Derestricted 18 June 2020
(This document has been derestricted at the meeting of the Board on 18 June 2020)

IAEA
Atoms for Peace and Development
Board of Governors

GOV/INF/2020/6
Date: 29 May 2020

Original: English

For official use only

IAEA Support to Member State Efforts in Addressing the COVID-19 Pandemic

Report by the Director General

Summary

- This report presents the latest status of the assistance rendered by the Agency to its Member States in their efforts to address the current COVID-19 pandemic, and indicates future steps.
- Agency assistance for the use of real time reverse transcription-polymerase chain reaction (real time RT-PCR) to address COVID-19 is being delivered through the technical cooperation project INT0098, 'Strengthening Capabilities of Member States in Building, Strengthening and Restoring Capacities and Services in Case of Outbreaks, Emergencies and Disasters', approved by the Board of Governors at its meeting in November 2019 as part of the 2020–2021 technical cooperation programme, with the objective of assisting Member States to restore capacities, competencies and services in the case of disease outbreaks, natural emergencies or other disasters.
- Real time RT-PCR is a highly accurate, nuclear derived technique used to detect viral pathogens, including those that cause zoonotic disease such as COVID-19. The Agency has built Member State capacities in the use of RT-PCR in response to previous outbreaks of zoonotic disease, including Avian influenza, Ebola virus disease and Zika virus disease.
- The Agency is delivering support to 120 countries and territories to address the outbreak of COVID-19. Several Member States have provided generous financial and in-kind support, which is enabling the Agency to respond rapidly and effectively to the urgent needs of its Member States. The Agency is working in cooperation with the Food and Agriculture Organization of the United Nations (FAO) and the World Health Organization (WHO), and is a member of the WHO-led COVID-19 UN Crisis Management Team.
- Looking forward, the IAEA is preparing to launch a new initiative focusing on identifying, monitoring, tracing and early detection of zoonotic disease pathogens at the animal-human interface. This initiative, named ZODIAC (for Zoonotic Disease Integrated Action), will

strengthen the ability of the IAEA and its Member States to prepare for and respond to zoonotic disease threats and outbreaks.

IAEA Support to Member State Efforts in Addressing the COVID-19 Pandemic

Report by the Director General

A. Background

1. Sixty percent of human pathogens are of animal origin, while 75% of emerging animal diseases can be transmitted to humans, causing zoonotic diseases such as severe acute respiratory syndrome (SARS) and Middle East respiratory syndrome (MERS). As pathogens evolve, they may become fully adapted to the human population (e.g. human immunodeficiency virus (HIV) or dengue).

2. The increase in zoonotic disease outbreaks is facilitated by human encroachment on natural habitats, and by changes in land use, including deforestation. It is exacerbated by population growth, the increased mobility of people and commodities, and climate change.

3. Coronaviruses are ribonucleic acid (RNA) viruses from the *Coronaviridae* family. Six types of coronavirus are known to infect humans. Four cause mild respiratory symptoms, while two, MERS and SARS, have resulted in epidemics with high mortality rates.

4. In December 2019, a new type of coronavirus, SARS-CoV-2, which causes COVID-19 disease, was identified. The disease spread rapidly, and on 30 January 2020, WHO declared the outbreak to be a public health emergency of international concern. On 11 March 2020, WHO declared COVID-19 a pandemic. As of 26 May 2020, the global number of confirmed infected people has reached 5 370 375, in more than 215 countries and territories, and the global number of deaths reported has increased to 344 454 people. [1]

B. RT-PCR technology and its applications

5. Real time RT-PCR is a nuclear-derived deoxyribonucleic acid (DNA) amplification method, and it is one of the most sensitive, established and accurate methods to detect pathogens. It uses an enzyme to replicate, or amplify, a specific genetic region of a pathogen's DNA a billion-fold in just an hour. Scientists then detect, monitor and characterize this DNA amplification, or replicon, either through radioisotopes or by counting fluorescent molecules attached specifically to the DNA replicon. It is a

[1] https://www.who.int/emergencies/diseases/novel-coronavirus-2019

highly accurate technique and is one of the most widely used laboratory methods for detecting the virus SARS-CoV-2.

C. Previous IAEA support to Member States, delivered through the regular and technical cooperation programmes

6. The IAEA has a long and proven track record of developing and deploying nuclear and nuclear-related techniques for the rapid and accurate detection of animal and zoonotic diseases. Over the past two decades, in partnership with FAO, the IAEA has trained and equipped experts around the world to use real time RT-PCR to detect major zoonotic and animal diseases such as Avian influenza, Ebola and Zika virus diseases, often using its Veterinary Diagnostic Laboratory Network, VETLAB. VETLAB was originally set up by the IAEA and FAO to combat the cattle disease rinderpest. Today, the network helps participating countries to improve the early detection and control of transboundary animal and zoonotic diseases

7. During the 2014–2016 outbreaks of Ebola virus disease (EVD) in West Africa, the IAEA and FAO, in collaboration with WHO and the World Organisation for Animal Health (OIE), helped African countries to strengthen their capacities to diagnose EVD, and other animal and zoonotic diseases, accurately and safely using RT-PCR through the regional TC project RAF5073, 'Strengthening Africa's Regional Capacity for Diagnosis of Emerging or Re-emerging Zoonotic Diseases, including Ebola Virus Disease (EVD), and Establishing Early Warning Systems'. In addition, networking was strengthened among national 'One Health' actors from the health, veterinary and wildlife sectors, in order to improve the national/regional early warning system. More than 140 African experts from veterinary and public health sectors were trained to carry out early molecular diagnosis of zoonotic diseases under adequate bio-safety conditions and equipment and diagnostic kits needed to perform the assays was provided. More than 250 African experts were also trained through national training courses to carry out field and laboratory inspections safely and securely, and to collect samples from sick animals (both livestock and wildlife). Expertise gained by the region was used very successfully by Member States to fight against the highly pathogenic avian influenza outbreaks that occurred shortly afterwards. The Agency continues to strengthen Member State capacities to detect disease and establish early warning systems in all regions, through various technical cooperation projects.

The IAEA worked with 39 African countries to strengthen national capacities to diagnose Ebola virus. (Photo: L. Gil Martinez/IAEA)

African experts were trained to carry out field and laboratory inspections safely, and to collect samples from diseased animals. (Photo: L. Gil Martinez/IAEA)

8. In March 2016, Zika virus infection was reported in 26 countries and territories in the Americas. WHO declared the Zika outbreak a public health emergency of international concern. The IAEA delivered RT-PCR equipment to 11 Member States and provided training for 31 scientists and medical personnel at its Seibersdorf Laboratories through technical cooperation reserve fund projects. Support to help Latin American and Caribbean countries to rapidly identify cases of Zika virus continued thereafter under RLA5074, 'Strengthening Regional Capacity in Latin America and the Caribbean for Integrated Vector Management Approaches with a Sterile Insect Technique Component, to Control Aedes Mosquitoes as Vectors of Human Pathogens, particularly Zika Virus'. The project focuses on building capacity for the field validation of the sterile insect technique (SIT) applied to mosquitoes – the vector for dengue, chikungunya and Zika viruses. Since mid-2016 the project has provided training, equipment, supplies and materials to the participating countries for creating a robust entomological baseline. By the end of 2019 more than 210 scientists from the 16 participating countries had been trained in the different components of SIT and its application.

Training by the IAEA helped Latin American and Caribbean countries to identify cases of Zika rapidly. (Photo: O. Yusuf/IAEA)

D. Current support to Member States in their efforts to address COVID-19

9. The Agency is currently providing support to Member States' efforts to address COVID-19 through the interregional technical cooperation project INT0098, 'Strengthening Capabilities of Member States in Building, Strengthening and Restoring Capacities and Services in Case of Outbreaks, Emergencies and Disasters'. The project was developed based on previous experiences of successful

Agency responses to urgent Member State needs, and taking into consideration feedback from Member States regarding the kind of support most likely to be requested, and the need to enable tangible, on-the-ground impact as soon as possible. It was intended to facilitate the IAEA's response to increasing requests by Member States for assistance in coping with outbreaks of disease (such as EVD in Africa, Avian influenzas in Asia, lumpy skin disease in Europe, and Zika virus disease in Latin America), as well the consequences of devastating natural disasters (such as major earthquakes and floods). The interregional project was developed in anticipation of such outbreaks and events, in order to allow the IAEA to provide its assistance to Member States within an appropriate framework and in a timely fashion.

10. TC project INT0098 was approved by the Board of Governors at its meeting in November 2019 as part of the 2020–2021 technical cooperation programme. The project has a duration of four years and is fully footnote-a/ (unfunded), as it is difficult to forecast the nature of the emergencies Member States may face and the scale of the support Member States may need. The interregional project provides an available framework for timely response to emergencies, and has already proved its value and effectiveness in the current crisis.

11. At the outset of the COVID-19 outbreak, Member States began to submit requests for Agency support to use RT-PCR for the detection of COVID-19 infections, and by 18 March, 42 such requests had already been received. The Agency responded immediately, preparing the technical details for the procurement of detection equipment, kits and consumables, and approaching relevant suppliers promptly to establish the availability of and lead times for the necessary equipment and materials. On 24 March, the Director General approved the first batch of procurement for 42 Member States under INT0098.

Monitoring the loading of a shipment of equipment to a Member State. (Photo: MTPS/IAEA)

12. As of 25 May, 120 countries or territories (41 in Africa, 27 in Asia and the Pacific, 22 in Europe and Central Asia, and 30 in Latin America and the Caribbean) have requested support from the IAEA (Figure 1), and the Agency has delivered or is in the process of delivering support to those countries and territories.

Morocco receives equipment from the IAEA to assist national efforts to address COVID-19.
(Photo: Ministry of Health, Morocco)

13. The equipment and materials procured are consolidated in a package which includes detection equipment, namely, real time RT-PCR and kits, together with reagents and laboratory consumables, as well as biosafety supplies such as personal protection equipment for the safe analysis of samples. Multiple suppliers are required for each package, as no single supplier can provide all the items in the package alone. As a result, the Agency has concluded separate purchase orders with five to six suppliers for each package. As so many purchase orders are required, and as the availability of the main piece of equipment (RT-PCR) is limited in the market, the Agency is delivering support in four batches, with 992 purchase orders issued, and an additional 138 purchase orders for personal protection equipment, as of 25 May 2020. Figure 2 provides information on the number of purchase orders issued for each batch.

Unpacking equipment sent by the IAEA, Bosnia and Herzegovina. (Photo: Communication Office of University Clinical Center).

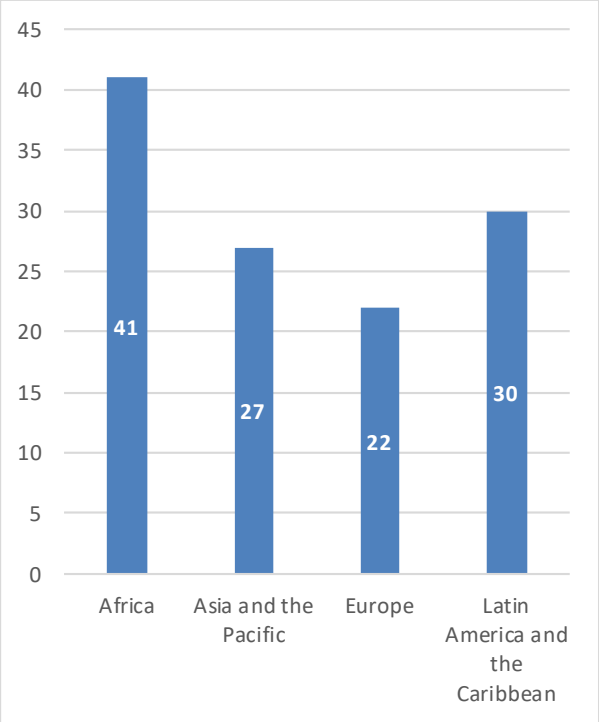


Figure 1: Countries and territories requesting IAEA assistance (as of 25 May 2020).

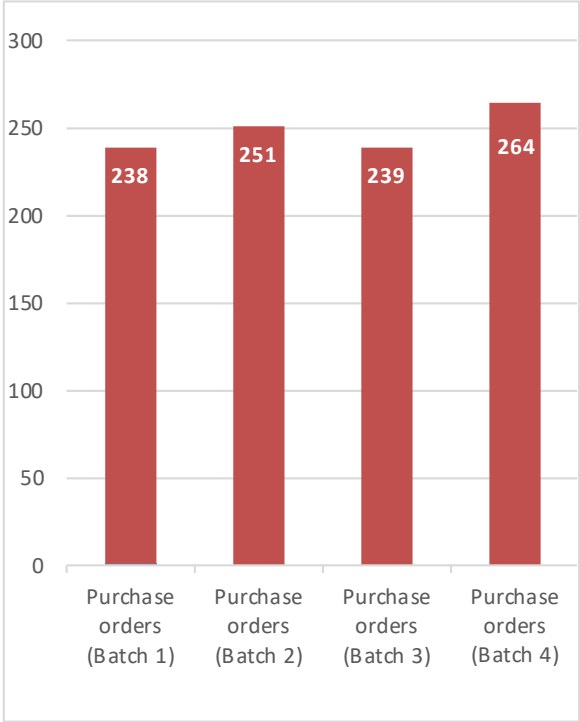


Figure 2: Purchase orders by batch (as of 25 May 2020).

14. The delivery of the packages is challenging. National lockdowns, reduced operations and staffing, global travel limitations, irregular cargo flights and other COVID-19 restrictions are affecting the suppliers' supply chain and the logistics for final delivery to countries, which has translated into delays that are having an impact on the initial suppliers' timelines. The Agency is making every effort to coordinate with suppliers and freight forwarders on the production and shipment of the necessary equipment and materials, in order to deliver this urgent support to Member States as soon as possible. Additional and alternative sources of supply and logistic arrangements are also being explored. As part of these efforts, the IAEA is finalizing a service level agreement with the United Nations World Food

Programme to access services to use their logistic hubs. As of 25 May, 35 PCRs have been delivered to end-users in 31 Member States, 16 are in customs clearance at the destination country/territory, and eight are in transit (Fig. 3). In the coming weeks, more equipment and materials will arrive at relevant Member States.

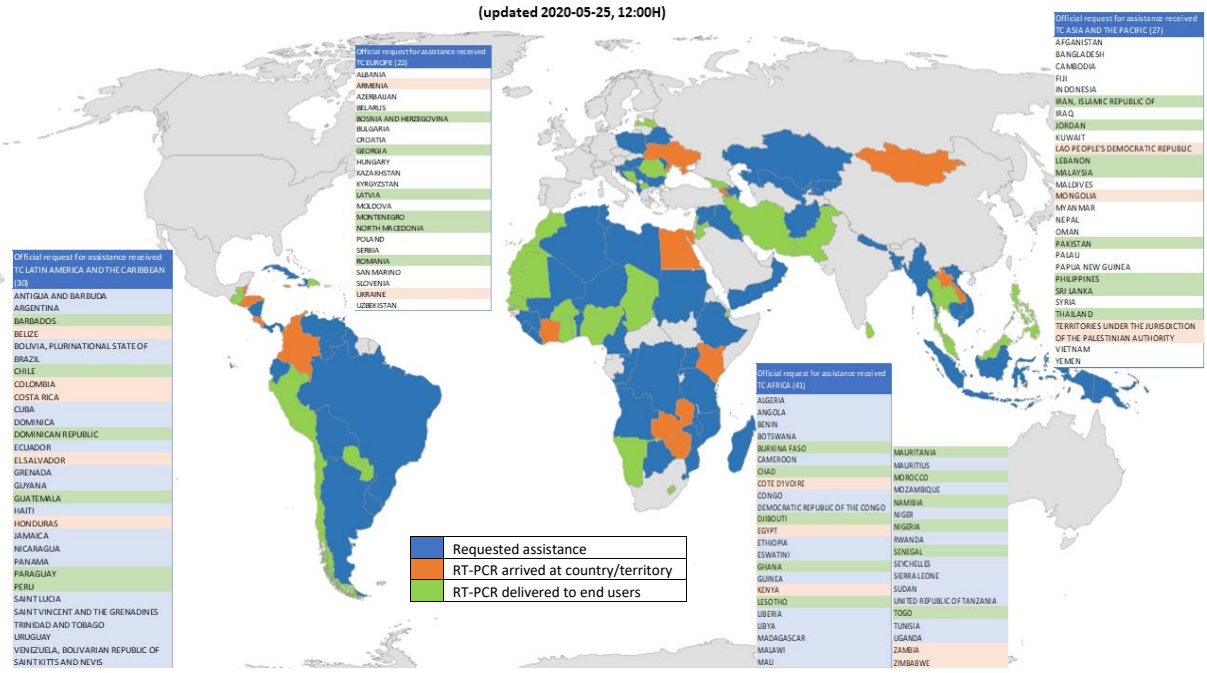
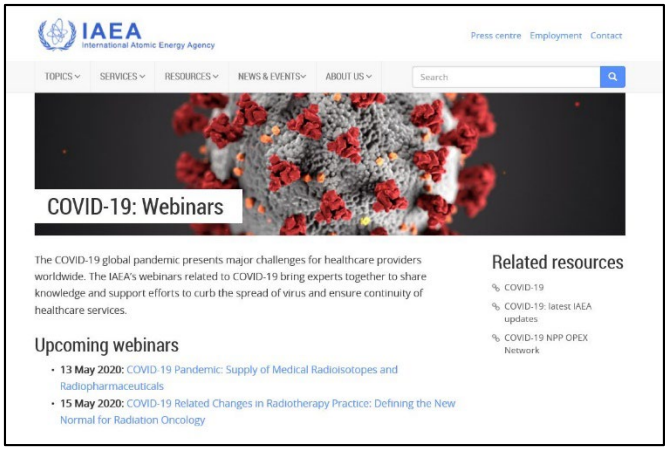


Figure 3: Deliveries of COVID-19 shipments as of 25 May 2020.[2]

15. In parallel to its procurement activities, the Agency also initiated a regional training course at the Agency's laboratories in Seibersdorf on 'Use of Nuclear Derived Techniques for Detection of the Novel Coronavirus (COVID-19) including Biosafety Measures During Sample Processing and Testing'. The course, which was designed to provide theoretical knowledge and practical skills in biosafety and detection to medical and veterinary professionals from affected (or at risk) Member States, was planned to take place from 30 March to 9 April. The course was announced on 21 February, nominations from African and Asian Member States were received, and external experts were identified. Unfortunately, because of global travel restrictions and national lockdowns, the training course had to be postponed. However, the IAEA, in collaboration with the FAO, has provided guidance on COVID-19 detection to 253 laboratory professionals from 119 Member States through VETLAB. The guidance and support include the provision of standard operating procedures to identify the virus following WHO recommendations.

[2] The map has been used only for the purposes of showing status of the Agency's assistance related to COVID-19 pandemic and in no way implies the expression of any opinion whatsoever on the part of the Secretariat of the IAEA, or its Member States, concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries.

16. In addition, the IAEA is conducting webinars to help health care providers around the world to adjust their standard operating procedures to cope with the pandemic so that they can continue to deliver their services while protecting patients, staff, and the public. The webinars provide advice to nuclear medicine, radiology and radiation oncology departments, and offer best practices in rotation policy, use of personal protection equipment, and other institutional considerations and experiences. The IAEA is also making online information materials on COVID-19 available on a dedicated page on the Human Health Campus[3]. The page offers responses to frequently asked questions from laboratory and health professionals, and includes links to recorded webinars, COVID-related articles, and other material.



17. The following webinars have been held so far:

- Coronavirus Disease (COVID-19) Pandemic – Challenges for Nuclear Medicine Departments (1384 participants);
- COVID-19 Preparedness for Radiotherapy Departments – Towards Consensus on Best Practices (in Arabic, English, French, Spanish, Russian, 2817 participants in total);
- ESR Connect Special Reports – Radiology in the fight against COVID-19. (Joint webinar with the IAEA, the European Society of Radiology and the International Society of Radiology, over 500 participants);
- Reporting chest x-ray, computed tomography and ultrasound. (Joint webinar with the IAEA, the European Society of Radiology and the International Society of Radiology);
- AFrica Radiation Oncology NETwork (AFRONET) (61 participants in total);
- COVID-19 Pandemic: Guidance for Nuclear Medicine Departments (In Arabic, English and French, 744 participants in total);
- On the use of RT-PCR (Held in cooperation with WHO reference labs);
- COVID-19 Pandemic: Supply of Medical Radioisotopes and Radiopharmaceuticals (771 participants);
- COVID-19 and Health Workers: Radiation Protection;
- COVID-19 Webinar on RT-PCR: From understanding the zoonotic origin of the virus, to transmission and diagnosis in humans – A session with IAEA-FAO-WHO experts (544 log-ins from 94 countries).

18. Guidelines and recommendations based on expert advice, international best practices, current literature and the IAEA webinars have also been compiled, and a summary of these recommendations has been made available to support health professionals. In addition, 15 practical videos on sample collection, handling, processing, use of personal protective equipment and RT-PCR use for detection

[3] https://humanhealth.iaea.org/HHW/index.html

have been produced in cooperation with colleagues in Brazil, and frequently asked questions on RT-PCR have been produced in audio format.

19. In addition to the provision of equipment, guidance and standard operating procedures, the IAEA has planned a series of further technical training courses at its laboratories in Seibersdorf, Austria. The courses will cover crucial aspects of the detection, characterization and monitoring of the virus at the wildlife-domestic animal-human interface; biosafety during sampling and sample processing; the contribution of nuclear and nuclear-derived techniques to the identification of COVID-19; techniques for accurate characterization of virus strains in circulation in animals; and methods for monitoring virus circulation in the environment. The first training course was planned for 30 March – 9 April 2020, but due to the rapidly evolving global travel restrictions it was not possible for training participants to attend. The series of training courses are now planned to take place between August and the end of 2020. Similar training courses will also be held in the different regions, using existing capacities in Member State laboratories.

20. Upon request from several Member States, the Agency also reviewed the findings of tests on the use of ionizing radiation (gamma and electron beams) to sterilize used respiratory masks, such as models N95 and FFP2, that are commonly worn by medical personnel. Tests showed that radiation sterilization reduces the performance of the protective filters in respiratory face masks and is therefore not a viable method. However, the Agency promotes the application of radiation for sterilization of other medical equipment.

E. Funding, and partnerships with the United Nations Food and Agriculture Organization and the World Health Organization

21. Several Member States provided generous extrabudgetary funding to TC footnote-a/ project INT0098, 'Strengthening Capabilities of Member States in Building, Strengthening and Restoring Capacities and Services in Case of Outbreaks, Emergencies and Disasters' through which the COVID-19 emergency assistance is being delivered. Australia, Canada, Finland, Germany, Japan, the Netherlands, Norway, Pakistan, Republic of Korea, the Russian Federation, the United Kingdom and the United States of America, together with private entities including Takeda Pharmaceutical Company Limited, have offered extrabudgetary pledges and assistance, as shown in Table 1. As of 25 May, €19.2 million of extrabudgetary funds were allocated for this purpose.

22. In addition, the IAEA was offered an in-kind contribution by China of €1.84 million worth of equipment and materials for the detection of COVID-19.

Table 1: Extrabudgetary contributions*

Member States	Offered/Pledged
Australia	46 023
Canada	3 268 401
Finland	200 000
Germany	500 000
Japan **	3 000 000
Korea, Republic of	271 800
Netherlands	500 000

Norway	2 001 779
Pakistan	20 000
Russian Federation	500 000
United Kingdom	574 713
United States of America	9 854 000
Other contributors	
Takeda Pharmaceutical Company Limited	4 320 774
Total	**25 057 490**
In-kind Contributions	
China	1 842 000
Total	**1 842 000**
* All amounts in Euros (May UNORE). Pledged but not allocated amounts are not final until formal acceptance is completed	
** In addition, Japan contributed 1 million Euro in support of a project 'Detection of emerging and re-emerging transboundary animal and zoonotic pathogens at the animal-human interface' in connection with the COVID-19 outbreak	

23. The IAEA has been working closely with the FAO and with WHO since the beginning of the COVID-19 outbreak, strengthening collaboration as the situation progressed, with a view to providing a coordinated response to requests from its Member States.

E.1. United Nations Food and Agriculture Organization

24. The Joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture and the Animal Production and Health Division of the FAO have been sharing data and information on a daily basis, as well as through weekly teleconferences with FAO headquarters and FAO regional offices to discuss progress and status of assistance provided to Member States.

25. A programme of training courses, to be implemented when global travel restrictions are lifted, has been developed jointly with the FAO. In addition, the distribution of updated standard operating procedures, reagent information and validation data to more than 253 medical and veterinary laboratories involved in COVID-19 testing was done jointly, with many receiving one-on-one guidance and support. The cooperation and technical backstopping at field level was channelled through the VETLAB platform.

26. The Joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture, in close cooperation with its sister Divisions in the FAO, is also participating in discussions and analysis of the impact of COVID-19 on global food security.

E.2. World Health Organization

27. The United Nations Crisis Management Policy has been activated for the COVID-19 pandemic. On 25 March 2020, the IAEA joined the COVID-19 UN Crisis Management Team (COVID-19 CMT) led by the World Health Organization[4]. The purpose of the COVID-19 CMT is to facilitate and align

[4] The COVID-19 CMT also includes United Nations Development Coordination Office, United Nations Office for the Coordination of Humanitarian Affairs, International Maritime Organization, United Nations Department of Safety and Security, United Nations Children's Fund, International Civil Aviation Organization, World Bank, World Food Programme,

United Nations efforts to enable coherent coordinated action, leveraging synergies and ensuring transparency and accountability in response to COVID-19.

28. The IAEA has assigned focal points to the COVID-19 CMT and its relevant working groups, such as supply chain and communication. The supply chain working group has initiated a joint purchasing pipeline and is planning the provision of logistic support through various corridors. The UN communication group, which reports to the CMT, aims to ensure regular coordination and management of external communication on the COVID-19 outbreak, so that WHO situation reports and dashboards are used as authoritative sources of public health information by all UN system entities.

29. Through this strengthened cooperation, the IAEA has ensured that the equipment and materials procured to address IAEA Member States' requests are in alignment with the overall UN response.

F. The way forward: early detection and global response to zoonotic disease

30. IAEA has worked extensively on transboundary animal and zoonotic disease outbreaks and emergencies, including emerging infectious diseases such as Ebola, Avian Influenza, SARS, MERS and COVID-19. These past episodes have demonstrated that outbreaks of zoonotic diseases, and their consequences, are occurring more frequently. An integrated approach, involving all relevant stakeholders, is needed to prevent, control and mitigate zoonotic diseases. Emergency assistance measures, such as those currently taken in the context of COVID-19, will be integrated into a holistic approach that ranges from identifying, monitoring, tracing and early detection of zoonotic disease pathogens at the environment-animal-human interface, to participation in global intervention and response to a potential outbreak. This approach will be based on the following pillars, with research, development and innovation at its core:

- Focus on the competitive and comparative advantage of nuclear and nuclear-derived molecular and immunological techniques;
- Laboratory-led research and technology development, including the integration of modern biotechnologies (omics and genomics); and
- Extension of the scope to include research and epidemiology studies at the wildlife-domestic animal-human interface.

31. Looking forward, and in order to be better prepared to deal with the challenges of zoonotic diseases, the IAEA is preparing to launch a new initiative entitled 'Zoonotic Disease Integrated Action' or ZODIAC project. The project will allow for the continuation of the current assistance as well as its integration to strengthen the ability of the IAEA and its Member States to prepare for and respond to zoonotic disease threats and outbreaks, which will include, but not be limited to:

- Enhanced national capabilities of Member States for surveillance, early detection and intervention against emerging/re-emerging zoonotic diseases;
- Availability of real-time decision-making support tools for timely interventions;

Food and Agriculture Organization of the United Nations, United Nations Department of Global Communications, Executive Office of the Secretary-General, Department of Political and Peacebuilding Affairs/Department of Peace Operations, Department of Operational Support, and additional members added as deemed necessary.

- Access to novel technologies for early detection of emerging zoonotic diseases;
- Access to data on the impact of zoonotic diseases on animal and human health.

Annex 1: List of countries and territories that have requested support from the Agency (as of 25 May 2020)		
AFRICA (41 official requests)		
Algeria	Ghana	Niger
Angola	Guinea (non-IAEA Member State)	Nigeria
Benin	Kenya	Rwanda
Botswana	Lesotho	Senegal
Burkina Faso	Liberia	Seychelles
Cameroon	Libya	Sierra Leone
Chad	Madagascar	Sudan
Congo	Malawi	Togo
Côte d'Ivoire	Mali	Tunisia
Democratic Republic of the Congo	Mauritania	Uganda
Djibouti	Mauritius	United Republic of Tanzania
Egypt	Morocco	Zambia
Eswatini	Mozambique	Zimbabwe
Ethiopia	Namibia	
ASIA AND THE PACIFIC (27 official requests)		
Afghanistan	Lao People's Democratic Republic	Palau
Bangladesh	Lebanon	Papua New Guinea
Cambodia	Malaysia	Philippines
Fiji	Maldives (non-IAEA Member State)	Sri Lanka
Indonesia	Mongolia	Syrian Arab Republic
Iran, Islamic Republic of	Myanmar	Thailand
Iraq	Nepal	Viet Nam
Jordan	Oman	Yemen
Kuwait	Pakistan	Territories under the jurisdiction of the Palestinian Authority
EUROPE and Central Asia (22 official requests)		
Albania	Hungary	Romania
Armenia	Kazakhstan	San Marino
Azerbaijan	Kyrgyzstan	Serbia
Belarus	Latvia	Slovenia
Bosnia and Herzegovina	Montenegro	Ukraine
Bulgaria	North Macedonia	Uzbekistan
Croatia	Poland	
Georgia	Republic of Moldova	
LATIN AMERICA AND THE CARIBBEAN (30 official requests)		
Antigua and Barbuda	Dominica	Nicaragua
Argentina	Dominican Republic	Panama
Barbados	Ecuador	Paraguay
Belize	El Salvador	Peru
Bolivia, Plurinational State of	Grenada	Saint Kitts and Nevis (non-IAEA Member State)
Brazil	Guatemala	Saint Lucia
Chile	Guyana	Saint Vincent and the Grenadines
Colombia	Haiti	Trinidad and Tobago
Costa Rica	Honduras	Uruguay
Cuba	Jamaica	Venezuela, Bolivarian Republic of