
**Project on “Strengthening National, Sub-Regional, and International
Capacities to Prepare for and Respond to the Deliberate Use of
Biological Weapons”**

**Report of the First Thematic Seminar
“The Importance of Disease Monitoring and Alert Mechanisms:
Lessons for the Biological Weapons Convention”**

**Geneva Centre for Security Policy
Geneva, Switzerland, 20 November 2018**

A. Background

1. Although of natural origin, the 2014-2015 Ebola Virus Disease outbreak in West Africa was widely recognized as demonstrating the lack of preparedness in the global health and humanitarian system to respond to larger scale disease outbreaks. It also sent an alarming message about the potentially dramatic consequences that could be caused by the deliberate release of biological agents or toxins by state or non-state actors. Biological weapons can be used not only to attack humans, but also livestock and crops.
2. At the Eighth Review Conference of the Biological Weapons Convention (BWC), its States Parties noted that “there are differences among States Parties in terms of their level of development, national capabilities and resources, and that these differences affect national and international capacity to respond effectively to an alleged use of a biological or toxin weapon. The Conference encourages States Parties, in a position to do so, to assist other States Parties, upon request, to build relevant capacity.”¹
3. The Government of Japan has generously provided a voluntary contribution to the United Nations Office for Disarmament Affairs (UNODA) for implementation of a project on “Strengthening National, Sub-Regional, and International Capacities to Prepare for and Respond to Deliberate Use of Biological Weapons”. The project, which is led by the BWC Implementation Support Unit (ISU), was initiated in autumn 2018 and will run until the end of the first quarter of 2020.
4. Noting the importance of having timely information about bio-incidents of potential concern, the project seeks to enhance capacity-building efforts at the national and sub-regional levels as well as contribute to strengthening collaboration and coordination among relevant international organizations at the health-security interface.
5. Disease surveillance mechanisms are crucial for detecting the outbreak of diseases, whether they stem from natural sources or have been deliberately caused. BWC States Parties have recognized the importance of disease surveillance in the context of the Convention and addressed the topic in previous meetings, such as the Meetings of Experts and the Meetings of States Parties in 2004, 2009, and 2010. Furthermore, States Parties recognized that ‘strengthening and broadening national and international surveillance, detection, diagnosis and combating of infectious disease may support the object and purpose of the Convention’² and that ‘scientific and technological developments have the potential to significantly improve disease surveillance and response’.³

¹ Final Document of the Eighth BWC Review Conference (BWC/CONF.VIII/4), para. 43.

² Report of the 2004 Meeting of States Parties (BWC/MSP/2004/3), para 18b.

³ Report of the 2004 Meeting of States Parties (BWC/MSP/2004/3), para 18d.

6. In view of the high importance of this topic, the issue was selected as the main theme of the seminar on “The Importance of Disease Monitoring and Alert Mechanisms: Lessons for the Biological Weapons Convention”, which was hosted by the Geneva Centre for Security Policy (GCSP) on 20 November 2018.
7. During the seminar, a wide range of experts shared insights from national, regional, and international perspectives. Additionally, scientists and NGO representatives provided participants with their views and contributed to the discussions. The presentations and ensuing discussions highlighted the value of disease-monitoring and alert mechanisms and the relevance of the information generated by these tools in the context of the BWC.

B. Summary of the Proceedings and of the Presentations

Opening Remarks and Introduction

8. Mr Daniel Feakes (Chief of the ISU) opened the proceedings and welcomed all the participants. This was followed by a statement delivered by Ambassador Nobushige Takamizawa (Permanent Representative of Japan to the Conference on Disarmament). Mr Marc Finaud (Senior Programme Advisor, GCSP) joined the previous speakers and welcomed participants on behalf of GCSP.
9. Dr Alex Lampalzer (Deputy Chief, ISU) delivered the seminar’s introductory presentation. At the beginning he provided an overview of the planned implementation of the two projects funded through voluntary contributions by Japan. Besides “Strengthening National, Sub-Regional, and International Capacities to Prepare for and Respond to the Deliberate Use of Biological Weapons” through the conduct of four two-day workshops in Asia, the voluntary contribution will also support the conduct of a training workshop in 2019 for BWC National Contact Points from ASEAN Member States on domestic implementation aspects of the Convention. Furthermore, Dr Lampalzer outlined the main objective of the seminar, namely to share information and examine different disease surveillance mechanisms and tools that have been established at the national, regional and international level. In addition, the seminar also had the purpose to identify respective lessons in the context of the BWC and thereby contribute to States Parties’ deliberations during the 2018-2020 intersessional programme.

Session I: Disease Surveillance Mechanisms - An Introduction

10. Professor Antoine Flahault and Ms Nefti-Eboni Bempong from the Institute of Global Health of the University of Geneva launched the first session of the seminar with their presentation on “The Evolution of Infectious Disease Surveillance”. At the outset, a definition of disease surveillance was provided, namely ‘the ongoing systematic collection, analysis and interpretation of outcome specific data for use in planning, implementing and evaluating public health policies and practices’. Furthermore, the presentation defined the principles and components relevant to the disease-surveillance process; types of existing mechanisms for disease

surveillance; and the history of disease-monitoring and infectious-disease classifications. In their presentation, the speakers noted a shift from indicator-based surveillance to unstructured event-based reports. The speakers concluded their presentation by providing an overview of the most recent utilization of technological tools and methods related to disease monitoring at the local, regional and international levels. In this context, they highlighted the potential of Big Data analysis as well as noted that the combination of data science with life science and social science can fundamentally change the way predications are made.

Session II: Disease Surveillance Mechanisms at the National Level

11. Dr Keishi Abe, (health security expert from Japan) was the first speaker of this segment, and informed participants about Japan's public health mechanisms in response to outbreaks of infectious diseases. Dr Abe explained the spectrum of threats in terms of biosecurity and then continued by describing the legal framework that governs Japan's responses to bio-risks and public health emergencies. He noted that there are various laws in place for biorisk management and public health emergencies. He then provided information about the various national agencies and related policy-making organs that are involved with public health emergencies. The presentation, which included relevant bio-statistics, also covered preventive measures and response mechanisms that exist at the national level. During his talk, Dr Abe also referred to Japan's pathogen-control systems; its stockpiling of medical countermeasures; its regular training programmes; its systems for sharing information about existing preventive measures; and its medical infrastructure capabilities for responding to outbreaks. The presentation provided an overall picture as to how Japan has planned and prepared itself to respond to infectious disease outbreaks.
12. Dr Aleksandr Semenov (Deputy Director of Pasteur Institute in St Petersburg, Russian Federation) complemented the series of presentations with a national focus and informed about "Rospotrebnadzor's Mobile Biomedical units and Their Capabilities in Disease Surveillance and Response Operations". He began with an overview of the Russian disease surveillance system; its legal framework; its structure and components; and the role that the Russian anti-plague Rospotrebnadzor Service plays as a specialized healthcare network of institutes for state sanitary and epidemiological surveillance of dangerous infections. The Russian anti-plague service consists of five scientific research institutions and 15 regional anti-plague stations, which cover the territory of the Russian Federation. This service plays a key role in monitoring and prevention, detection and alert in case of deliberate use of bio-threat agents. The remainder of Dr Semenov's presentation was focused on Rospotrebnadzor's mobile biomedical units and their capabilities. The biomedical units are highly mobile, based on a modular structure and can operate autonomously in various climatic zones. These units, which can fulfil a range of tasks from epidemiological investigations, sample

collection and analysis up to implementing sanitary/quarantine measures, are regularly deployed at the domestic level to ensure biological safety in case of natural disasters, armed conflicts and during mass gatherings. Furthermore, the Russian Federation also deployed biomedical units to deliver assistance during the Ebola Virus Outbreak in 2014-2015 in Western Africa. Dr Semenov also noted that the concept of biomedical units has been introduced by the Russian Federation in BWC-related discussions proposal to improve the implementation of the Convention in several areas.⁴

Session III: Disease Surveillance Mechanisms at the Regional and International Level

13. Dr Lee Myers (Manager, Emergency Management Centre for Animal Health, Food and Agriculture Organization of the UN (FAO)) delivered a presentation about FAO's Emergency Management Centre for Animal Health. She informed about FAO's Animal Health mandate, which is to 'prevent, contain and control the world's most serious livestock diseases at their source, while also surveying for newly emerging pathogens in a changing environment'. Dr Myers then defined and described health surveillance systems, and then continued by providing data related to the most common zoonotic diseases that have occurred in recent years. Furthermore, she introduced the EMPRES-I platform, which serves as a Global Animal Disease Information System and informs about disease distribution and current threats at the national, regional and global levels. Additionally, Dr Myers briefed about the Surveillance Evaluation Tool (SET) that allows for the comprehensive and comparative assessment of a country's surveillance system for animal diseases, including zoonoses. The presentation continued with a report on the activities of the newly re-branded and modernized FAO Emergency Management Centre-Animal Health (EMC-AH). Dr Myers also informed the audience of a range of capacity-building activities and workshops that are being conducted by the EMC-AH. In addition, information on response missions, the introduction of novel techniques and the coordination of responses to animal health incidents were provided. She concluded her presentation by referring to the importance of the strategic alliance between the EMC-AH and the World Organization for Animal Health (OIE) in their mandate to prepare for and respond to animal disease outbreaks.
14. Dr Christine Uhlenhaut (Chargée de mission for Biological Threat Reduction at the World Organisation for Animal Health (OIE)), first presented the history of the OIE including its evolution and then covered the list of notifiable animal disease under OIE's mandate. During her talk, she provided an overview of the World Animal Health Information System (WAHIS). Dr Uhlenhaut then described how the

⁴ Russian Federation: Strengthening the Biological Weapons Convention Operationalising mobile biomedical units to deliver protection against biological weapons, investigate their alleged use, and to suppress epidemics of various etiology (BWC/CONF.VIII/PC/WP.1/Rev.2); and Addendum (BWC/CONF.VIII/PC/WP.1/Rev.2/Add.1).

number of notifiable diseases had expanded, from seven diseases in the 1920s to 117 at the present time. A large segment of her presentation was dedicated to the WAHIS. WAHIS is a platform which is used for the collection, submission, and access of all data provided by OIE Member Countries, and provides a disease-reporting format for the clear and concise exchange of information; national focal points can use this format to submit their information to the OIE. WAHIS also actively looks for event-based surveillance and searches for rumours of outbreaks and either confirms or excludes them. Dr Uhlenhaut concluded her presentation by giving an overview of OIE's support activities, which include technical assistance and capacity building; rumour tracking; updating the digital mapping of outbreaks; data analysis; and networking and information-sharing among Member States.

15. Dr Massimo Ciotti (Deputy Head of Unit, Public Health Capacity and Communication, European Centre for Disease Prevention and Control (ECDC)) began his presentation by giving a brief history of pandemics and by providing an overview of major emerging and re-emerging infectious disease outbreaks, epidemics, and pandemics between 2002 and 2015. He then continued by providing information about the primary drivers for past disease emergence such as land use changes, agricultural industry changes, international travel and commerce. He then described disease outbreak trends in the 21st century and noted the impact of globalisation of travel and trade, climate change, antimicrobial resistance, vaccine hesitancy and refusal, and intentional use of bio-agents as important factors that have an impact on these trends. After this introduction, Dr Ciotti described the pillars of public health in the European Union (EU) and summarized EU legislation on communicable diseases. He also provided the audience with an overview of the ECDC's mission, which is to 'identify, assess and communicate current and emerging threats to human health from communicable diseases'. Dr Ciotti explained that the ECDC is a decentralized EU Agency, which was established in 2005 and currently has a budget of EUR 58 million and 280 staff members. Dr Ciotti concluded by informing about the various epidemic intelligence activities and outputs produced by the ECDC and also shared information about Emergency Operations Centre Response activities to major disease outbreaks in recent years.
16. Dr Maurizio Barbeschi (Manager, Health and Security Interface, Health Emergencies Programme World Health Organization (WHO)) delivered a presentation regarding the WHO's alert and response mechanisms for events involving the deliberate use of toxins and biological/disease agents. Upon briefly recalling the WHO's strategic priorities, he informed about the two main components of the International Health Regulations (IHR), which serve the purpose of (a) internationally coordinated monitoring; information-sharing and response; and (b) strengthening of WHO's core public health capacities to detect, assess, respond, and encourage recovery from disease in every single country, including at points of entry, regardless whether the disease stemmed from natural causes or was deliberate. Dr Barbeschi also noted at the outset that deliberate use

of biological agents represents a challenge to both the public health and the security sector. Furthermore, he stressed that the WHO is not in any way empowered to monitor or to verify compliance with international disarmament or non-proliferation agreements. His presentation then continued with an explanation of the WHO's Epidemic Intelligence from Open Sources (EIOS) initiative. EIOS has the objective of becoming the global authority for early warning for evidence-based action to improve global health, to prevent illness, and to save lives. He concluded his presentation by outlining EIOS's principles and noting the existing multi-sectoral collaboration among relevant international organizations at the informal level to share information on events of potential deliberate nature.

17. Mr Orlando Sosa (Programme Specialist, International Plant Protection Convention (IPPC) Secretariat) started his presentation by providing an overview of the IPPC, its mandate, and its system of governance, as well as the framework by which it engages with its stakeholders. IPPC has 183 Contracting Parties and its Secretariat is hosted by the FAO in Rome. He then outlined the IPPC's disease surveillance system, related international standards, and its provisions to implement quarantines and pest control. In his presentation, Mr Sosa outlined surveillance and reporting related responsibilities of the IPPC Secretariat versus those of the Contracting Parties. In conclusion, he informed the audience of the challenges of pest control at both the national and the global levels.

Session IV: Other Mechanisms

18. Dr Marjorie Pollack (Deputy Editor ProMED-mail, International Society for Infectious Diseases) briefed the audience about the history of infectious disease medicine; emerging infectious diseases; and types of disease surveillance, ranging from traditional (indicator-based) public health surveillance to informal (event-based) source surveillance ('biosurveillance'). In this context, she noted the various information sources for event-based surveillance, such as media reports, astute observers, official sources and the general public (through e.g. social media). She then proceeded by informing about the emergence of innovative disease surveillance initiatives dating back to 1994 when ProMED-mail was founded. Dr Pollack highlighted that ProMED-mail is based on a global electronic reporting system for outbreaks of emerging infectious diseases and toxins and is open to all sources. She also noted that ProMED-mail is truly global by having more than 86,000 subscribers in over 180 countries. The second part of her presentation covered the new initiative from the International Society of Infectious Diseases (ISID) called EpiCore. EpiCore is a network of health professionals who provide verification of suspected or rumoured disease outbreaks around the world. Dr Pollack then went on to explain EpiCore's operating principles. The last part of her presentation provided the audience with a list of intentional events which have been registered by ProMED-mail since 2001, many of them in fact poisoning cases.

19. Mrs Jihye Choi (Researcher, Graduate School of Public Health, Seoul National University, Republic of Korea) focused in her presentation on the findings from a scientific publication⁵ about web-based active disease surveillance systems. At the outset, she noted some of the concerns with respect to traditional passive (indicator-based) systems, such as potential delays between events and notifications, or poor information flow especially in remote areas. She then highlighted the research approach taken and informed about the eleven event-based surveillance systems that were part of her research. Besides explaining the strengths and challenges of web-based surveillance systems, she noted the importance of data as the main ingredient in disease surveillance and underlined essential related aspects such as the kind of raw data to be used, the importance of maximizing the use of various data sources as well as giving considering on how data from surveillance systems can be reused for alert purposes and further control of epidemics. She concluded her presentation by stating that web-based surveillance is a complementary aid to traditional surveillance systems, rather than an alternative mechanism.

C. Summary and Conclusions

20. Disease surveillance can be defined as a continuous process that involves the systematic detection, collation, analysis and interpretation of disease patterns including the timely dissemination of information to those who need to know, for combating infectious diseases and taking relevant action.
21. Discussions at the seminar clearly highlighted the benefits of strong disease surveillance capacities not only for helping to protect against natural disease outbreaks, but also against the use of biological and toxin weapons. As such, one of the most effective methods of preparedness against deliberate use scenarios is in fact the strengthening of public health surveillance systems for naturally and accidentally occurring diseases.
22. It was also noted that some States Parties continue to experience challenges in establishing and maintaining effective disease surveillance systems at the national level. As past international emergency response operations to major disease outbreaks have shown, investing in preventive measures, including strengthening of national public health systems, is far less costly than efforts to contain the spread of a disease outbreak and mitigate its consequences.
23. In the context of the above, speakers at the seminar underlined the importance of international cooperation and assistance, including building capacity in the area of early detection, identification and response. The seminar informed about different efforts that have been undertaken at the bilateral, regional and international levels with a view to strengthen domestic disease surveillance systems and preparedness measures.

⁵ Jihye Choi, Youngtae Cho, Eunyoung Shim and Hyekyung Woo: [Web-based infectious disease surveillance systems and public health perspectives: a systematic review](#). BMC Public Health Series, 2016.

24. While seminar participants acknowledged the difficulty of distinguishing between natural and deliberate outbreaks of infectious diseases, particularly during the early stages of an outbreak, effective and strong surveillance mechanisms including the availability of relevant background data can assist in distinguishing between the two.
25. While it was noted that the initial procedures for dealing with both deliberate and natural outbreaks of disease would essentially be the same it was also argued that a deliberately caused epidemics would fundamentally transform the context in which public health services must be delivered in order to ensure human safety and security.
26. The seminar also highlighted that besides traditional surveillance systems (indicator-based, focusing on confirmed diagnoses), also event-based mechanisms (focusing on signs and symptoms) have evolved over the last years. In view of the ever increasing amount of data available in the public domain, these 'syndromic' surveillance systems have great potential and allow much faster recognition of outbreaks than the traditional systems. At the same time, it was noted that these mechanisms cannot replace traditional surveillance mechanisms, but rather complement them.
27. Similarly, it was evident from the seminar proceedings that civil society and interested stakeholder groups have made valuable contributions in the area of disease surveillance and have augmented the efforts made by public health services. Accordingly, the use of informal or unofficial information sources can enhance the detection of diseases, irrespective whether they are of natural or deliberate origin.
28. Besides efforts at the national level, regional actors such as the European Union have also established their own comprehensive disease surveillance systems. Furthermore, intergovernmental organizations such as the World Health Organization, the Food and Agriculture Organization of the United Nations, the International Plant Protection Convention and the World Organization for Animal Health have put in place systems for surveillance, identification, reporting and response to disease outbreaks. Moreover, and recognizing the importance of the 'One Health' approach, joint initiatives and platforms have also been established to enhance information exchange and sharing regarding disease-related aspects among relevant organizations.
29. The seminar also showcased efforts being made by regional and international organizations to further improve existing mechanisms and systems, including by, *inter alia*, making use of open sources or promoting novel technologies to support data collection, analysis and forecasting.
30. In the course of the seminar it was noted that concerns regarding the deliberate use of disease traditionally focus on those affecting humans. At the same time, it was recognized that deliberate use scenarios targeting the agricultural sector are also a matter of significant concern. Noting the multi-sectoral connectivity, it was

highlighted that 75 percent of newly emerging diseases in humans are zoonotic and 70 percent of newly emerging diseases in animals come from wildlife.

31. Finally, it should be noted, that three additional one-day seminars will be held during the course of the project on selected topics pertaining to preparedness, response and assistance issues triggered by the deliberate use of biological weapons. It is an accepted fact that thematic seminars can contribute to the enhanced preparedness of the international community in relation to the deliberate use of disease.

Annex A

Seminar Programme

“The Importance of Disease Surveillance and Alert Mechanisms: Lessons for the BWC”

20 November 2018
Geneva Centre for Security Policy (GCSP)

| From | To | Topic | Presenter |
|---|-------|---|--|
| 8:30 | 9:00 | <i>Participants arrival</i> | |
| 9:00 | 9:15 | <i>Opening of the Seminar</i> | Mr Daniel Feakes <i>Chief, BWC Implementation Support Unit</i> H.E. Ambassador Nobushige Takamizawa <i>Permanent Representative of Japan to the Conference on Disarmament</i> Mr Marc Finaud <i>Senior Programme Advisor, GCSP</i> |
| 09:15 | 09:30 | <i>Presentation of the Project and Seminar Objectives</i> | Dr Alex Lampalzer <i>Deputy Chief, BWC Implementation Support Unit</i> |
| Session I – Disease Surveillance Mechanisms - an Introduction | | | |
| 09:30 | 10:00 | <i>The evolution of infectious disease surveillance</i> | Prof Antoine Flahault <i>Director of the Institute of Global Health, Faculty of Medicine, Université de Genève</i> Mrs Nefti- Eboni Bempong <i>Research Assistant, Institute of Global Health, Faculty of Medicine, Université de Genève</i> |
| Session II – Disease Surveillance Mechanisms at the National Level | | | |
| 10:00 | 11:10 | <i>Japan’s public health mechanism in response</i> | Dr. Keishi Abe <i>Health Security Expert, Japan</i> |



| From | To | Topic | Presenter |
|--|-------|--|---|
| | | <i>to infectious disease outbreaks</i> | |
| | | <i>Rospotrebnadzor's mobile biomedical units: capabilities and roles in disease surveillance and response operations</i> | Dr Alexander Semenov Deputy Director, Pasteur Institute, St Petersburg, Russian Federation |
| | | <i>Q&A Session and Discussion</i> | |
| 11:10 | 11:30 | Coffee-break | |
| Session III – Disease Surveillance Mechanisms at the Regional and International Level | | | |
| 11:30 | 13:00 | <i>FAO's engagement in animal disease detection and response</i> | Dr Lee Myers Manager, Emergency Management Centre for Animal Health, FAO |
| | | <i>OIE's World Animal Health Information System (WAHIS)</i> | Dr Christine Uhlenhaut Chargée de mission for Biological Threat Reduction at the World Organisation for Animal Health |
| | | <i>Surveillance of Infectious Diseases in Europe: the role of ECDC</i> | Dr Massimo Ciotti Deputy Head of Unit, Public Health Capacity and Communication, ECDC |
| | | <i>Q&A Session and Discussion</i> | |
| 13:00 | 14:00 | Lunch | |
| 14:00 | 15:00 | <i>WHO alert and response to deliberate events: key considerations</i> | Dr Maurizio Barbeschi Manager, Health and Security Interface, WHO Health Emergencies Programme |
| | | <i>The International Plant Protection Convention pest surveillance and pest reporting framework</i> | Mr Orlando Sosa Programme Specialist, IPPC Secretariat |



| From | To | Topic | Presenter |
|---|-------|---|--|
| | | Q&A Session and Discussion | |
| Session IV – Other Mechanisms | | | |
| 15:00 | 16:00 | Detecting emerging infectious diseases - the ProMED Perspective | Dr Marjorie Pollack Deputy Editor ProMED-mail International Society for Infectious Diseases |
| | | Web-based infectious disease surveillance systems and public health perspectives: a systematic review | Mrs Jihye Choi Researcher, Graduate School of Public Health, Seoul National University, Republic of Korea |
| | | Q&A Session and Discussion | |
| 16:00 | 16:20 | Coffee break | |
| Session V – Drawing lessons for the BWC | | | |
| 16:20 | 17:00 | Discussion | |
| 17:00 | 17:15 | Wrap up of the discussions and concluding remarks | Mr Daniel Feakes Chief, BWC Implementation Support Unit |

Annex B

Speaker Biographies

“The importance of Disease Surveillance and Alert Mechanisms: Lessons for the BWC”

20 November 2018
Geneva Centre for Security Policy (GCSP)

Professor Antoine Flahault

Professor of public health at Faculty of Medicine, University of Geneva; Founding director of the Institute of Global Health

Professor Antoine Flahault is MD, PhD in biomathematics; he is professor of public health at Faculty of Medicine, University of Geneva where he is the founding director of the Institute of Global Health, at Campus Biotech (since January 2014). He has been appointed founding director of the French School of Public Health (EHESP, Rennes, 2007-2012), co-director of Centre Virchow-Villermé for Public Health Paris-Berlin (Université Descartes, Sorbonne Paris Cité), co-director of the European Academic Global Health Alliance (EAGHA), president of the Agency for Public Health Education Accreditation (APHEA). He has conducted his research in mathematical modelling of communicable diseases; has chaired the WHO collaborative center for electronic disease surveillance; has coordinated research on Chikungunya in Indian Ocean and in French Caribbean Islands (Inserm Prize, 2006; was scientific curator of a large exhibition Epidemik, la Cité des Sciences et de l'Industrie, Paris, Rio and Sao Paulo, 2009-2013). He was elected as corresponding member at Académie Nationale de Médecine (Paris). He has chaired the World Health Summit in 2016, the M8 Alliance, and the Geneva Health Forum in 2016 and 2018. Professor Antoine Flahault has 274 scientific publication referenced in Medline.

Ms Nefti-Eboni Bempong

Scientific Assistant at the Institute of Global Health, Faculty of Medicine, University of Geneva

Ms Nefti-Eboni has been a Scientific Assistant at the Institute of Global Health since April 2017, having graduated from her MPH program at Lund University. Her current work involves supporting and coordinating activities related to the NCCR: Precision Epidemic Forecasting, and conducting associated research. She has previous experience conducting research at the Centre Virchow-Villermé for Public Health Paris - Berlin, and was also involved in a clinical study at the University of Chicago Medicine, supported by her BSc in Biomedical Science.

Dr Keishi Abe

Health Security Expert, Japan

Dr Keishi Abe is a health security expert in the Ministry of Health, Labour and Welfare of Japan and an Affiliate of Georgetown University Center for Global Health Science and

Security. He has been engaged in policies against infectious disease outbreaks (H7N9 Avian Flu, Ebola outbreak in West Africa, MERS outbreak in Korea, etc.) and diplomacy in global health security with the UN and WHO. He is a Doctor in Medicine from Hokkaido University and Master of Science in Foreign Service from Georgetown University.

Dr Aleksandr Semenov

Deputy Director of Pasteur Institute in St Petersburg, Russian Federation; Professor of clinical immunology at St Petersburg State Medical University

Dr Alexander Semenov is a biochemist and virologist who holds a PhD in parasitology and a doctorate degree in clinical immunology and clinical laboratory diagnostics. Currently, he is the Deputy Director of Pasteur Institute in St Petersburg, Russian Federation and a professor of clinical immunology at St Petersburg State Medical University. His medical research includes studies in drug resistance mechanisms in HIV and viral hepatitis as well as clinical laboratory diagnostics of HIV and infectious diseases.

Dr Lee Myers

Manager, a.i. Emergency Management Centre for Animal Health (EMC-AH), Food and Agriculture Organization (FAO) of the United Nations

Dr Lee Myers is a U.S. Department of Agriculture (USDA) veterinarian assigned to the Food and Agriculture Organization (FAO) of the United Nations in Rome, Italy where she serves as Manager, a.i., of the Emergency Management Centre for Animal Health (EMC-AH). Under Dr Myers' leadership the EMC-AH published a five-year Strategic Action Plan expanding its scope to embrace all stages of emergency management, including support for FAO Level 3 emergencies. She leads the EMC-AH core functions of emergency preparedness and response, incident coordination, and collaboration and resource mobilization, and is the focal point for collaboration with the key partners, the World Organisation for Animal Health (OIE) and the World Health Organization. Dr Myers oversees the rapid deployment of experts to assist countries with their preparedness and response efforts to threats or incursions of high impact transboundary animal diseases, emerging diseases and zoonoses. She strongly supports the FAO and OIE Rinderpest Secretariat in their biothreat reduction efforts as lead author of the inaugural Global Rinderpest Action Plan published in November 2018.

Prior to joining the FAO, Dr Myers served as the state-federal liaison for the USDA National Veterinary Stockpile supporting States to develop supply chain capacity for animal vaccines and personal protective equipment, and conducting training and exercises. She also spearheaded the USDA Veterinary Services National Training and Exercise Program that delivers the multi-year training and exercise strategy and plan. Prior to joining USDA, Dr Myers served as the Georgia State Veterinarian and Assistant Commissioner of Agriculture for thirteen years where she represented the agriculture sector on the State Homeland Security Task Force. She is a past president of the United States Animal Health Association. Dr Myers holds a Master in Public Health from Emory University and maintains board certification in the American College of Veterinary Preventive Medicine. She is certified as a Master Exercise Practitioner from the U.S.

Federal Emergency Management Agency and focuses her efforts on animal health emergency management and global health security.

Dr Christine Uhlenhaut

Chargée de Mission for Biological Threat Reduction at the World Organisation for Animal Health (OIE)

Dr Christine Uhlenhaut is the Chargée de mission for Biological Threat Reduction at the World Organisation for Animal Health (OIE). Prior to joining the OIE, she was the Deputy Head of Strengthening Global Biosecurity at the Federal German Public Health Institute where she was responsible for developing the German Partnership Program for Biological and Health Security on behalf of the German Federal Foreign Office. Among other appointments, she worked for the US Food and Drug Administration on Vaccine Safety. She obtained her Ph.D. from the Free University of Berlin and the department for highly pathogenic viruses at the Robert Koch Institute. She is a trained inspector for biological weapons of mass destruction and worked in this capacity for the United Nations Monitoring Verification and Inspection Commission in Iraq.

Dr Massimo Ciotti

Deputy Head of Unit Public Health Capacity and Communication / Head of Section Country Preparedness Support, European Centre for Disease Prevention and Control

Dr Massimo Ciotti is a Medical doctor, specialised in public health and in medical statistics. Since 1988 he has been working in international health, mainly in the communicable disease field, in developing and developed countries. During his career, he contributed to the work of different WHO programmes as a medical officer of the organisation until March 2006. He was seconded by WHO to the European Commission just before the SARS outbreak (November 2002) contributing to the coordination of SARS surveillance and control in Europe as well as in the efforts for the influenza pandemic preparedness. He then moved to ECDC (European Centre for Disease Prevention and Control) in 2006 to take the position of Deputy Head of the Preparedness and Response unit. His main area of responsibilities in ECDC has been in crisis management planning and operations, epidemic intelligence, strategic development in European public health emergency preparedness and response to communicable disease, including pandemic influenza, deliberate outbreaks, Ebola, MERS-CoV, Zika. Since May 2011 he is the Deputy Head of the Public Health Capacity and Communication Unit, and from July 2013 also head of the Section of Preparedness Country Support. He has worked in and travelled to more than 80 countries worldwide.

Dr Maurizio Barbeschi

Scientist, World Health Organisation

Dr Maurizio Barbeschi is a scientist, and manages the Health Security Interface at the World Health Organization's headquarters in Geneva.

Dr Oliver Morgan

Director of the Health Emergency Information and Risk Assessment Department in the WHO Health Emergencies Program

From 2007 through 2016, Dr. Morgan worked for the US Centers for Disease Control and Prevention during which time he held critical leadership positions in the Ebola response between November 2014 and February 2016 (CDC Atlanta Ebola Response Incident Manager and CDC Country Director in Sierra Leone). From March 2010 to October 2014, Dr. Morgan was the CDC Country Director in the Dominican Republic. Dr. Morgan was an Epidemic Intelligence Service Officer at CDC from 2007 to 2009 with the International Emerging Infections Program, during which time he conducted projects in Thailand, Bangladesh, Kenya, Uganda, and Guatemala. Before joining CDC, Dr. Morgan worked for the UK Health Protection Agency, leading epidemiological investigations of outbreaks (enteric, vaccine preventable, hospital acquired, zoonotic, respiratory, and sexually acquired infections), chemical and radiation exposure incidents, terrorist bombings in London, natural disasters, and humanitarian civil conflicts. Dr. Morgan has also worked as a consultant to WHO/PAHO in several countries. Dr. Morgan's academic achievements include a doctorate in epidemiology from Imperial College London and extensive publication in peer-reviewed journals and reference books.

Mr Orlando Sosa

Programme Specialist, International Plant Protection Convention Secretariat

Mr Sosa was born in Belize in 1972. He studied in the USA in life sciences as a Biology/Chemistry major then professionally as an Entomologist and Crop Protection specialist in the UK. He worked in Belize from 1995-2003 where he spearheaded the modernization of the National Plant Protection Organization in Belize and, with a small team, established the first model Agricultural Health Agency now called the Belize Agricultural Health Authority. In 2003, Orlando was recruited to work with the FAO/IPPC. Orlando's focus has been to ensure the strengthening of institutional capacity of Contracting Party NPPOs through provision of technical assistance. He spearheaded initiatives such as the development and application of the phytosanitary capacity and evaluation tool (PCE), the development of the IPPC's first Capacity development strategy, the gradual evolution of a subsidiary body focused on capacity development and the provision of capacity development tools and resources. Orlando was instrumental in making the CPM's vision for a compliance mechanism a reality and implemented the Implementation Review and Support System (IRSS).

Dr Marjorie Pollack

Deputy Editor, ProMED-mail (the Epidemiology and Surveillance Moderator and the Liaison Editor for the Regional networks)

Dr Marjorie Pollack received her MD degree at the Medical College of Pennsylvania and is ABIM certified in Internal Medicine. She has worked as a consultant medical epidemiologist for over 35 years after completing EIS training and a preventive medicine residency at CDC. Since leaving CDC, she has served as a consultant medical epidemiologist with international assistance agencies such as the WHO, PAHO, USAID, UNICEF, the World Bank and the Asian Development Bank, working in more than 50

countries around the world. Topics of interest have included vaccine preventable diseases and other child survival related initiatives, disease surveillance, disease eradication and emerging infectious diseases. She has been working with ProMED-mail – the Program for Monitoring Emerging Diseases, a program activity of the International Society for Infectious Diseases since 1997. She wears multiple hats at ProMED-mail, serving as the Deputy Editor, the Epidemiology and Surveillance Moderator, and the Liaison Editor for the Regional networks. She has developed a curriculum for training field epidemiologists in the use of non-traditional information sources as an adjunct to routine disease surveillance. These courses have been run in Latin America, Asia, the Middle East/North Africa and Africa at TEPHINET global and regional meetings and as part of the introductory epidemiology courses for the Thai FETP and FETP-V programs. She has been an invited speaker to numerous scientific conferences internationally focusing on non-traditional information sources for enhanced disease surveillance. She has also worked in inner city emergency rooms in New York City.

Mrs Jihye Choi

Researcher, Graduate School of Public Health, National University of Seoul, South Korea

Jihye Choi completed her bachelor's degree in Health Studies from Queen's University in Canada and holds a master's degree in Health Demography from Seoul National University Graduate School of Public Health in South Korea. Over the past years, she has actively engaged in several government-funded research projects pertaining to Korean population policy and fertility rate projection. Along with her experience in teaching health promotion and nursing informatics, Jihye has also conducted extensive research on the role of technology in the public health arena, especially with regards to mobile health in the surveillance of infectious diseases and in the spectrum of cancer care with a particular focus on skin cancer. Her current research interests lie in promoting healthy dietary behaviour and preventing chronic disease through evidence-based interventions, and the integration of mobile health in various domains of public health including cancer survivorship. Jihye is now in the process of preparing for enrolment in a PhD program.