: Strengthen the workforce to deliver at speed, scale and quality

Objective 3: Enhance data utility for streamlined local to global public health decision-making and action

Objective 4: Maximize connectivity for timely value add in the broader surveillance architecture

Objective 5: Maintain a readiness posture for emergencies

Consultation participants were asked to provide real-time feedback on the Global Strategy objectives using the Slido polling platform (Annex III).

Opening remarks

Dr Sylvie Briand, Director, Epidemic and Pandemic Preparedness and Prevention, World Health Organization, Switzerland

Dr Sylvie Briand welcomed the panellists and offered opening remarks on the need for a globally aligned strategy on genomic surveillance. This need has been made more pressing by the emergence of SARS-CoV-2. The pandemic has emphasized the importance of quality, timely and geographically representative genetic sequence data. Such data is critical to inform public health decision-making. Dr Briand expressed gratitude for countries and partners who have scaled up their genomic surveillance capacities and openly shared genomic information.

The COVID-19 pandemic is a watershed moment, and there is opportunity to build on recent momentum. Developing a pathogen-agnostic strategy is key towards setting a high-level agenda that considers existing capacities, barriers and fills genomic surveillance gaps. This Global Strategy will maximize coherence across activities and ensure that surveillance needs are met with maximum impact. By doing so, genomic surveillance capacities can be developed that meet country needs in a right-sized and consistent way.

Setting the scene

Dr Gina Samaan, Unit Manager a.i., Global Preparedness Platforms, World Health Organization, Switzerland

The COVID-19 pandemic has demonstrated the critical role of genomic surveillance. In response to the pandemic, technologies in sequencing and bioinformatics are rapidly evolving and genomic surveillance capacities are increasing. As such, there have been immense gains in genomic surveillance data sharing during the pandemic. As of September 2021, 64% of WHO Member States shared SARS-CoV-2 genomic surveillance data through GISAID, a 57% increase from December 2020. Gains have also been made in access to sequencing infrastructure, with an 11% increase in WHO Member States with national capability to sequence SARS-CoV-2 in country between June and December 2021.

However, there are also barriers, gaps and challenges that require our collective attention. These include the timeliness, geographic representation, efficiency and quality of data collected. For example, ensuring complete meta-data associated with genomic surveillance is key to genomic surveillance as time, person and place variables are important considerations in data interpretation. We must also consider the type of surveillance activities being undertaken. Sentinel versus non-sentinel surveillance sites detect unique lineages of SARS-CoV-2 differently. Data from July to December 2021 indicate that sentinel systems were more efficient in capturing different lineages compared to non-sentinel systems. Overall, challenges in global genomic surveillance relate to issues of access to technologies, capabilities, analysis and data availability, as well as technical fragmentation, connectivity and information sharing, in addition to challenges in sustaining sequencing underway.

Panellist discussions

Objective 1:
Improve access to tools for better geographic representation

Moderator:

Dr Anurag Agrawal, Institute of Genomics and Integrative Biology, India

Panelists:

Professor William Ampofo, Noguchi Memorial Institute for Medical Research (NMIMR), Ghana; Dr Meera Chand, Public Health England, United Kingdom of Great Britain and Northern Ireland; Mr Kay van der Horst, Rockefeller Foundation, United States of America

Genomic surveillance, as it relates to pandemic preparedness and response, can be described as the process of understanding host and strain distribution of an emerging disease to inform risk assessment, communication, implementation and outcomes. Implementing and scaling up genomic surveillance globally is a complex task that requires systems-thinking, collaboration, as well as contextual considerations and geographic representation. Broad geographic representation cannot be achieved without capacity building across the genomic surveillance value chain. Progress has been made, and resources committed nationally and globally, to building capacity in response to COVID-19. However, investment in genomic surveillance must be sustainable post-pandemic, both financially and from a workforce and systems perspective.

Robust genomic surveillance systems require systems-thinking from the point of design onwards, guided by clear goals, objectives, resource commitments. New tools and technologies in genomic surveillance can be leveraged to detect, characterize, or contain outbreaks. Such tools and technologies include using artificial intelligence and Big Data. Existing tools must also be strengthened, including ensuring more complete meta-data and more robust linkages to clinical data and other data sources. These tools and technologies must be applied by a skilled workforce, including those in the animal health sector using a One Health approach. The alliances and collaborations created in response to COVID-19 are foundational towards building capacity and ensuring access to tools across geographies moving forward.

Objective 2:
Strengthen the workforce to deliver at speed, scale and quality

Moderator:

Dr Sébastien Cognat, World Health Organization, Switzerland

Panelists:

Dr Silvia Bertagnolio, World Health Organization, Switzerland; Dr Salman Muhammed, Ministry of Health, Pakistan; Dr Neil Squires, Health Security Agency, United Kingdom of Great Britain and Northern Ireland.

Strengthening the genomic surveillance workforce begins upstream with a broader consideration of how people are incentivized to pursue careers in science, and in particular science in the health sector. The roots of a skilled genomics workforce lie in primary and secondary school science education leading to further training opportunities. Once recruited, it is imperative to support the workforce and enable career advancement. At the same time, it is important to develop and maintain existing talents within health systems. Genomic surveillance is delivered by a multidisciplinary team including skillsets across bioinformatics, epidemiology, amongst other disciplines, providing the appropriate skill mix for service delivery.

Talent development can include:

- Training packages: Training packages offered to both entry level and in-service training are essential to creating career pathways for the genomic surveillance workforce and can be facilitated by partnerships. For example, Pakistan had existing training agreements with the United States Centers for Disease Control and Prevention (CDC) that enabled the rapid scale up of COVID-19 genomics work. Such efforts may be leveraged to enhance training opportunities in low- and middle-income countries (LMICs) across the genomic surveillance system.

- Quality assurance: Quality assurance efforts seen in both HIV and antimicrobial resistance (AMR) systems feature minimal quality standards across areas, tested through external quality assurance (EQA) programs. EQA programs are crucial but should be complemented by testing and appraising technologies through a centralized process, documenting changes to facilities or procedures and validating assays when these occur based on pre-defined criteria. Quality must be assessed throughout the process.

- Communities of practice and knowledge sharing: Communities of practice and knowledge sharing tap into people's motivation to feel a sense of belonging. By fostering these professional relationships there is an opportunity to include peer-to-peer support for career development. Links between institutions are crucial to supporting these efforts and to ensure that communities of practice and peer support are sustainable and maintained during peace time.

HIVResNet offers an example of successful genomic surveillance workforce strengthening and development. Established in 2005, HIVResNet aims to ensure laboratories can generate data to monitor HIV drug resistance. Key to its success has been the creation of a sense of identity found by having a network with a name, structure and clear terms of reference. Clear WHO standards and requirements for designated laboratories outline the minimum qualifications and trainings needed to support the work undertaken. Continuous training of the workforce has been key in moving beyond data generation and towards understanding disease epidemiology, including defined career pathways, standard training packages for different professions, on-the-job and in-service training, as well as building South-South collaborative training programs and global communities of practice.

Objective 3:
Enhance data utility for streamlined local to global public health decision-making and action

Moderator:

Dr Vasee Sathiyamoorthy, World Health Organization, Switzerland

Panelists:

Dr Maria van Kerkhove, World Health Organization, Switzerland; Dr Sebastian Maurer-Stroh, Agency for Science, Technology and Research, Singapore; Dr Leena Inamdar, Health Security Agency, United Kingdom of Great Britain and Northern Ireland.

Data utility contributes to real time public health decision-making by providing situational awareness and setting a pipeline of information for national, regional and global action. Data utility relies on sharing sequences on platforms. Key to success of such platforms is trust in the system, rights of those who submit the data, a clear data access agreement and value added by access to analysis tools shared by collaborators worldwide.

There are several key challenges to data utility including sharing of metadata, data linkages, workforce development and data ownership. A key challenge learned from experience with the United Kingdom's New Variant Assessment Platform (NVAP) is that while countries may have developed improved laboratory capacity, the capacity to translate and use the data for decision-making has not necessarily matched laboratory progress. To harness existing systems, linkages between sequencing, epidemiological and clinical data must be strengthened while addressing concerns for privacy. New technologies can support federated data analysis across systems and can help to address current challenges while still protecting the rights of data submitters. Countries should be applauded for sharing data and reporting critical information, and this should be safeguarded in future.

Genomic surveillance relies on an integrated system of appropriate sampling, specimen sharing, methods, algorithms, analysis tools and data sharing to identify pathogens. To achieve this value chain, it requires nurturing and strengthening of local capacities across both human and animal sectors. Time and effort must be invested globally in bringing together networks, systems, communities of practice and ensuring cross-pollination to ensure that stakeholders are committed to common protocols and agreements. Enhancing trust in existing and emergent data sharing platforms requires more open sharing of information, sharing of experiences, and the political will to make this happen.

Objective 4:
Maximize connectivity for timely value add in the broader surveillance architecture

Moderator:

Dr Dhamari Naidoo, South East Asia Regional Office of the World Health Organization, India

Panelists:

Dr Natalya Kolosova, State Research Center of Virology and Biotechnology VECTOR, Russian Federation; Dr Senjuti Saha, Child Health Foundation, Bangladesh; Dr Gregory Armstrong, Centers for Disease Control and Prevention, United States of America.

Genomic sequencing must be complementary and connected to epidemiological and clinical work. Importantly, genomic sequencing efforts must remain focused on activities with public health impact with clear objectives and how it will lead to actionable data. Comprehensive and interconnected systems must be built with the idea that genomics will be a core part of infectious disease public health practice in the future.

The United States CDC offers examples of achieving data linkages at different levels. At the national level, sequencing can characterize variants that have important epidemiological characteristics, or that have implications on effectiveness of vaccines, therapeutics and diagnostics. At the local level it can be used for more granular epidemiological monitoring, guiding outbreak investigations and other applied public health functions. Existing or nascent genomic capacity that has been scaled up in response to COVID-19 should maintain linkages to the traditional surveillance systems, as seen for example in Bangladesh. Moving forward, when pathogens are detected through traditional clinical surveillance, they can be sequenced to address local problems based on local needs, allowing for targeted interventions. Key considerations to maximize connectivity learned at the State Research Center of Virology and Biotechnology (VECTOR), Russian Federation, include collaboration with One Health partners; timeliness to ensure outbreaks and emerging pathogens are identified; availability of tolls to all partners, government support in establishing collaborations, building infrastructure and ensuring supplies; and support of the Global Influenza Surveillance and Response System.

Objective 5:
Maintain a readiness posture for emergencies

Moderator:

Dr Georgina Murphy, Bill and Melinda Gates Foundation, United States of America

Panelists:

Dr Filip Claes, Food and Agriculture Organization, Italy; Dr Sofonias Tessema, Africa Centres for Disease Control and Prevention, Ethiopia; Professor Linfa Wang, Duke Global Health Institute, Singapore; Dr Marilda Siqueira, National Influenza Centre Fiocruz, Brazil.

Maintaining a readiness posture requires capacity building across genomic sequencing networks. Recent efforts include partnerships such as through the Africa Pathogen Genomics Institute. A readiness posture can be further strengthened by building infrastructure in an innovative and sustainable manner through collaboration between governments, philanthropic organizations, and other stakeholders. Experience from Singapore underscores the importance of multidisciplinary teams and integrated preparedness programs during peace time as part of readiness. Supporting such an approach requires scaling up infrastructure and the workforce, as well as developing legal and diplomatic frameworks for efficient collaboration during emergencies. Lessons learned from Brazil indicate that readiness requires ongoing collaborative relationship with national ministries of health and regional health organizations to link across stakeholders. Additionally, sustainable financial support is crucial to ensure the adequate infrastructure and training necessary to maintain a decentralized system and expand it to other disease areas. The animal health sector perspective is key to maintaining a readiness posture. There is a need to improve and better integrate surveillance, diagnostics, interventions and infrastructure to prevent and detect spill over events, requiring sustainable investment in One Health and the veterinary workforce, as well as efforts to better engage with policymakers.

Closing remarks

Dr Mike Ryan, Executive Director, Health Emergencies Programme, World Health Organization

Dr Mike Ryan provided closing remarks and emphasized the importance of the Global Strategy in looking beyond pure genomic sequencing. The Global Strategy highlights the need to strengthen the elements of genomic surveillance that give meaning to the information generated, including strengthening the meta data and linking data to practice and decision-making. Importantly, surveillance must be built from the bottom up and develop local solutions that connect to a global infrastructure, which is built on the sharing of resources, tools, data and insights, in a spirit of equity. The Omicron variant of SARS-CoV-2 has again highlighted the large gaps in capacity, capability and resources for genomic surveillance, caused by inequitable distribution of resources. If surveillance is to work, it must be participatory and equitable.

Genomic surveillance must become mainstreamed into public health infrastructure and processes. We now have the collective opportunity to broaden our surveillance tool kit and meet the needs of countries and communities.

Conclusions and next steps

There is urgent need for continuous surveillance, rapid identification and real-time tracking of pathogens with pandemic and epidemic potential. While significant gains have been throughout the COVID-19 response, there continues to be persistent global inequities in genomic surveillance. A pathogen-agnostic Global Strategy is an important way forward to address the many challenges facing genomic surveillance. Importantly, efforts must be made to link genomic surveillance with clinical, epidemiological, environmental and other data.

There have been recent advancements towards these goals. In addition to the consultation described here, there has also been a detailed review of feedback from the public consultation on the Global Strategy. The Global Strategy itself was finalized and launched in March 2022[1]. In the coming months, the implementation plan will be developed in line with the five key objectives.

Declaration of interests

Declarations of interests were collected from all external panel members and assessed for any conflicts of interest. There were no significant conflicts of interest.

Funder

The meeting was funded by the World Health Organization.

1 Global genomic surveillance strategy for pathogens with pandemic and epidemic potential, 2022–2032 https://www.who.int/publications/i/item/9789240046979

Annexes

Annex I: Meeting agenda

Wednesday 08 December 2021		
Time (CET)	**Sessions**	**Speaker**
13:00-13:10	Welcome and opening remarks	Sylvie Briand
13:10-13:30	Setting the scene	Gina Samaan
13:30-14:00	Objective 1: Improve access to tools for better geographic representation Panel discussion	Moderator: Anurag Agrawal Panel members: William Ampofo, Meera Chand, Kay van der Horst
14:00-14:30	Objective 2: Strengthen the workforce to deliver at speed, scale and quality Panel discussion	Moderator: Sébastien Cognat Panel members: Silvia Bertagnolio, Salman Muhammed, Neil Squires
14:30-14:45	**Break**	
14:45-15:15	Objective 3: Enhance data utility for streamlined local to global public health decision-making and action Panel discussion	Moderator: Vasee Sathiyamoorthy Panel members: Maria van Kerkhove, Sebastian Maurer-Stroh, Leena Inamdar
15:15-15:45	Objective 4: Maximize connectivity for timely value add in the broader surveillance architecture Panel discussion	Moderator: Dhamari Naidoo Panel members: Natalya Kolosova, Senjuti Saha, Gregory Armstrong
15:45-16:15	Objective 5: Maintain a readiness posture for emergencies Panel discussion	Moderator: Georgina Murphy Panel members: Filip Claes, Sofonias Tessema, Linfa Wang, Marilda Siqueira
16:15-16:30	Summary and closing remarks	Mike Ryan

Annex II: Consultation participants

Panel participants included global experts and leaders from the field of genomic surveillance including countries, philanthropies and academia, as well as WHO.

The consultation was attended by 853 participants from 117 countries, territories and areas, including 32 in the WHO African Region, 17 in the Region of the Americas, 8 in the South-East Asia Region, 34 in the European Region, 13 in the Eastern Mediterranean Region and 13 in the Western Pacific Region. The participants included representatives from national health authorities, academia, donors and civil society organizations.

Annex III: Consultation participant feedback

Virtual consultation participants were encouraged to provide real-time feedback on the Global Strategy objectives using the Slido polling platform. Between 13 and 35 free-text answers were received for each question. Table 1 offers an overview of questions and a summary of responses.

Table 1. Summary of consultation participation questions and feedback.

1. Which indicators do you think could be helpful to measure the success of the strategy implementation?

Participants indicated that it could be helpful to measure the success of the strategy implementation. Most answers related to:

- The proportion of samples sequenced and/or the number of sequences shared
- The timeliness of data sharing.

Additional considerations included:

- Quality aspects
- Geographic representativeness of genomic surveillance
- Number of staff trained

2. Without optimized, simple, interoperable and affordable tools, genomic surveillance architecture will continue to be scaled in an inequitable and unsustainable manner. What are the main challenges you foresee in your context?

The three most frequently reported challenges were:

- Lack of sustainable funding
- Limited data sharing
- Cost of reagents

3. In your country's context, where do you see opportunities to ensure sustainability of the newly created genomic surveillance capacity?

Participants reported several opportunities and challenges including:

- COVID-19 variants have ensured funding in the short term, but more must be done to ensure ongoing government financial support.
- Investments should be made available for use by other programmes including antimicrobial resistance and One Health.
- Investments should be used to train and build future cohorts, a multi-sectoral workforce for genomic surveillance, including ensuring that graduate programs have standardized curriculum on genomics and public health curriculums include genomic epidemiology.
- Retaining and investing in the existing genomics workforce. This extends to ensuring that reagents are made available continuously so capacity creation is not a 'one time event' in response to crisis but the workforce can continue to enhance their skills during peace time.
- Strategic partnerships between health departments or ministries of health and other public health bodies and research universities to support 'peak capacity' (both in terms of laboratory capacity and workforce capacity) during epidemic waves and to facilitate task shifting for rapid scaling of complex diagnostic capacity complemented by high level expertise.
- Genomic surveillance capacities should leverage on existing structures and increasing efforts in determining those most-similar protocols for different pathogens using the same sequencing technology. It is cost prohibitive to maintain a parallel structure independently of existing networks already in place (e.g., existing structures for HIV or influenza).

4. What do you see currently as the main limiting factors towards strengthening the technical competencies of the workforce in your country's context?

The main limiting factors noted towards strengthening the technical competencies of the workforce included:

- Sustainable funding
- Resource constraints
- Leadership
- Time
- Staff motivation and retention

5. In your country, how do you see quality assurance being adapted and rolled out for genomics?

Participants suggested the following opportunities:

- Proficiency testing schemes for both wet lab and bioinformatics
- Participation in external supporting programmes such as tool sharing and certification programmes
- In surge drills
- Creation of specialized national quality assurance units

6. What do you see as the main challenges towards data sharing in your context?

Six main challenges impacting data sharing were reported:

- Recognition
- Trust
- Privacy, security, legal and regulatory concerns
- Stigmatization, penalties, or other negative impacts from sharing data
- Availability of metadata and interoperability of networks and data tools

7. Which measures or mechanisms do you think could be implemented to support timely data sharing?

Participants proposed the following:

- Platforms and tools such as simplified pipelines and automation
- Workforce development
- Harmonized protocols
- Recognition or incentives for data sharing

8. In your country, which programmes or resources have been leveraged to enhance genomic surveillance capacity?

Several types of resources have been leveraged to enhance genomic surveillance capacity including:

- Reference and sub-national laboratories
- Academic institutions
- Funding agencies

9. In your context, what do you see as the main challenges to tackle to enhance multisectoral collaboration and coordination towards a successful genomic surveillance program?

Participants reported several challenges including:

- The need to identify a national body responsible for national public health security is necessary to have multisectoral collaboration and coordination put into action
- Biosecurity
- Data sharing and access to metadata
- Building trust
- Current legislation
- Sustainable funding

10. Which strategic actions do you think could be prioritized in your context to ensure capacity for emergency readiness?

Participants suggested strategic actions that could be prioritized to ensure capacity for emergency readiness such as:

- Structural use in peacetime to maintain a readiness posture for emergencies
- Collaboration between national surveillance laboratories and academic research groups
- Decentralizing surveillance
- Infrastructure capacitation (including supply chain)
- Improving bioinformatic capacity
- Developing the workforce
- Linkage with other disease surveillance programs and networks
- Investment in baseline capacity and equitable real-time sharing of pathogen sequencing data (metagenomic, unbiased and targeted)
- Addressing benefit sharing and issues of ownership and attribution up front
- Continuous work on emergency simulations, surge exercises and joint projects, including having an 'open failure culture' and considering corrective actions that could be taken on past emergencies
- Effective communication and information dissemination between key stakeholders to ensure clarity on roles and procedures in emergency situations. This relied on 'buy-in' from the highest levels including policy makers to ensure adequate and sustainable resource allocation.

For additional information, please contact:

Department of Epidemic and Pandemic
Preparedness and Prevention
World Health Organization
20, avenue Appia
1211 Geneva 27
Switzerland

Email: pathogengenomics@who.int
Website: www.who.int/initiatives/
genomic-surveillance-strategy

World Health Organization

9789240057401