



General Assembly

Distr.: General
28 November 2023

Original: English

**Committee on the Peaceful
Uses of Outer Space**
Scientific and Technical Subcommittee
Sixty-first session
Vienna, 29 January–9 February 2024
Item 13 of the provisional agenda*
Space and global health

Report on the United Nations/World Health Organization International Conference on Space and Global Health

(Geneva, 1–3 November 2023)

I. Introduction

1. At its sixty-first session, held from 20 to 29 June 2018, the Committee on the Peaceful Uses of Outer Space welcomed the introduction of a new item entitled “Space and global health” on the agenda of the Scientific and Technical Subcommittee and the establishment of the Working Group on Space and Global Health under the item. At its sixty-second session, held from 12 to 21 June 2019, the Committee endorsed the multi-year workplan of the Working Group (2019–2022).¹

2. On 12 December 2022, the General Assembly adopted its resolution [77/121](#) on international cooperation in the peaceful uses of outer space, in which it took note of the report of the Working Group on the work conducted under its multi-year workplan,² noted with satisfaction the establishment of the Space and Global Health Platform, based in Geneva, to promote effective collaboration on space and global health issues among Member States and United Nations system entities, in particular the World Health Organization (WHO) and the Office for Outer Space Affairs, as well as international organizations and relevant actors, and welcomed the establishment of the Space and Global Health Network.

3. On the same date, the General Assembly adopted its resolution [77/120](#) on space and global health, in which it agreed to promote capacity-building events, to be organized by United Nations entities and other relevant actors, with the objective of further promoting awareness of and engagement with regard to the important contribution of space science and technology in the health domain.

4. In line with the resolutions, the United Nations/World Health Organization International Conference on Space and Global Health was co-organized by the Office for Outer Space Affairs, WHO and the United Nations Conference on Trade and

* [A/AC.105/C.1/L.412](#).

¹ [A/AC.105/1202](#), annex III, appendix I.

² [A/AC.105/C.1/121](#).



Development in collaboration with the Government of Switzerland and the Space and Global Health Network and with the support of the European Space Agency (ESA). The Conference was held in Geneva from 1 to 3 November 2023.

II. Background and objectives

5. The Conference provided a forum for discussion on the areas identified by the Working Group on Space and Global Health and was an opportunity to increase awareness and build capacity among attendees in four areas of interest where space technologies have been shown to provide significant contributions to global health:

- (a) Telemedicine and telehealth;
- (b) Tele-epidemiology and environmental health;
- (c) Space life sciences;
- (d) Disaster and health emergency management.

6. To address the objectives in the aforementioned areas in the time available, the Conference included keynote addresses, presentation sessions and a poster session and was streamed online to maximize the capacity-building impact. Each session was followed by discussion sessions on the implementation of the resolution on space and global health, which are summarized in the observations and recommendations section of the present report.

III. Attendance

7. A total of 998 individuals from 132 countries registered for the event; of that total, 232 individuals (104 women and 118 men) were selected by the programme committee and invited to participate. The final number of participants was 171, with funding provided by the Office for Outer Space Affairs for 17 participants (11 women and 6 men), including funding from ESA.

8. Funding support was provided to participants from the following States: Argentina, Armenia, Bolivia (Plurinational State of), El Salvador, India, Mauritius, Mongolia, Morocco, Pakistan, Paraguay, Peru, Philippines, Serbia, Tajikistan, Thailand and Uzbekistan.

9. Applicants from the following States were invited to attend in person: Algeria, Argentina, Armenia, Australia, Bahamas, Bahrain, Belgium, Bolivia (Plurinational State of), Cambodia, Cameroon, Canada, China, Colombia, Côte d'Ivoire, Democratic Republic of the Congo, Ecuador, El Salvador, Ethiopia, France, Germany, Ghana, India, Iraq, Ireland, Israel, Italy, Jordan, Monaco, Kenya, Latvia, Lebanon, Madagascar, Malaysia, Mali, Mauritius, Mexico, Monaco, Mongolia, Morocco, Nepal, New Zealand, Niger, Nigeria, Norway, Pakistan, Paraguay, Peru, Philippines, Portugal, Qatar, Republic of Korea, Romania, Russian Federation, Rwanda, Senegal, Serbia, Sierra Leone, South Africa, Spain, Switzerland, Tajikistan, Thailand, Tunisia, Türkiye, Uganda, United Arab Emirates, United Kingdom of Great Britain and Northern Ireland, United Republic of Tanzania, United States of America, Uzbekistan and Zambia. Applicants from Kosovo³ were also invited to attend in person.

10. Forty-one speakers presented their entities' activities, including representatives of six national space agencies: Geo-Informatics and Space Technology Development Agency (GISTDA) of Thailand, German Aerospace Center (DLR), Italian Space Agency (ASI), National Aeronautics and Space Administration (NASA) of the United States, National Commission on Space Activities (CONAE) of Argentina and Space and Upper Atmosphere Research Commission (SUPARCO) of Pakistan. Representatives of

³ References to Kosovo shall be understood to be in the context of Security Council resolution [1244 \(1999\)](#).

the following regional and international organizations also presented their activities: Group on Earth Observations (GEO), ESA and WHO. Representatives of Governments, academia and non-profit and non-governmental organizations also attended the Conference.

IV. Programme of activities

11. The programme consisted of four main sessions, one for each area of interest. The first session was focused on telehealth and was divided into two sub-sessions: one on space solutions in support of telemedicine and telehealth and the other on space and digital solutions supporting health. The second session was focused on space solutions in support of tele-epidemiology and environmental health and was divided into two sub-sessions: one on tele-epidemiology and the other on environmental health. The third session highlighted uses of space life sciences, with an emphasis on space exploration and suborbital flights. The fourth session covered space solutions in support of disaster and health emergency management. In addition, there were posters on display throughout the Conference, both at the venue and online. The programme also included keynote addresses, scene-setting presentations and opening and closing remarks.

12. On the evening of the first day of the Conference, a reception was hosted by the Government of Switzerland. It provided an opportunity for participants to network and stimulated informal conversations, which increased the number of exchanges between participants during the following days.

A. Opening ceremony

13. In his opening remarks, the Deputy Permanent Representative of Switzerland to the United Nations Office at Geneva emphasized his Government's role in supporting the nexus between space and global health. He highlighted efforts to create synergies between the two areas for societal improvement and to foster interdisciplinary collaboration, with the Conference marking the first step in providing robust support for the development of the Space and Global Health Network.

14. The Senior Adviser to the Director of the Office for Outer Space Affairs underscored the importance of space technology in supporting efforts to achieve Sustainable Development Goal 3 (Good health and well-being), emphasizing its role in areas such as disease surveillance, all stages of the disaster management cycle, telemedicine and environmental monitoring. He also noted the efforts of the Office to highlight the benefits of space technology for the Goals, in the aforementioned areas in particular, through its various programmes, platforms and initiatives.

15. The representative of WHO highlighted the work carried out by WHO to tackle the multifaceted challenges in global health and the importance of data analytics and technology, including space technology, to address some of those challenges. He noted the role of the Conference in highlighting such links and addressing such challenges.

16. The representative of ESA welcomed the initiative taken by the Office for Outer Space Affairs to organize the Conference as a first step towards the implementation of the General Assembly resolution on space and global health. He mentioned that ESA had been eager to contribute funding to cover the participation costs of some participants in order to make progress towards the achievement of the Sustainable Development Goals and the implementation of the resolution.

17. The representative of the Space and Global Health Network highlighted the role of the Network and its mandate to bridge the gap between space technologies and the health sector. He welcomed the fact that the Conference was being held in Geneva, giving the Network an opportunity to strengthen links for the work it carried out.

B. Setting the scene

18. The “setting the scene” segment provided an overview of the structure and objectives of the Conference and expectations of relevant actors. It included presentations by representatives of the Office for Outer Space Affairs, WHO, the Space and Global Health Network, GEO and the Government of Switzerland.

19. The representative of the Office for Outer Space Affairs provided an overview of the structure and mandate of the Office. She also spoke of the work that had been carried out on space and health by the Committee on the Peaceful Uses of Outer Space in the lead-up to the adoption by the General Assembly of its resolution on space and global health and the organization of the Conference.

20. The representative of WHO focused on the importance of immunization and the fact that humankind was not on track to achieve the Immunization Agenda 2030 target of halving the number of zero-dose children by 2030. She also highlighted the role of space technology and satellite imagery in helping to advance immunization campaigns.

21. The representative of the Space and Global Health Network presented the mission of the Network and the work it was doing to promote effective collaboration on space and global health issues among Member States, United Nations entities, other international organizations and relevant actors, aiming at bridging gaps between the two domains by increasing collaboration and information-sharing. He added that the coordinator of the Network reported on a yearly basis to the Scientific and Technical Subcommittee.

22. The representative of GEO presented the work of the organization and the activities it carried out in the field of space and global health, including the work of the GEO Health Community of Practice and its structure, providing an overview of its projects and initiatives. He also presented the Global Heat Resilience Service, an initiative to support cities in tackling global warming as one of the consequences of climate change.

23. The representative of the Government of Switzerland welcomed the creation of the Space and Global Health Network, supported by the Space and Global Health Platform based in Geneva, highlighting both as concrete outcomes of extensive discussions by the Committee on the Peaceful Uses of Outer Space. She underlined the role of space research and technology, interdisciplinary dialogue and synergies in making progress towards the implementation of the General Assembly resolution on space and global health and in promoting good health and well-being as set out in the Sustainable Development Goals.

C. Keynote addresses

24. Three keynote addresses were delivered, providing an overview of a variety of topics connecting health and space and serving to frame the sessions that followed. Two of the addresses were provided by representatives of space agencies (ESA and NASA), and the third was given by a representative of WHO.

25. The presenter from ESA highlighted how Earth observation contributed to addressing global challenges such as climate change and health issues. He presented the Copernicus programme and its missions monitoring environmental factors, emphasizing its role in supporting European Union policies. He also presented the EO4Health Resilience approach integrating the areas of the Earth and human, and animal health using artificial intelligence. Initiatives such as the Waterborne Infectious Diseases and Global Earth Observation in the Nearshore project had helped to tackle waterborne diseases and predict outbreaks. ESA played a role in capacity-building and promoting satellite-based tools, demonstrating the importance of space in global health and environmental monitoring.

26. The speaker from NASA spoke about how technologies developed for space exploration, and in particular by NASA, had significantly advanced health care on Earth. Innovations for astronaut support had led to breakthroughs in prosthetics, pharmaceuticals and telemedicine. Technologies such as ceramic oxygen generators and the Mars Oxygen In-Situ Resource Utilization Experiment, initially developed for space, would make oxygen more readily available for clinics in austere environments, improving health and environmental outcomes. In addition, contributions by NASA in the areas of genomic sequencing and 3D printing could revolutionize treatments and medication development, exemplifying the impact of space technology on the production of tangible health-care solutions on Earth.

27. The speaker from WHO highlighted the importance of data in today's world and stressed the need for a global data governance framework to address the challenges of data as a public good, such as inequalities, biases and responsible use. He mentioned actions to tackle such issues, such as establishing universal data principles and a global data compact. He emphasized the crucial need for an international data governance framework given the significant impact that data could have and noted that, in a 2023 paper,⁴ the United Nations System Chief Executives Board for Coordination had set out steps for achieving such a framework.

D. Session on space solutions in support of telemedicine and telehealth and digital solutions supporting health

28. The session was divided into two subsessions, one on space solutions in support of telemedicine and telehealth and the other on space and digital solutions supporting health, with presentations on aspects such as privacy, machine learning and possible uses of the metaverse.

Subsession on space solutions in support of telemedicine and telehealth

29. Presentations were given by speakers from ESA, the University of Petroleum and Energy Studies (India), the Ministry of Health and Wellness (Mauritius) and the Salvadoran Institute of Social Security.

30. The representative of ESA discussed the relationship between health and space industries in the European context. His presentation covered health investment trends, commercial opportunities and emerging platforms in Europe, highlighting the alignment of ESA with global market trends. He also spoke about the growing impact of telemedicine and telehealth in space, emphasizing their importance in space health management. In addition, the speaker provided resources for further information on advancements made by ESA in health and biotechnology, underscoring the significance of the intersection between those sectors.

31. The speaker from the University of Petroleum and Energy Studies highlighted how space technologies had advanced telemedicine by extending its global reach, enabling real-time communication and improving emergency responses. Examples included telemedicine applications in the Amazon rainforest in Brazil, astronaut health monitoring by NASA and coronavirus disease (COVID-19) responses in India. Her presentation also covered technical aspects such as satellite communications, remote health monitoring, telehealth centres and the role of wearable devices in patient monitoring. She also spoke about challenges such as regulatory and technological barriers, which were noted as key issues needing solutions for telemedicine to fully realize its potential.

32. The representative of Mauritius addressed the ethical and legal aspects of telemedicine and telehealth, emphasizing the need for a unified legal framework to ensure consistent practices and quality worldwide. Key issues included licensing to guarantee qualified telemedicine practitioners and the protection of patient data amid privacy and security challenges. The speaker also highlighted the importance of

⁴ [CEB/2023/1/Add.2](#).

maintaining the integrity of the doctor-patient relationship in online settings, underlining the need for transparency, trust and ethical guidelines in digital health care to adapt to the unique dynamics of virtual interactions.

33. The speaker from the Salvadoran Institute of Social Security provided information on the use of telemedicine in El Salvador and showcased the Dr. ISSS online platform, a digital health initiative aimed at increasing the accessibility and continuity of medical services. Telemedicine had become an essential alternative in health-care delivery in El Salvador, enhancing the country's health infrastructure. Achievements and insights from the Dr. ISSS project were presented as a valuable case study for other countries looking to implement or improve their telemedicine and telehealth services, demonstrating the transformative impact of telemedicine in providing health care to more people more promptly.

Subsession on space and digital solutions supporting health

34. The second part of the session was devoted to space and digital solutions supporting health, with presentations from the Bern University of Applied Sciences (Switzerland), the International Space University (France) and ESA.

35. The representative of the Bern University of Applied Sciences highlighted the need for vigilance in digital health interventions, focusing on the risks and benefits of technologies such as digital therapeutics. Using patient sleep monitoring as an example, the speaker advocated for awareness-raising, responsible design, systematic adverse event assessment, global surveillance harmonization and clear reporting guidelines for digital health solutions. Those measures were emphasized as crucial for effective and safer oversight in the expanding field of digital health.

36. The speakers from the International Space University discussed the potential of the metaverse in the space sector, beginning with an overview of the technology as a virtual reality space where users interacted in real time. The speakers then discussed the benefits of combining the metaverse with artificial intelligence for space medicine, medical training and education, highlighting its potential to revolutionize learning and provide remote virtual solutions. They also emphasized the role of the metaverse in addressing global health issues, suggesting that its impact extended beyond space into broader health-care realms.

37. The representative of ESA discussed satellite products and machine learning technologies in environmental health research, highlighting how the AI4EO4Health initiative used standardized data for studying air pollution and weather patterns. She emphasized the importance of integrating environmental and health data for scientific insights and presented a web platform for easy data management and analysis. The presentation concluded with insights into the role of machine learning in data recovery and interpretation and upcoming research opportunities from ESA.

E. Session on space solutions in support of tele-epidemiology and environmental health

38. The session was divided into two subsessions: one on space solutions in support of tele-epidemiology and the other on environmental health.

Subsession on tele-epidemiology

39. Presentations were given by speakers from the University of Maryland (United States), Universidad Peruana Cayetano Heredia (Peru), Dipteron, CONAE and SUPARCO.

40. The speaker from the University of Maryland focused her presentation on how global environmental change complicated efforts to eliminate malaria, showing that since 2015 progress towards eradicating the disease had stalled, with one of many contributing factors being global environmental change. During the previous 20 years, driven by environmental change, malaria transmission potential had grown in some

areas of the world and declined in others. The presentation included an analysis of temperature, rainfall, vegetation greenness, land cover and land use as key environmental factors influencing malaria transmission potential, and it was shown that global environmental conditions favourable to the spread of malaria were improving overall, that human activity was a key factor and that more research was needed to understand the relationship between those variables.

41. The presenter from Universidad Peruana Cayetano Heredia also focused her presentation on malaria, pointing out that it remained a public health challenge despite efforts to control it. The disease was prevalent among high-risk, hard-to-reach populations in isolated areas, including Indigenous and mobile peoples. The speaker's research in the Peruvian Amazon involved developing an assessment to identify high-risk malaria zones, using spatial tools, geo-referenced infection and exposure data, ecological and environmental factors, remotely sensed data, and social factors, which were analysed with boosted regression trees.

42. The representative of Dipteron presented the application developed by the company to serve as an early warning system for dengue outbreaks in Brazil. The system involved gathering data and training an artificial intelligence model to predict outbreaks up to four weeks in advance. Hosted on a smart city platform in the cloud, the system aided in monitoring, planning and supporting emergency management logistics and helped reduce the costs associated with remediation actions and campaigns.

43. The representative of CONAE highlighted the work of the Mario Gulich Institute for Advanced Space Studies in providing geomatics tools for at-risk populations and developing an extensive information network across Latin America. The Institute specialized in creating risk maps, modelling outbreaks and epidemics and contributing to an online system for tracking diseases such as dengue and Chagas disease in Argentina. In addition, the Institute and CONAE were dedicated to capacity-building in Latin America and beyond, offering online postgraduate courses and a master's degree in Earth observation and modelling applied to environment and health.

44. The representative of SUPARCO discussed space technology applications for health care in Pakistan. The speaker gave an overview of the situation in Pakistan, the activities carried out by the country's space programme and its areas of application, highlighting the work carried out by SUPARCO in the realm of health care. The speaker gave examples of how remote sensing and geographic information systems were used to provide information and analytics about dengue, to map polio high-risk areas, to improve disaster management and emergency response and to study environmental applications in the health-care domain.

Subsession on environmental health

45. Presentations were given by speakers from GISTDA, the University of Southern California (United States) and UhDa Health.

46. The representative of GISTDA showcased the Life Dee platform for air pollution monitoring in the Province of Chonburi in Thailand. The objective of the platform, which was designed to address air pollution concerns, is to conduct spatiotemporal analysis of fine particulate matter concentrations, generate microclimate data, generate high-definition maps of urban areas and provide a user-friendly interface. The platform had been showcased in journals and at conferences and was expected to provide insights on the relationship between air pollution and hospitalizations. There were plans to expand it to also monitor dengue fever and heat stroke.

47. The speaker from the University of Southern California discussed the Urban Trees Initiative, which focused on urban greening to counteract global warming and air pollution. He shared insights from efforts to provide relief from heat in Los Angeles, highlighting community engagement and the evaluation of neighbourhoods

for optimal tree planting. Factors considered included household locations, street networks, transit stops and areas with high foot traffic. In addition, the impact of various tree species on pollutants such as fine particulate matter, carbon monoxide and nitrogen dioxide was assessed, and the outcomes of the project were presented.

48. The speaker from UhDa Health provided an overview of the company, a spin-off of UniversalDoctor that focused on data collection and health monitoring, combined with evidence-based behavioural change components, with the aim of delivering preventive interventions. It worked with municipalities, universities, civil society, research institutions and governments, helping to empower non-experts to create and deploy digital interventions and integrate health studies. UhDa Health also sought to improve the diagnosis process. The speaker presented the concept of the digital exposome and explained how the climate, the urban environment, diet and physical activity affected individuals' health. The variables of the exposome were interlinked and the relationships between them could only be uncovered through analysis of vast amounts of data.

F. Session on space life sciences

49. The third session was focused on space life sciences with an emphasis on space exploration and suborbital flights. The session featured speakers from Charité – Universitätsmedizin Berlin (Germany), ASI, DLR, the National Institute for Nuclear Physics (Italy), Universidad Católica Boliviana San Pablo (Plurinational State of Bolivia), Tor Vergata University of Rome (Italy), Bioviser and the International Association for the Advancement of Space Safety.

50. The speaker from Charité – Universitätsmedizin Berlin discussed the evolution of oxygen consumption measurement tools and the vulnerability of humans to heat exposure, particularly older persons and those with health conditions. Data from astronauts on board the International Space Station could be used to help better understand thermoregulation and how heat affects the performance of human activities. The speaker presented a study in Burkina Faso, where it was shown that even minor temperature increases could drastically reduce productivity and possibly soon render places such as Burkina Faso uninhabitable. The speaker emphasized the need for clear communication with policymakers and recommended leveraging European research capabilities to address challenges related to climate change.

51. The representative of ASI discussed the structure of the agency, including its Rome headquarters and Kenyan station. She highlighted its collaborations with 350 entities and innovative projects such as Prometeo, OVOSPACE and LIDAL. Key research areas included human pathophysiology, biomarkers, autonomous monitoring and the psychological effects of isolation. The speaker emphasized the terrestrial benefits of space research, such as developing health-care protocols for remote areas, enhancing telemedicine and advancing protective materials.

52. The speaker representing DLR highlighted the prevalence and preventability of eye diseases on Earth. He discussed spaceflight-associated neuro-ocular syndrome in astronauts and how smartphones equipped with artificial intelligence could be used for eye screening and diagnosis, contributing towards the achievement of the Sustainable Development Goals. He also spoke about how optical coherence tomography was effectively used for eye disease diagnosis on Earth, including methods that used artificial intelligence to detect Parkinson's disease. The speaker concluded that such technologies could help address global health challenges and be used to monitor eye health during deep space exploration.

53. The presenter drew parallels between space innovation and global health, outlining examples of recent artificial intelligence innovations for astronauts' eye health that could be useful for the 1 billion people living with avoidable visual impairments, primarily in low- and middle-income countries. Emphasizing the potential of machine learning and drawing on relevant research, the speaker suggested

using non-invasive methods for disease detection in space, which could also benefit remote, isolated areas on Earth.

54. The speaker from the National Institute for Nuclear Physics expressed gratitude for interdisciplinary collaboration, highlighting the Alpha Magnetic Spectrometer (AMS) programme at the European Organization for Nuclear Research, which united 44 institutes and was planned to run until 2030. He detailed the programme, which measured all components of space radiation, and discussed research areas such as cosmic ray detection and radiobiology. He mentioned the creation of the AMS space radiobiology collaboration in 2017 to foster knowledge exchange among researchers and students. He shared outcomes from a recent meeting in Italy and noted upcoming collaborations, including one with the National University of Singapore. He gave an overview of ongoing space radiation research and its practical applications in hospitals.

55. The presenter from Universidad Católica Boliviana San Pablo provided an overview of the diverse geography of the Plurinational State of Bolivia and how changes in sea level pressure affected human red blood cells. She explained the osmotic fragility test, which assessed red blood cells in hypotonic conditions to study fluid shift changes in hypergravity and their link to haemolytic anaemia. Future research plans included electronic microscopic studies. The speaker described the challenge of high reagent costs in her region compared to Europe and emphasized the need for global collaboration to address the issue.

56. The speaker from Tor Vergata University of Rome discussed experiments conducted on the ground and in suborbital flights to examine the impact of gravity on product design and engineering, specifically in drug powder mixing and coating. She outlined the history of industrial engineering in space and presented the new centre at Tor Vergata University, which was focused on researching life in space and its broad implications, including space law and safety issues. The centre also developed multidisciplinary proposals for space-related projects. The speaker concluded by emphasizing the potential of suborbital flights for medicine and global health, advocating for increased collaboration in that area.

57. The representative of Bioviser discussed advancements in space exploration and presented efforts undertaken in 2021 to make space exploration more accessible. He identified challenges, including the physical toll of space exploration, radiation exposure and isolation, suggesting counselling and other modern tools to mitigate risks. The speaker emphasized the importance of international collaboration for cost reduction and safety improvements, noting the need to overcome political and cultural differences, with the United Nations playing a key role. The speaker advocated for integrating space science into university curricula and promoting interactive learning environments.

58. The representative of the Human Health Research Planning Committee of the International Association for the Advancement of Space Safety discussed developing a programme to study the effects of space travel on civilians, including those with chronic conditions and disabilities. The global initiative aimed to enhance human performance, mitigate negative effects and provide personalized health care in space. It included focused research, countermeasures and data analysis, with a comprehensive plan set for release in December 2023 and a workshop at Oklahoma State University (United States) in January 2024 to improve space safety and accessibility.

G. Session on space solutions in support of disaster health and emergency management

59. The fourth session was focused on showcasing examples of the use of space solutions in support of disaster health and emergency management, with presentations from WHO, CEPT University (India), the Office for Outer Space Affairs, GEO and the SatCom Industry Association (India).

60. A first speaker from WHO emphasized integrating new technologies, particularly geographic information systems, into global public health initiatives for improved disease surveillance and response. He highlighted the role of geographic information systems in geo-enabled microplanning, combining satellite imagery and health data for better public health decision-making. He underlined the importance of collaborative data-sharing, citizen science and global initiatives in creating comprehensive data sets, in line with the Sustainable Development Goals, and in enhancing pandemic preparedness and health-care coverage.

61. A second speaker from WHO presented the ability of the Health Resources and Services Availability Monitoring System initiative to provide countries with an end-to-end solution for geographic accessibility modelling that encompassed the standardized and continuous collection, analysis and dissemination of core information on the availability of and accessibility to essential health resources and services. He underscored the demonstrated ability of the initiative to support decision makers in a large variety of contexts, from preparedness to emergency response, as well as health systems strengthening on issues such as needs assessment, prioritization, response planning and monitoring, and impact measurement. He advocated for its further expansion at the global level.

62. The speaker from CEPT University discussed the link between urban planning and public health, a connection made evident by the COVID-19 pandemic. He noted the historical neglect of health in urban infrastructure and the subsequent shift towards integrating health and well-being into urban planning. He emphasized the need for planners to include health facilities and public spaces in city designs, using a case study from Kerala, India, to show the integration of health components into urban planning. The study included analyses of health infrastructure efficiency, highlighting disparities in service delivery and reliance on public hospitals. The speaker concluded with suggestions for improved vaccination delivery, medical resources and infrastructure to strengthen public health in urban areas.

63. The representative of the Office for Outer Space Affairs presented the United Nations Platform for Space-based Information for Disaster Management and Emergency Response (UN-SPIDER), established in 2006 to provide Member States and organizations with access to space-based information and technology for disaster management. He emphasized its focus on using Earth observation data, satellite services and communications throughout the disaster management cycle, including response and preparedness. The speaker highlighted the importance of geo-information in disaster management. He explained the work of UN-SPIDER, which is structured around knowledge management, capacity-building workshops, technical advisory missions and the mobilization of international cooperation, especially in developing countries. The programme also involves a network of regional support offices and training for national agencies to request and manage space-based resources, enhancing the link between disaster management and space technology.

64. The representative of GEO emphasized the urgent need for a global heat resilience service in his talk on heatproofing cities. He explained the evolving role of GEO and its plans for a strategy focusing on “Earth intelligence”. The proposed global heat resilience service would utilize Earth observation data from GEO to address challenges related to extreme heat events, particularly in urban areas. The speaker highlighted the significant impacts of heat on health, economies and societal stability. The service will be designed to provide data, analytics and decision-support tools, broader support to policymaking and institutional capacity-building, and community engagement and awareness-raising to mitigate heat risks, especially in cities of the global South. He concluded by calling for collaboration and input for the project, which was set to be showcased at the twenty-eighth session of the Conference of the Parties to the United Nations Framework Convention on Climate Change.

65. The speaker from the SatCom Industry Association emphasized the key role of satellite communication in disaster and health emergency management in India. He highlighted how the association advocated for sector development, educational

partnerships and health sector support. He noted the organization's extensive partnerships and involvement with international initiatives and stressed the importance of satellite communication in various sectors, including telemedicine, defence and remote connectivity, especially in inaccessible areas. The speaker concluded with an invitation to space-related events and a commitment to expanding connectivity by 2025.

66. Representatives from WHO gave a lecture on population mobility mapping for outbreak preparedness, readiness and response, in which they emphasized the importance of understanding population movement in managing health emergencies. They highlighted the need for inclusive health-care services and collaboration with travel sectors for effective public health integration. Citing the Ebola virus disease outbreak in the Democratic Republic of the Congo, the speakers discussed the mapping of border crossings for targeted interventions, leading to successful disease containment. They concluded by emphasizing the importance of multisectoral collaboration and adaptable strategies in outbreak response.

H. Poster session

67. Five posters were submitted and included in the programme on the following topics:

(a) The Space and Global Health Network Platform, by the Geneva Digital Health Hub;

(b) The contribution of remote sensing in the risk assessment of cutaneous leishmaniasis, a case study of the region of Biskra in Algeria, by the Algerian Space Agency;

(c) A systematic review of the use of geographical information systems in epidemiology, by the health services of the Royal Armed Forces of Morocco;

(d) Space debris and its implications for global health, by the Wilson Center (United States);

(e) Exploring deep space medical capabilities, from LEO to Lunar, by ESA.

I. Closing ceremony

68. The representative of the Space and Global Health Network expressed appreciation for participants' engagement and emphasized the importance of the ongoing cooperation between his organization and the Office for Outer Space Affairs. The speaker invited participants to take an active role and join the Network. He expressed the hope that the discussions that had taken place at the Conference would be the starting point for collaboration and partnerships.

69. The representative of ESA highlighted the quality of the discussions and recommendations and said he looked forward to seeing advances in the use of space for global health and continuing to work with the Office for Outer Space Affairs in that regard and in the implementation of future activities.

70. The representative of WHO thanked participants for the discussions and presentations and said he looked forward to ongoing cooperation between the Office for Outer Space Affairs and WHO.

71. The Senior Adviser to the Director of the Office of Outer Space Affairs noted with satisfaction that the Conference had enabled interactions between emerging and developed space nations and among representatives from academia, civil society, international organizations and space agencies towards the objective of increasing awareness about the contribution of space activities to global health.

72. The Deputy Permanent Representative of Switzerland to the United Nations Office at Geneva welcomed participants' active engagement during the Conference

and the wide range of topics addressed in relation to space and global health. He encouraged attendees to further expand international and interdisciplinary collaborations and to pursue further engagement with the Space and Global Health Network after the Conference.

V. Observations and recommendations

73. The participants in the Conference welcomed the establishment and launch of the Space and Global Health Network, an open and flexible network of international organizations, governmental institutions, non-governmental entities, other relevant stakeholders and individuals willing to share experiences and expertise in the fields of space and global health and contribute to the development and use of services and tools supporting these goals.

74. Representatives of international organizations, governmental institutions, non-governmental entities, private entities and other relevant stakeholders and individuals were encouraged to join the Network using the letter of intent to that effect.

75. The participants in the Conference noted the progress in the development of the Space and Global Health Platform, including Implementome, a platform that connected members with similar interests and included tools, data, projects, publications and communities of practice. The aim of Implementome was to leverage collaboration among members and foster knowledge-sharing.

76. Participants encouraged space agencies and health authorities to proactively engage with the Space and Global Health Network by providing updates on and insights into their collaborative projects and endeavours for incorporation in the Space and Global Health Platform, and to make that information available to the members of the Network, thus enriching the collective expertise of the Network and fostering an environment conducive to innovation and enhanced cooperation.

77. Participants noted the planned activities of the Space and Global Health Network for 2024, which included meetings of the Network on the sidelines of the sixty-first session of the Scientific and Technical Subcommittee, to be held in Vienna from 29 January to 9 February 2024; in parallel to the seventy-seventh World Health Assembly during the Geneva Health Forum, to be held from 27 to 29 May 2024; and, tentatively, on the sidelines of the sixty-seventh session of the Committee on the Peaceful Uses of Outer Space, to be held from 19 to 28 June 2024.

78. Participants noted that, as the first global event aiming to implement the recommendations in General Assembly resolution [77/120](#) of 12 December 2022 on space and global health, the Conference had been effective in bringing together United Nations entities, intergovernmental organizations, Governments and private-sector entities to pursue coordination on key space activities relevant to global health.

79. It was also noted that discussions at the Conference had been enhanced by the involvement and contributions of a wide range of stakeholders from both the space and health sectors, including representatives of national health authorities, space agencies, academia, international organizations, governmental institutions, non-governmental entities and other stakeholders.

80. Several examples of formalized cooperation between health authorities and space agencies were presented during the Conference, including from ESA, ASI, DLR, NASA, CONAE and SUPARCO.

81. The importance of cooperation and knowledge exchange between entities in the space and health sectors was emphasized by participants, and it was recommended to continue pursuing and sharing cooperative activities and initiatives as a foundational resource for ongoing dialogue and development within the Space and Global Health Network.

82. Participants noted that continued participation in future conferences and activities aimed at raising awareness, as well as the expansion of participation to a wider range of stakeholders, including representatives from industry and venture-capital and financing firms, would assist with the practical aspects of identifying problems, implementing solutions and commercializing innovations.

83. Examples of national-level legal and ethical issues were presented and participants expressed the need to advance policy and governance mechanisms, including to address concerns regarding health data privacy, data-sharing, data standardization and liability, at transnational, national and local levels, triggering further discussions and highlighting the complexity of these topics. In that regard, participants were encouraged to liaise with relevant United Nations entities.

84. The identification of issues and concerns, as well as existing policies and regulations, could be taken as a first step towards establishing mechanisms to facilitate the development of space-based technologies in support of global health. Participants recognized the need to advance further in terms of organizational and technical interoperability.

85. There were presentations on the use of remote sensing data and geographic information systems and their role in preventing and forecasting health issues and guiding decision makers, with concrete examples in areas such as urban heat, air pollution and vector-borne, waterborne and soil-related diseases. The use of machine learning, artificial intelligence and data modelling techniques were also discussed during the Conference.

86. Acknowledging that the applications presented during the Conference made use of existing and mostly freely available sensors, it was recognized that a thorough needs assessment should be conducted to understand the appropriate spatial resolution for each application and to identify potential needs for very high resolution data in some applications.

87. Variables such as temperature, humidity, particulate matter, carbon monoxide and dioxide concentration, land cover and use, and other environmental data were identified as important for risk assessment. Along the same lines as the essential climate variables, it was recommended to create a list of public health monitoring requirements and essential variables that could be captured by space systems and associated applications to reduce the risk of monitoring gaps.

88. Participants recommended organizing an event devoted to the space industry and health at a future session of the Scientific and Technical Subcommittee or of the Committee on the Peaceful Uses of Outer Space to raise awareness among Member States.

89. Conference participants were made aware of the efforts by WHO to geotag health facilities and make a master list publicly available as part of an ongoing project in collaboration with ministries of health.

90. Conference participants highlighted the use of the space environment, including space stations and suborbital flights, in the field of space medicine, with presentations on applications in fields such as ophthalmology, osteoporosis, human thermoregulation, radiation research and space manufacturing for medicine.

91. It was highlighted that, although there was limited data from participants in spaceflights, a gender imbalance existed, due to the overrepresentation of men as compared to women, which presented challenges to understanding specific health issues. Space agencies were encouraged to continue broadening the participation of women in space exploration, including through the Space4Women initiative of the Office for Outer Space Affairs.

92. Participants noted the benefits of the Access to Space for All initiative of the Office for Outer Space Affairs in promoting cooperation and equal opportunities for accessing space and conducting space research.

93. Participants recommended the creation of dedicated offices within space agencies to serve as pivotal instruments in facilitating the transition of scientific and technological advancements from the conceptual stage to market-ready products and services, thereby maximizing their impact and accessibility, and with the express purpose of bridging the divide between research initiatives, innovative health projects and their subsequent use and commercialization.

94. Participants acknowledged the work of UN-SPIDER concerning disaster management and emergency response and in working with Member States to develop recommendations for the disaster management cycle.

95. Successful examples of multidisciplinary capacity-building efforts bridging space and health were discussed, and it was recognized that more efforts were needed. Participants recommended advocating for improving education through the creation of a space and global health curriculum and a comprehensive list of relevant use cases to drive capacity-building and awareness-raising efforts.

96. Due to the complexity of the issues discussed during the Conference, participants recommended further discussions and the creation of a short-term action plan and a longer-term strategy for the implementation of actions supporting the General Assembly resolution on space and global health.
