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Space and global health**

Responses to the set of questions regarding policies, experiences and practices in the use of space science and technology for global health

Note by the Secretariat

Addendum

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II. Replies received from Member States

Bolivia (Plurinational State of)

[Original: Spanish]
[2 February 2021]

Responses provided by the Unit for the Management of Disasters, Emergencies and Environmental Health Risks of the Ministry of Health and Sports

Question 1

Pursuant to Ministerial Decision No. 0689-A of 25 July 2016, agreements have been concluded with scientific institutions at the national level, including the institute for climatological monitoring (the National Meteorology and Hydrology Service (SENAMHI)), the Technical Committee on Health and Nutrition and the National Emergency Operations Committee (COEN), in relation to emergency and disaster management, weather warnings, climate events and health.

Question 2

Disaster information systems that consolidate information from around the world, such as the Global Disaster Alert and Coordination System (Virtual OSOCC), which is highly specialized in climatic events, should be strengthened. A system that provides global information on epidemics should also be established.

A platform for real-time space-based information on notifiable diseases as referred to in the International Health Regulations should be created, incorporating artificial intelligence systems, such as big data, that the health systems of Member States can access to monitor the emergence of outbreaks and diseases that can be contained before they become epidemics.

Question 3

Environmental mechanisms have been established through national decrees and laws that provide for the use of information from scientific institutions in the event of disasters and emergencies at the national level. A mechanism is also being developed for the use of space satellites to manage national information on events that affect people's health and well-being.

Question 4

The purpose of Act No. 164 is to establish general rules relating to telecommunications and information and communications technology, the postal service and the regulatory system with a view to ensuring high living standards and the individual and collective right to communication in conformity with economic pluralism. Accordingly:

- The State, at all levels of government, promotes the right of universal access to telecommunications, information and communications technology and the postal service for all those living in the Plurinational State of Bolivia as one of the means by which they can exercise their rights, primarily in relation to communication, education, access to knowledge, science, technology and culture.
- The State formulates policies, plans and programmes that harness telecommunications and information and communications technology to improve the quality of life of all Bolivians and ensure equal access to opportunities, including in the areas of education, health and culture.
- Work is also under way to centralize information from various bodies so as to have complete data enabling the adequate and timely management of health risks.

Question 5

Health information systems are unrestricted and publicly accessible in the event of an emergency or disaster. There is an information system that is shared with the Pan American Health Organization of the World Health Organization and other bodies that request information for the management of health risks.

Question 6

With regard to the management of health risks, there is intersectoral cooperation between the Ministry of Health and Sports, the Office of the Deputy Minister of Civil Defence, agencies of the United Nations system including the Pan American Health Organization of the World Health Organization and the United Nations Children's Fund, non-governmental organizations, technical and scientific bodies and representatives of national civil society organizations, which use space technology and science to develop sectoral and national health contingency plans within the framework of the National Emergency Operations Committee.

Question 7

Under the National Programme for Disaster Risk Management in the Area of Health, technological tools have been used to develop means of communicating real-time geospatial information in the event of an emergency or disaster that affects people's health: the application EDAN-SALUD, which was launched through technical regulations for the purposes of dissemination among and use by universities and the general public, enables the analysis of damage and health needs and the reporting of prevalent diseases in real time.

Question 8

Information mechanisms have been created for the management of health risks, including through the use of digital and geospatial climate data that can help to identify links between the climate and epidemics and disease vectors. Those data are consolidated through alerts that are issued to the public and to health networks. The information is shared with scientific bodies and with the National Programme for Disaster Risk Management in the Area of Health for subsequent dissemination.

Question 9

The information collected by scientific bodies at the national level is archived and supplemented by historical epidemiological data from places in which health emergencies have occurred. The information is incorporated into analytical research documents on health emergencies and disasters and used to provide a record of events; it is also used to develop contingency plans at the municipal, departmental and national levels, improving understanding of how an event unfolds in a given area and enabling the preparation of plans to increase resilience in the sector.

Question 10

Technical research documents have been produced, including the Assessment of Health Risks Posed by Emergencies and Disasters, which is aimed at fostering the use of geospatial climate information in health risk mapping, thus helping to build a record of and locate events. That information can be integrated into risk management with a view to mitigating such risks in the future.

The Health Contingency Plan for Emergencies and Disasters includes, among other key data, direct actions taken on the basis of the maps and records provided by scientific entities and georeferential mapping of epidemics, outbreaks and vector location, which contribute to the management of emergencies and disasters.

The EDAN-SALUD application is used to manage spatial georeferencing data to locate health centres in areas affected by events and georeferences the location of the events to produce maps accompanied by statistics relating to prevalent diseases.

Question 11 (a)

Disaster and health emergency management: technology, applications and practice offer many benefits. With regard to gaps, there are difficulties in relation to the acquisition of and budgeting for georeferencing systems and systems for the incorporation of databases constituting a historical record and maps of health-related events, and in relation to the incorporation of the latest generation systems for handling emergencies, such as artificial intelligence systems, which can greatly assist in the prevention of events but which are expensive and difficult to acquire. It is also difficult to access real-time information on outbreaks and locations of vectors in other countries; such data can help to prevent diseases from crossing borders and entering countries.

Responses provided by the National Tele-health Programme of the Ministry of Health and Sports

Question 1

In 2019, the Bolivian Space Agency and the Ministry of Health and Sports concluded a service contract covering 215 locations throughout the country where tele-health services have been established. Those locations benefited from services free of charge from 13 March to 31 May 2020 pursuant to interministerial agreements on tackling the health emergency caused by the coronavirus disease 2019 (COVID-19), as seen in the table below. (Further details on connected municipalities are proved below.)

Table

Number of municipalities in each department connected to tele-health services through the Túpac Katari satellite signal

<i>Department</i>	<i>Satellite connectivity</i>	<i>Departmental percentage</i>
Beni	10	52.6
Chuquisaca	17	58.6
Cochabamba	44	93.6
La Paz	44	50.6
Oruro	32	94.1
Pando	11	73.3
Potosí	39	97.5
Santa Cruz	14	24.6
Tarija	4	36.4
Total	215	63.4

Source: N.I. MSyD/VMSyP/DGSS/URSSyC/PTLS/NI/115/2020.

For more details on the connected municipalities, please refer below.

Question 11 (a)

The introduction of new technologies in medical care and advances in telecommunications have driven the development of telemedicine around the world, transforming health systems.

Article 21 (Financing of the Tele-health for Bolivia Project) of Act No. 396 of 26 August 2013, which was enacted for the purpose of adopting the amended 2013 general State budget for public sector entities and establishing specific financial provisions for its implementation, states that “within the framework of the Intercultural Community Family Health policy (SAFCI), the Ministry of Health and Sports is authorized to implement the first phase of the Tele-health for Bolivia project at the national level. The Ministry of Health and Sports is responsible for the

implementation, monitoring and evaluation of the project and for the use of resources allocated under this article.”

The project was initiated accordingly, comprising four components or areas: telemedicine, tele-epidemiology, tele-education and tele-management. After five years, the National Tele-health Programme was created through Ministerial Decision No. 0891 of 26 December 2018 and launched on 2 January 2019 in order to give continuity to the activities already implemented under the Tele-health for Bolivia project.

In the Plurinational State of Bolivia, the National Tele-health Programme has reduced barriers to access to health services, particularly in rural areas, enabling communities with limited access to health care to receive specialized care through telemedicine. Such services are a viable option for making specialized health resources available to the public.

As part of the National Tele-health Programme, 340 telemedicine teams have been established in 338 municipalities, in the health facilities with the highest level of service coverage in each municipality, thereby constituting the largest tele-health network in Latin America.

The telemedicine component (area) of the National Tele-health Programme comprises clinical care, including prevention, diagnosis, treatment and rehabilitation through the use of information and communications technology.

The telemedicine area currently offers a portfolio of services nationwide, in the following 67 “tele-interconsultation” areas (specialties and subspecialties): allergies, pathological anatomy, anaesthesiology, disabilities, biological imaging, cardiology, paediatric cardiology, face and neck surgery, cardiovascular surgery, general surgery, maxillofacial surgery, paediatric maxillofacial surgery, paediatric surgery, plastic surgery, paediatric plastic surgery, vascular surgery, coloproctology, dermatology, paediatric dermatology, echography, endocrinology, paediatric endocrinology, epidemiology, physical medicine and rehabilitation, physiotherapy and kinesiology, speech therapy, clinical gastroenterology, paediatric gastroenterology, genetics, geriatrics, gynaecology and obstetrics, haematology, paediatric haematology, imaging, infectious diseases, paediatric infectious diseases, sports medicine, family medicine, internal medicine, traditional medicine, transfusion medicine, nephrology, paediatric nephrology, neonatology, pneumology, neurosurgery, neurology, paediatric neurology, nutrition and diet therapy, dentistry, paediatric dentistry, ophthalmology, oncology, ear, nose and throat, paediatrics, chagas disease platform, tuberculosis platform, psychology, psychiatry, paediatric psychiatry, rheumatology, intensive care, paediatric intensive care, social work, traumatology and orthopaedics, paediatric traumatology and urology.

Software

The National Tele-health Programme uses a platform called TCONSULT on which various forms are stored, including the “digital medical history – tele-interconsultation” form, the tele-interconsultation sheet, tele-interconsultation sheet II, tele-interconsultation sheet III, the telemetry form and the tele-consultation form. The forms are used to record the details of consultations and are stored in a database on central servers; however, as the software has been in use for more than five years, it is becoming obsolete.

To date, a total of 548,245 telemedicine consultations have been provided to patients requiring specialized medical care.

Technology

The National Tele-health Programme uses the following specialized equipment and digital medical devices: general examination cameras, digital otoscopes, vital signs monitors, digital electrocardiographs, digital spirometers, digital

ophthalmoscopes, ultrasound probes, digital colposcope video machines and videoconferencing cameras.

Initiatives

With regard to initiatives relating to health emergencies, the National Tele-health Programme has implemented strategies to contain outbreaks, epidemics and pandemics, including the current COVID-19 pandemic. The Programme has developed and executed two early detection strategies: the identification, on the basis of reporting through a call centre, of individuals who are likely to have COVID-19 and the tracking and tracing of those individuals through teleconsultations to ensure their timely isolation, thereby cutting the chain of transmission; coordination with emergency coordination centres ensures timely transfer in emerging situations. This approach ensures both safety in that the services are provided remotely, and efficiency in that the services are accessible and available nationwide. In view of the general public's lack of familiarity with digital applications such as the Zoom videoconferencing platform, the decision was made to use traditional telephone calls and WhatsApp video calls.

Gaps

The Agency for eGovernment and Information and Communications Technology proposed the establishment of a comprehensive system for the monitoring of COVID-19; however, various factors prevented the implementation of that proposal, the most significant of which was the lack of technological infrastructure at health facilities nationwide and the high cost of setting up Internet services.

The National Tele-health Programme proposes that, in order to make optimal use of Bolivian Space Agency resources, a low-cost State policy should be established for agencies of the Ministry of Health, since a large number of municipalities report that they do not have sufficient funds to afford an optimal service that allows interconnectivity between the various health establishments.

The Túpac Katari satellite has provided a data transfer (Internet) signal to places that microwave and fibre-optic signals had previously been unable to reach owing to the country's large size, rugged terrain and areas of difficult access, such as Pando, Beni and northern Potosí. However, although the service is beneficial, it is very expensive and, as a result, service provision is limited.

Question 11 (b)

The National Tele-health Programme generates information through the provision of tele-health services (tele-interconsultations, teleconsultations and telemetry) at the national level, that information reflecting the frequency and distribution of health problems and their determinants relating to tele-health.

In the field of tele-epidemiology, processes and procedures are being developed for the systematic analysis of health situations through the use of information and communications technology (TeleASIS). As part of that work, applications are being developed by the Systems Division for the collection, organization, processing and analysis of information relating to the assessment of the current situation in the areas in which our tele-health clinics are located nationwide so as to provide tools to assist in the implementation of the health situation analysis (TeleASIS). Certain calculations, tasks and procedures may be included automatically in the future.

With regard to environmental health, the National Tele-health Programme has taken health measures in relation to environmental factors that cause dermatological problems, specifically the launch and implementation of virtual campaigns aimed at preventing and monitoring problems caused by exposure to external agents such as sunlight. One such initiative was the first dermatological campaign, which was carried out nationwide in 2018 and during which a total of 1,279 consultations were provided in the following areas, from highest number of consultations to lowest: La Paz,

286 consultations; Oruro, 253 consultations; Cochabamba, 172 consultations; Potosí, 156 consultations; Santa Cruz, 150 consultations; Chuquisaca, 136 consultations; Tarija, 62 consultations; Pando, 49 consultations; and Beni, 15 consultations.

The most commonly diagnosed conditions, classified according to the tenth revision of the International Statistical Classification of Diseases and Related Health Problems, were as follows: D22 (melanocytic naevi); L82 (seborrhoeic keratosis); and C44 (melanoma and other malignant neoplasms of skin). In addition, it was determined that the environmental exposure factors in these patients were sun exposure for more than two hours (809 cases) and sun exposure for less than two hours (454 cases). A direct or proportional relationship was found between longer sun exposure time (more than two hours) and the occurrence of skin cancer (C44 (melanoma and other malignant neoplasms of skin)).

Owing to the high incidence of dermatological diseases in Oruro Department in 2018 (253 cases) and their connection with greater sun exposure because of the Department's geographical location (3,706 metres above sea level), a new virtual campaign was launched in 2020, as part of which 691 consultations were carried out. The data gathered are in the process of being analysed.

The results have been transmitted to the relevant division so that virtual awareness-raising and prevention activities can be carried out for the general public.

In conclusion, the National Tele-health Programme has carried out activities in the area of environmental health through virtual dermatology campaigns, telemedicine practices and initiatives in health-related emergencies. We recommend that the present report be submitted to the relevant authorities.

Responses provided by the Bolivian Space Agency

The Bolivian Space Agency is a national strategic public company that provides telecommunications services through the national telecommunications satellite TKSAT-1. It also has a laboratory for satellite image processing through which it provides services based on open-access satellite images.

In view of the above, and given that the questionnaire focuses on the use of space science and technology for global health, several of the topics covered are outside the Agency's area of competence and are therefore not addressed below.

Questions 1, 2, 3, 5, 10 and 11

Not applicable to the Agency's area of competence.

Question 4

One of the Agency's specific functions is to promote the use of satellite applications in social, production, defence, environmental and other programmes. Accordingly, in 2015 the Agency established an Earth observation unit comprising a laboratory for the analysis and processing of satellite images. The work of the laboratory is focused on Earth observation and aimed primarily at building knowledge and contributing to the growing use of new geospatial technologies in the country.

In order to promote the laboratory's work, a satellite-based Earth observation system (see <http://sots.abe.bo/>) has been set up in recognition of the fact that satellite observations are vital for environmental monitoring, meteorology, disaster response, agriculture, water resource management and many other activities. The system is freely accessible. Furthermore, for the period 2016–2017, a landslide monitoring platform for the city of La Paz was developed so that risk management could be performed using that tool.

Question 6

The Agency is not carrying out specific activities relevant to the application of space science and technology in the field of global health. However, framework

agreements for cooperation in the area of space science and technology have been concluded with various space agencies, including the Indian Space Research Organization, the Paraguay Space Agency and the National Aerospace Research and Development Commission of Peru.

Question 7

Since 2015, the Agency has been administering scholarships for master's degrees at Beihang University in Beijing. The scholarships are aimed at young Bolivian professionals wishing to specialize in areas relating to satellite applications, such as satellite telecommunications, global satellite navigation, microsatellite technology, space policy, remote sensing and satellite imagery.

In January of each year, the Agency publishes an open call for interested professionals on its social media accounts and in the national print media. The selection process involves the completion of an online application; applicants must meet the criteria established by Beihang University, which are, namely, to have a professional degree in engineering or a subject related to the master's degree for which they are applying, to be no more than 35 years of age and to have English language skills.

Applicants must then take an online examination on the basis of which their skills in mathematics, physics and critical thinking and their basic skills in space science and technology in English are assessed. Applicants who proceed to the next stage are then interviewed by Agency staff who, after assessing various aspects, select those applicants who are eligible to continue with the process and, accordingly, notify the relevant persons at the University of Beihang. The professionals who are selected in April or May have an online interview with the relevant Beihang University and Chinese Master's of Space Technology Application (MASTA) programme staff. Lastly, those staff select the young professionals who are to be awarded a master's scholarship in their chosen area of study by the Government of China.

To date, 15 young professionals have received a scholarship. Nine of those professionals have completed their master's degrees in China, three are in the process of carrying out research on their chosen topics and the remaining three, who were selected for the 2020 academic year, began their courses in September but have been attending remotely owing to the pandemic; however, they will travel to China once public health restrictions are eased.

Question 8

The Agency's laboratory for the processing of satellite images has set up a cost-free, open-access system for satellite-based Earth observation (see <http://sots.abe.bo/>) that, although not specifically designed to address global health issues, facilitates decision-making in various sectors according to those sectors' needs.

Question 9

As explained in the previous responses, the Agency's laboratory for the processing of satellite images has developed cost-free, open-access tools to assist in the management of health-related emergencies and disaster management plans. Those tools are available at: <http://sots.abe.bo/>; <http://maps.abe.bo/>; and <http://sots.abe.bo/bolivia-covid19>.

Bulgaria

[Original: English]
[16 December 2020]

Question 1

The Ministry of Health (through the National Centre of Public Health and Analyses) has cooperative agreements with other ministries and departments in Bulgaria that are unrelated to space activities.

The National Centre of Public Health and Analyses took part in an international project (SEE-ERA.NET), in cooperation with the Space Research and Technology Institute, on the development of a strategy on and methods for monitoring electromagnetic pollution in the environment of the Western Balkans.

Question 2

Our opinion on this question is that it will be a good initiative. We believe that such a platform will unite the efforts of specialists in the field of space investigations to expand cooperation in providing global health. It is necessary to coordinate the proposal with the World Health Organization, whose main activity is in the field of risk assessment and public health protection on a global scale, in order not to duplicate activities.

Question 3

We are not aware of such policies and have no opinion on this issue.

Question 4

A strategy operating at the national level, entitled “Informational system of sources of electromagnetic fields in residential areas”, was developed in 2017 by the National Centre of Public Health and Analyses. It includes information on the technical characteristics and location of telecommunications sources, and on the electromagnetic field exposure of the general population in Bulgaria. The electronic system uses Google maps as a platform for the placement of the information, and it is web-based and available for use by the general population and experts. It can be viewed on the Centre’s website: <https://public-emp.ncpha.government.bg/Geolocation/ViewBaseStationsOnMap.aspx>.

Question 5

In the field of health information systems, the National Centre of Public Health and Analyses has developed and maintains the following databases: register of births; register of rare diseases; register of diabetes; register of invasive cardiology; and information system for the sources of electromagnetic fields.

Some of these registers have administrative or legislative problems and need to be updated. They can be viewed on the Centre’s website: www.ncpha.government.bg.

Question 6

The National Centre of Public Health and Analyses was a coordinator of the National Action Plan on Environment and Health up to 2013. It brought together all sectors in Bulgaria: economy, agriculture, communications, energetics, industry, health and safety at work and health status of the people.

The Centre participates in a variety of projects in the fields of public health, occupational health, the health of children and adolescents, nutrition, environmental health and others. Information on some of the current projects can be seen on the website: www.ncpha.government.bg.

None of the programmes cited have a direct connection with space research or programmes.

A project in the field of the health effects on the population connected with the implementation of 5G technology is planned. This technology has a direct impact on global health and space technologies because it will work using hundreds of satellites around the globe.

Question 7

Postgraduate education in the fields of medical sanitary physics and sanitary engineering includes training in the area of new contemporary applied technologies. Some of the lectures cover new technological applications in space exploration.

Question 8

We don't have any information to answer this question.

Question 9

We don't have any information to answer this question.

Question 10

There are no any projects in this area at this time.

Question 11 (a)

Improvement and maintenance of the information systems managed by the National Centre of Public Health and Analyses: register of births; register of rare diseases; register of diabetes; register of invasive cardiology; and information system for the sources of electromagnetic fields.

Question 11 (b)

There are no planned activities in this area.

Question 11 (c)

There are no projects in this area.

Question 11 (d)

The Ministry of Health has a plan for activities in emergency situations.
