United Nations A/AC.105/895

General Assembly

Distr.: General
15 November 2007

Original: English

Committee on the Peaceful Uses of Outer Space

Report on the United Nations/Mexico/Pan American Health Organization Training Course on Satellite Technology for Tele-health

(Mexico City, 25-29 June 2007)

Contents

V.07-88131 (E) 171207 181207

I. Introduction

A. Background and objectives

1. In the resolution entitled "The Space Millennium: Vienna Declaration on Space and Human Development",[1] the States participating in the Third United Nations Conference on the Exploration and Peaceful Uses of Outer Space (UNISPACE III) recommended that activities of the United Nations Programme on Space Applications promote collaborative participation among Member States at both the regional and international levels by emphasizing the development and transfer of knowledge and skills in developing countries and countries with economies in transition.

2. In its resolution 59/116 of 10 December 2004, the General Assembly endorsed the United Nations Programme on Space Applications for 2005, which had been endorsed by the Committee on the Peaceful Uses of Outer Space at its forty-seventh session.[2]

3. In accordance with the recommendation of UNISPACE III on the use of space applications to improve public health services, the United Nations Programme on Space Applications for 2005 included the Workshop on the Use of Space Technology for Human Health for the benefit of the countries in Latin America, organized by the United Nations, Argentina and the European Space Agency (ESA). The Comisión Nacional de Actividades Espaciales (CONAE) of Argentina hosted the Workshop, which was held in Córdoba, Argentina, from 19 to 23 September 2005. The Workshop marked the beginning of a new series of activities dedicated to tele-health and tele-epidemiology issues.

4. The Workshop had two main outcomes: participants established the task force on health using space technologies for the Latin American and Caribbean region; and participants agreed to implement a regional initiative to strengthen activities in the field of tele-epidemiology (A/AC.105/860, paras. 85 and 86).

5. In its resolution 61/111 of 14 December 2006, the General Assembly endorsed the United Nations Programme on Space Applications for 2007, which had been endorsed by the Committee on the Peaceful Uses of Outer Space at its forty-ninth session.[3]

6. Pursuant to General Assembly resolution 61/111 and in accordance with the recommendation of UNISPACE III, the United Nations/Mexico/Pan American Health Organization Training Course on Satellite Technology for Tele-health, organized in cooperation with the National Centre for Health Technology Excellence (CENETEC) of the Ministry of Health of Mexico and hosted by the National Autonomous University of Mexico (UNAM), was held in Mexico City

---

[1] *Report of the Third United Nations Conference on the Exploration and Peaceful Uses of Outer Space, Vienna, 19-30 July 1999* (United Nations publication, Sales No. E.00.I.3), chap. I, resolution 1.

[2] *Official Records of the General Assembly, Fifty-eighth Session, Supplement No. 20* and corrigenda (A/59/20 and Corr.1 and 2), para. 71.

[3] *Official Records of the General Assembly, Sixty-first Session, Supplement No. 20* (A/61/20), para. 87.

from 25 to 29 June 2007. It was the third activity of the United Nations Programme on Space Applications to be dedicated to tele-health and tele-epidemiology issues related to the use of space technology.

B. Programme

7. Opening statements were made by representatives of the Ministry of Health of Mexico, CENETEC, UNAM, the World Health Organization (WHO), the Pan American Health Organization (PAHO) and the Office for Outer Space Affairs of the Secretariat.

8. Keynote addresses were given by the representatives of WHO and eSalud Américas. A total of 29 presentations were made during the thematic sessions. Two round-table discussion sessions, as well as observation and recommendation sessions and three technical visits, were also organized. All sponsored participants made presentations on the status of the use of tele-health and tele-epidemiology programmes for the improvement of public health services in their respective countries.

9. Discussions were held with the aim of finding solutions and follow-up activities to address the regional problems identified by participants.

10. Common problems in the countries of Latin America and the Caribbean underline the need for a better understanding of tele-health and tele-epidemiology. Participants identified three main deficiencies requiring the following actions: the establishment of standards for health data and communications, the definition of a training strategy and the reduction of the digital divide. Participants made recommendations, which are contained in section III below, to address those regional problems.

C. Attendance

11. Nearly 100 participants from the following countries and territories and international organizations attended the Training Course: Anguilla, Argentina, Brazil, Canada, Colombia, Costa Rica, Ecuador, France, Mexico, Netherlands, Paraguay, Saint Kitts and Nevis, Saint Vincent and the Grenadines, United States of America and Venezuela (Bolivarian Republic of); and the Office for Outer Space Affairs, WHO, PAHO, ESA and the Latin American and Caribbean Chapter of the American Telemedicine Association.

12. Funds allocated by the United Nations and CENETEC were used to defray the cost of air travel, accommodation, daily subsistence and transportation for 15 participants.

13. The Training Course was supported by CENETEC, which was established in 2004 to provide decision makers with information on the appropriate use, management and assessment of health technology and whose mandate includes the implementation of information systems and telecommunications technologies in health-care services, in particular for poor and rural areas of Mexico. The Training Course was hosted by UNAM, and facilities were provided by the Universum Science Museum of UNAM.

II. Summary of presentations

Action taken by the World Health Organization

14. Target 18 of the Millennium Development Goals (A/56/326, annex) is, in cooperation with the private sector, to make available the benefits of new technologies, especially information and communications technologies.

15. In its resolution 58.28 of 25 May 2005,[4] the fifty-eighth World Health Assembly of WHO stressed that e-health, which is the use of information and communications technologies in support of health and health-related fields, including health-care service, health monitoring, health literature and health education, was cost-effective and secure.

16. WHO has determined that the introduction of communication technologies is crucial to improving health services and that equitable access, cost recovery and quality of service are also important.

E-health infrastructure in Latin America and the Caribbean

17. At present, of the 1,491 projects recorded in the database of information and communication technology projects (PROTIC) of the Observatory for the Information Society in Latin America and the Caribbean of the Economic Commission for Latin America and the Caribbean, 88 projects (that is, 5.9 per cent of the total) belong to the health sector.

18. Of those 88 projects, 45.5 per cent are aimed at establishing a knowledge repository for technical and scientific publications, guidelines, best practices and lessons learned; 15.9 per cent focus on providing access to information and communications technology resources; 13.6 per cent are related to education and prevention applications; and only 11.4 per cent focus on the establishment of direct clinical care, epidemiology or education through practical training.

19. The private sector was the most frequent leader, leading 31.8 per cent of the 88 projects, followed by international and national agencies, which led 23.8 per cent of projects. The private sector was the most frequent source of funding.

20. Telemedicine, which is the use of information and communication technologies for remote clinical consultation, case reviews and second opinions, as well as e-health, are at a relatively early stage of implementation, even in developed countries.

21. The information systems and networks used in health-care systems are vulnerable to a wide variety of threats because of their extensive connectivity to public networks, the use of off-site application-hosting and data storage, the ubiquity of portable equipment and small, high-capacity mass storage devices in the field and the inherent vulnerability of computer code. Those threats compel organizations and users to adopt work procedures that can provide effective, consistent and continuous protection from human and environmental threats to information and communication systems and data. New and evolving threats and

[4] See World Health Organization, *Fifty-eighth World Health Assembly, Geneva, 16-25 May 2005, Resolutions and Decisions, Annex* (WHA58/2005/REC/1).

vulnerabilities stemming from unintentional or malicious user activity (for example, by disgruntled or ideologically motivated employees, hackers, criminals, intelligence agents or terrorists) are continually being discovered, and the technical resources needed to conduct anonymous attacks can easily be obtained.

22. National and regional initiatives in the area of information and communication technology in the Latin American and Caribbean region require investment to develop and deploy infrastructure, establish open architecture and ensure sustainability. In addition, Governments can stimulate implementation of information and communication technologies by establishing policies and strategies for standardization, ensuring the cost-effective use of technology and by making available the information required to sustain e-health projects.

23. To further implementation of e-health services, Governments must, as a priority, promote education, training and national capacity-building; establish entities responsible for the implementation of standards ensuring the interoperability of systems and services; fund research and development; ensure the equitable distribution of resources; protect security, privacy and intellectual property rights; and introduce regulations to promote cooperation in e-health activities.

Satellites for Epidemiology project of the European Space Agency

24. There is a growing risk of epidemics and emerging and re-emerging diseases such as avian flu and Chikungunya fever. Fortunately, such risks can be contained through measures for prevention, early warning and prompt management. In that context, although the current early warning and response systems of Europe are well-developed, they can further benefit from satellite services.

25. The detection and monitoring of potential risks has become an important part of “epidemic intelligence”, and surveillance systems are being adapted to address the risk of epidemics spreading to Europe from less-developed areas. Health-related early warning systems based on satellite communications, for use in remote, inaccessible areas and areas prone to natural and man-made disasters, can significantly limit the risk of outbreaks and the effects of epidemics and contribute to resolving major public health issues. From an economic point of view, satellite communications can save money by facilitating rapid, coordinated responses and the optimal deployment of resources during the execution of an emergency plan.

26. The Satellites for Epidemiology (SAFE) project, co-funded by ESA, will develop and demonstrate the added value of satellite communication services, including low- and high-bandwidth access to the Internet, geolocalization and cooperation in all phases of a biological crisis, including prevention, early warning and crisis management. ESA aims to use SAFE to determine how satellite services, by providing or restoring access to information, can be integrated in European health-care systems and be used by civil protection authorities.

27. The SAFE project is part of a transitional phase of telemedicine via satellite that ESA has undertaken to prepare the way for the creation of a European programme on user-driven telemedicine via satellite, which will be carried out in cooperation with WHO.

28. SAFE has three components: monitoring of biological and disaster signals (“e-care”); data collection, reporting and statistical analysis (“e-surveillance”); and

the provision of objective information to public health authorities and decision makers (“e-governance”).

Experience of Anguilla and Trinidad and Tobago

29. The experience of Anguilla in the field of information and communication technology applications for health services is specifically related to teleradiology. After teleradiology had been proposed as a solution to the territory’s needs, the equipment required to support a teleradiology service was determined. The low-cost solution of using a high-resolution digital camera was chosen. The experience demonstrated that teleradiology is prohibitively expensive and would not be feasible without additional subsidies.

30. The Caribbean Medical Imaging Centre (CMIC) and Imaging Services Ltd. of Saint Vincent and the Grenadines provide patient images for teleconsultations, using links to centres in Anguilla and Trinidad and Tobago. The infrastructure used for the service consists of a satellite communication link, a computer at the receiving station, a computer at the image-sending station and a digitizer. The use of teleradiology is limited by funding options, a lack of trained personnel and a lack of awareness among decision makers.

31. CMIC has undertaken numerous teleradiology projects in the Caribbean subregion. In 2002, it established a pilot project with a private imaging centre in Tobago to compensate for the lack of a resident radiologist. Previously, a patient’s X-ray images had to be sent by courier from Tobago to a radiologist in Trinidad, and the radiologist’s report was then sent back to Tobago by courier, a process that took a week to complete. The pilot project successfully ran for six months, until the services of a radiologist that frequently visited Tobago were secured.

Experience of Argentina

32. Earth observation satellites are indispensable for monitoring the environment. In addition, the close links between environmental conditions and infectious diseases (such as vector-borne, rodent-borne and water-borne diseases) have been recognized. Thus, satellite imagery can be used as a powerful tool not only to accurately monitor the evolution of environmental and geophysical parameters but also to gain knowledge and understanding of environment-related diseases.

33. The advantages of using satellite-based remote-sensing in tele-epidemiology include the global coverage of the Earth, its ability to make observations at various resolutions, the frequent repetition of observations and the digital format of the images.

34. Satellite-based remote-sensing and geographical information systems can give health services a new perspective on the problems faced and new tools to understand them. The continuous monitoring of environmental conditions allows for early warning of diseases. At present, the use of remote-sensing technology for health services allows experts to contribute to a new field of applications that have a high social impact.

35. CONAE of Argentina, upon the request of the Ministry of Health, prepares elaborate risk maps for the monitoring and control of infectious diseases such as

malaria, dengue fever, Chagas' disease, leishmaniasis, hantavirus pulmonary syndrome and viral haemorrhagic fever.

36. Tele-epidemiology projects developed so far include a map of malaria risk prepared using data from satellite-based synthetic aperture radar, satellite-based radiometer measurements of lead contamination, a study of the evolution of the spread of dengue fever and a study of Chagas' disease.

Experience of Brazil

37. In 2006, the Ministry of Health of Brazil established the Permanent Commission on Tele-health, whose main objective is to promote and follow up on tele-health initiatives and projects in Brazil. The Commission comprises participants from various entities, including PAHO, the Federal Council of Medicine and various universities.

38. The Brazilian experience has shown that tele-health projects are providing better health care for several small and remote Brazilian cities. In addition, teleconsultations, second opinions and telemetrics have been shown to be effective in improving the quality of care and in lowering costs by eliminating unnecessary patient referrals. The equipment used to date is inexpensive. The Internet, in combination with open source applications, is the chosen infrastructure.

39. The national e-health project in Brazil was undertaken to improve the quality of primary care, give training to health professionals and improve cost-effectiveness. The policy of the Government of Brazil on health informatics was implemented to make adequate use of information technologies in the field of health care, in particular to promote quality of care and for disease prevention. The strategies used include electronic health records, national identification numbers and the strengthening of human resources in health informatics.

40. The national health-care system of Brazil uses unique health-care identification numbers for individuals (116 million people identified) and health providers (153,903 health providers identified).

41. The National Research and Education Network of Brazil, a specialized Internet service provider that was established in 1989 to promote the innovative use of advanced networking in the country, currently connects 329 Brazilian institutions and foreign institutions. The network is part of the Latin American Cooperation of Advanced Networks (CLARA). The connection of CLARA to Europe is funded by the European Commission.

42. Successful tele-health projects in Brazil include the following:

(a) The BH Telesaúde project provides online, real-time teleconsultations with specialists and permits the sharing of clinical data and images. It also provides for offline teleconsultations, enabling second opinions via a secure channel in cases requiring specific advice;

(b) The Minas Telecárdio project, which supports telecardiology, implements and measures the effectiveness of the telemedicine system used to deliver cardiovascular care to 82 small towns in the state of Minas Gerais;

(c) The Telemedicine University Network (RUTE) supports the improvement of existing telemedicine infrastructure in university hospitals and promotes the integration of participating institutions.

Experience of Canada

43. The Communications Research Centre Canada found that no single type of network could be recommended as a complete solution for tele-health services but that each network type had its place within a combined network. Hybrid satellite networks (two or more types of networks used together to achieve seamless end-to-end connectivity) are the network designs normally used in Canada to access rural and remote communities.

44. Point-to-multipoint satellite networks are used in tele-health applications. In systems where traffic flows from multiple remote locations to a single central location, network administration is required at the hub to control traffic. In such a set-up, equipment is more expensive, but costs can be recovered over time because of the increased bandwidth utilization. Moreover, the cost of remote infrastructure is lower, because the hub station uses a large dish antenna, permitting smaller dishes to be used at remote sites (for example, a 5-metre antenna is used at the hub site, and 1-metre antennas at remote sites).

45. The basic telemedicine platform consists of videoconference equipment to transmit digitized data. Peripherals can include a dermatology camera, an otoscope, a stethoscope, an X-ray machine and ultrasound equipment. Any information that can be digitized can be sent using satellite-based communications.

46. Modern pharmaceuticals enable patients with severe mental illness to live at home, with intensive support from psychiatrists, registered nurses and social workers. For eligible individuals, home care is a less expensive and more effective option than hospitalization. The Remote Assertive Community Homecare (REACH) project of Canada provides a way to reduce the cost of home care by more than 20 per cent, while improving the quality of care offered to patients.

47. In the framework of the Smart Labrador project, 21,000 kilograms of technologically advanced equipment were installed to connect 39 sites in 25 communities in the province of Newfoundland and Labrador, Canada, within an overall area of 294,330 square kilometres. The communities involved used innovative technologies to enhance their traditional way of life. Nine core tele-health services were provided using the concept of the remote communities services telecentre.

48. Under that concept, a community site is established in a building that is accessible to the public, such as a school, for use by the general public. A second community site is established in a community health clinic or hospital, for exclusive use by health sector staff. The network backbone provides connectivity between sites using a satellite connection and sites using a terrestrial connection and provides connectivity outside the Smart Labrador network.

49. The Smart Labrador project provides health services such as remote medical consultations and diagnosis, consultations with specialists, continuing education and professional development for health-care workers, teleradiology, storing and forwarding of medical files, telepsychiatry and administration and management. In a

one-year period, 250 tele-health videoconferences and a total of approximately 600 conferences took place in Labrador.

50. Future projects will increase mobility by using Ka-band to reduce the size of satellite terminals, making it possible to carry briefcase-sized terminals or to mount terminals on small vehicles, such as cars and small trucks, that are equipped with a tracking device. Such systems using broadband cellular connectivity and hand-held terminals could be deployed in urban and other areas where cell-phone infrastructure exists, for use by ambulance units, emergency first responders and nursing and home care patients.

51. The experiences in tele-health acquired through the project suggest that all applications and services using information and telecommunication technologies for remote access, such as justice, education, government and community services, should be combined in order to share the costs among the largest possible user base, because the use of such infrastructure in small remote communities for tele-health alone is expensive and difficult to sustain.

52. The drawbacks of tele-health are the steep learning curve that it presents for medical staff and patients and the resistance of both those groups to change. Patients and medical staff need time to become comfortable with the practice of tele-health.

Experience of Colombia

53. Satellite communication technology offers an environment for tele-health solutions in the countries of Latin American and the Caribbean, where limited access to communication systems hinders the building of effective networks to share expertise. In Colombia, operational telemedicine programmes were carried out using the existing connectivity of hospital networks or the services provided by telecommunication operators.

54. Communication technologies can be used to create mobile initiatives and facilities in the area of health care. The Colombian Telemedicine Centre makes use of such mobile e-health initiatives, such as its mobile care units.

55. A project financed in part by the Information Society Technologies programme of the European Commission, called “@HEALTH”, aims to support and stimulate international cooperation in the e-health sector among European and Latin American organizations and to stimulate joint research, the transfer of technology and market opportunities that link Europe and Latin America. The “@HEALTH” project developed the e-Health Virtual Community, a web portal giving those involved in e-health in Europe and Latin America a forum for communication and the exchange of experiences.

56. The Ministry of Communications of Colombia has determined that very small aperture terminal (VSAT) networks are the most attractive option for providing broadband access to IP-based services in rural and remote areas. In addition, the VSAT networks must be integrated with terrestrial “last-mile” (local access) solutions in order to reduce service costs. Thus, satellite networks must be used to provide access to information and communication technologies in those areas. Among the digital services to be provided in such areas, tele-health and telemedicine applications remain among the highest priorities. But such applications place great demands on the network infrastructure. Because human lives are at

stake, the quality of service of the network, including network availability, must be higher than what commercial services can provide. Those greater demands increase the cost of such applications.

Experience of Ecuador

57. In Ecuador, mobile surgery has been adopted as an innovative way to deliver high quality surgical services to underserved areas of the country. The system has proven to be safe and cost-effective, with a low complication rate. The extensive geographical area covered, as well as the remote and rural nature of the environment, pose a challenge for pre-operative and post-operative care. However, the use of telemedicine applications can be used to overcome the long distances involved and carry out patient selection, on-site organization, intra-operative consultations and patient follow-up.

58. There are several systems for establishing connectivity between two points to carry out telemedicine services: fixed telephone lines and dial-up Internet connections for real-time consultation and the storing and forwarding of images, as well as ISDN and satellite connectivity. Two laptop computers and a desktop computer have been used for the hardware requirements, and, occasionally, a rapidly deployable telemedicine unit has been used.

59. Telemedicine has been used, in the pre-operative phase, for consultations and patient selection, thus reducing the time that medical teams require for pre-operative procedures during their visits to remote sites, leaving them more time for the actual operations. Several projects for intra-operative procedures were carried out: the monitoring of surgery from a remote location (“teleanaesthesia”); an experience in which a resident surgeon safely completed a laparoscopic cholecystectomy in the jungle of Ecuador under the guidance of a laparoscopic surgeon located in the United States (“telementoring”); an experience in which consultants at a remote location identified anatomical features and participated in the decisions taken during a surgical operation (“telepresence”); and teleconsultations. Telemedicine was also used for post-operative procedures: patient follow-up meetings were conducted remotely to examine surgical wounds for signs of potential complications.

60. Telemedicine has made the mobile surgery programme more effective in several areas: patient selection, anticipation of the medical supplies needed for surgical missions; and reduction of the time required for pre-operative planning at remote locations. Telemedicine also permits reliable post-operative monitoring of patients until they have completely recovered, thus overcoming one of the main limitations of intermittent mobile surgery services. Telemedicine is an invaluable aid in those areas of the country where patients have limited access to an experienced surgical team.

61. As in other countries, the Ecuadorian experience in telemedicine and tele-health began, many years ago, with the use of information and communication technologies in remote areas. Telephone, radio and the Internet have been used for the storing and forwarding of information, and Internet and satellite connectivity, when available, have been used for videoconferences. Most of the initiatives have been supported by national and international private funding.

62. One such initiative, the Ecuadorian Foundation for Telemedicine and e-Health, aims to create a network of information, expertise and projects in the field of health

care and, to that end, has made strategic alliances with local universities and institutions. At present, the Foundation contributes to a team led by the Ministry of Health of Ecuador that is working to create a national telemedicine and tele-health plan.

63. The Foundation has planned the following three initial projects in three areas of Ecuador:

(a) The Zapallo Grande (coastal area) project for 120 communities in the northern province of Esmeraldas that can be reached only by navigation along the Cayapas and Santiago rivers. The communities, whose inhabitants are Chachi Indians and Afro-Ecuadorians, have almost no electricity, water or communication infrastructure;

(b) The Galápagos project serves the inhabitants from the main islands of the archipelago. Given the larger number of tourists visiting the islands, tourism will be used as a sustainable source of private sector financing for the project;

(c) The Zumbahua (Andean area) project is located in the province of Cotopaxi, where a large percentage of the population is under the age of 15 years and where there is little or no basic services or communication infrastructure. Respiratory diseases such as tuberculosis are prevalent in the area.

64. The communities involved in those projects will be linked to university clinics and specialists in order to provide support for prevention, diagnosis, treatment and continuous education and to monitor statistics on disease control.

Experience of Mexico

65. In January 2000, the Government of Mexico proposed a national health programme with three main components: teleconsultations; tele-education for medical professionals; and electronic medical content, to be provided, in particular, in local languages. Relying on those three components, the programme provides support for rural medical centres, reduces the barriers that hinder access to medical professionals and services and creates electronic medical content for both the general public and medical professionals.

66. Electronic health-care services provided in Mexico include health information for citizens and medical professionals as well as medical support using teleconsultation services for primary and specialized health care.

67. In Mexico, telemedicine is used in the states of Guerrero, Oaxaca, Puebla, Nuevo León, Chiapas and Tamaulipas, with the participation of national institutions specializing in cardiology, nutrition, rehabilitation, orthopaedics and paediatrics. Projects to develop information systems are being implemented in Sinaloa and Puebla.

68. In Mexico, telemedicine has been applied in the fields of radiology, cardiology, pathology, dermatology and ophthalmology, with some experiences in telesurgery and remote care in emergencies. The latest project is in the use of telemedicine for psychiatry.

69. The Institute for Social Security and Services of State Workers (ISSSTE) provides special medical services to 23 states with a total population of 5 million. Teleconsultation services has helped to reduce patient trips by 47 per cent. Using the

Institute's tele-health system, 7.2 million appointments in 168 health units have been carried out.

70. The Mexican Social Security Institute (IMSS) carries out various activities to improve telemedicine applications for public health, such as electronic health records, the scheduling of appointments, an e-library and the specialized medical health units implemented in the framework of the VISTA information system.

Experience of Paraguay

71. It is estimated that some 400,000 people in Paraguay are infected with Chagas' disease. Approximately 1,000 of those individuals have developed or will develop heart disease. By introducing telemedicine services, the Government of Paraguay seeks to optimize specialized medical treatment in areas where Chagas' disease is endemic.

72. Chagas' disease is a major public health problem not just in Paraguay but in many countries of Latin America. Approximately 10 million Latin Americans are infected with Chagas' disease, and at least 1 million of those infected will die if political and medical decisions are not soon taken.

73. A health network will be implemented throughout 37 districts in the departments of Paraguarí and the Cordillera of Paraguay. More than 40 health-care centres operating in those areas will treat patients at six remote units. The proposed project is the first of its type in the country. It will not only be able to diagnose Chagasic cardiopathy but also identify patients before the disease further develops. In addition, the project will determine the impact of the endemic disease in Paraguay, in terms of morbidity and mortality, which is so far unknown.

74. A total of 1,850 infested houses were detected during an inspection of a total of 96,500 houses during an entomological inspection carried out from October 1999 to July 2000, and the infested sites were mapped using the global positioning system (GPS). These areas presented a dispersion rate of infested communities higher than 50 per cent in those 37 districts. Between 150 and 220 infested dwellings were detected and mapped using GPS in each year of the later surveillance period 2002-2006.

Experience of Saint Kitts and Nevis

75. Telemedicine was introduced at the general hospital of Saint Kitts and Nevis in 1998, using a communication link with a university in Nova Scotia, Canada. Although there had been a general familiarity with the capabilities and advantages of telemedicine, the concept had not been fully accepted, perhaps due to a lack of awareness of how helpful the technology can be in today's environment. Ultimately, two areas of telemedicine were practiced: teleradiology and videoconferences. Owing to the absence of a radiologist, teleradiology had been performed on a large scale for approximately two years, with the X-ray images being digitized and sent to a hospital in Halifax, Canada, until a resident radiologist had been found. The hardware required for teleradiology remained in place, although upgrades and improvements were needed. Videoconferences had been carried out periodically but had come to a halt due to technical difficulties with the configuration of the ISDN lines used for transmission. Other areas of telemedicine had been discussed but had

not been implemented, in large part because the technicians had not been able to configure the lines for transmission.

Experience of Saint Vincent and the Grenadines

76. In Saint Vincent and the Grenadines, digitized results of X-ray images have been downloaded using a dedicated Internet connection, but that process is time-consuming and requires great attention to the details of file management for the digital images. Despite those difficulties, that method has been used to transmit more than 200 chest X-rays. However, the high cost of advanced teleradiology systems has prevented CMIC from offering the service on a full-time basis. It is hoped that with additional training, a more efficient teleradiology system that is suitable for the country can be assembled.

Experience of Venezuela (Bolivarian Republic of)

77. The objective of the tele-health project in Venezuela (Bolivarian Republic of) is to design, develop, implement and integrate a telematic system for consultation, diagnosis and education in order to improve access to good quality health services. In that context, the capacity of the public health system will be enhanced in order to overcome problems, and health-care personnel located in remote areas of the Amazonas will be trained.

78. The Venezuelan Society of Telemedicine and e-Health (SVTeH) is a multidisciplinary group that supports telemedicine, tele-health and e-health applications. SVTeH assists national programmes in telemedicine and tele-health and has facilitated the exchange of information and cooperation at the national and international levels.

79. Currently, SVTeH participates in national and regional projects to increase access to telemedicine and new applications of technology and to improve connectivity using WiFi, Code Division Multiple Access (CDMA), the Global System for Mobile Communications (GSM) and VSAT platforms in remote communities with access problems.

80. In particular, SVTeH is implementing a project to create a tele-health network in Venezuela, in order to enhance the national public health system through the use of information and communication technologies in selected areas of the country. That tele-health network project is complemented by five subprojects in the following areas: a study on connectivity for the new national public health system; standardization; application of informatics in health care; telemedicine for specialized fields, consultations and diagnostics; and education and training. Another pilot project uses telemedicine to address hygiene issues for the rural indigenous population of the state of Bolívar.

Latin American Group on Tele-epidemiology

81. The Latin American Group on Tele-epidemiology was established in 2005 as part of the outcome of the United Nations/Argentina/European Space Agency Workshop on the Use of Space Technology for Human Health for the benefit of the countries in Latin America, held in Córdoba, Argentina, on 19-23 September 2005 (A/AC.105/860).

82. The Group is supported by PAHO, ESA, the Office for Outer Space Affairs and a network of international universities. The Group's objectives are to establish a regional alliance to facilitate the development and exchange of space technology applications in the public health sector, for the benefit of the countries of Latin America and the Caribbean.

83. To date, the Group has participated in the following international events: the 2005 United Nations/Argentina/European Space Agency Workshop on the Use of Space Technology for Human Health for the benefit of the countries in Latin America; the Med-e-Tel Forum, held in Luxembourg in April 2006; and the Fifth Space Conference of the Americas, held in Quito in July 2006.

84. The advanced school for training in landscape epidemiology is a further step in the regional cooperation that is promoted by the Office for Outer Space Affairs and CONAE. The fellowship programme at the Mario Gulich Institute for Advanced Space Studies in Córdoba, Argentina, comprises tutorial classes, the development of individual institutional projects and the development of the regional initiatives. During their visit to the Gulich Institute, well-known international researchers conduct full-day master classes on particular issues.

III. Recommendations and observations

A. Recommendations

85. Participants in the Training Course made the following recommendations:

(a) The integration of countries in Latin America and the Caribbean on tele-health issues that require harmonization and standardization should be encouraged. To that end, the United Nations system, in particular PAHO, should take a proactive role in promoting national and regional initiatives for e-health governance, network design and standardization;

(b) Regional meetings on tele-health and telemedicine should be encouraged, because they provided an opportunity to develop an expert network. In addition, it would be appropriate to create a permanent international forum where experts could exchange opinions, experiences and information;

(c) Activities to enhance standards for health informatics in Latin America and the Caribbean should be carried out. To that end, local experts could help to organize and support multilingual training courses and tele-education programmes;

(d) Caribbean countries needed to be integrated into the telemedicine projects and initiatives of Latin American countries, taking into account their specific characteristics and needs;

(e) PAHO should be requested to establish a forum, for participants from national ministries of health, on the subject of the benefits of telemedicine technologies. Such a forum should be designed for the English-speaking countries of the Caribbean;

(f) A study on the feasibility of implementing telemedicine and identifying cost-effective and sustainable applications should be established for the English-speaking countries of the Caribbean. Recommendations in that regard should be

presented at a meeting of ministers of health and to the Caribbean Community, for further action;

(g) A specific study should be carried out on telemedicine projects that incorporate evaluation methodologies. The outcome of the study should include: a cost analysis encompassing benefits and effectiveness; statistics on morbidity and mortality for diseases treated by teleconsultations and telediagnosis; an analysis of failed regional telemedicine initiatives, in order to identify mistakes and weaknesses; a measurement of the real impact of information and communication technologies on public health;

(h) Governments should implement national, standards-based policies on health informatics, with coherent initiatives in health metrics and knowledge management, in accordance with WHO parameters;

(i) National standards for health informatics should be promoted through national entities on standards, and such entities should participate in standardization activities of the International Organization for Standardization (ISO) related to health informatics. The following ISO working groups are most relevant in that regard: the working group on data structure; the working group on data interchange; the working group on semantic content; and the working group on data security;

(j) A working group should be established on tele-health using videoconferences and the Global Development Learning Network. The working group's cohesion can be maintained using the Internet to exchange information, experiences and opinions on a web portal to be designed by CENETEC;

(k) The technical specifications of each component of tele-health networks should be determined, taking into account the various technological options for telecommunications (such as copper wires, fibre optics, satellites, mobile networks, wireless local area networks and Bluetooth);

(l) In areas where tele-health programmes using satellite technology are to be implemented, needs, including connectivity requirements, should be identified;

(m) A survey should be made of the various options that satellite services can provide in the field of telemedicine and related educational applications;

(n) In considering a regional proposal on tele-health using satellites services, information from the "@LIS" and "@HEALTH" programmes should be taken into account;

(o) Recommendations on issues of standardization should be reviewed and compared with the approaches adopted by other international organizations. Decision makers in national ministries should incorporate recommendations in that regard in their national programme, in order to have an effective impact;

(p) Tele-health projects should be implemented with a view to long-term sustainability and the reduction of costs for public health systems. To that end, it is necessary to identify how investment in connectivity and associated tools can save money in the public health sector;

(q) It is proposed that PAHO conduct specific courses on tele-health and telemedicine to improve capacity-building in Latin America and the Caribbean;

(r) Experts from the International Telecommunication Union (ITU), ISO and the European Committee for Standardization should be invited to attend regional meetings on tele-health. The participation of experts from those organizations will contribute an international perspective on the current situation with respect to interoperability;

(s) The book on *Telemedicine in the Americas*, sponsored by ITU and the Inter-American Telecommunication Commission, could be updated;

(t) PAHO should make a clear statement that telemedicine and tele-health applications are necessary to improve public health in developing countries;

(u) The Committee on the Peaceful Uses of Outer Space could support regional efforts by making a statement on the importance for national development of satellite applications in the fields of tele-health and telemedicine.

B. Observations

86. Participants in the Training Course reached the following observations:

(a) The countries of Latin America and the Caribbean need to involve WHO and PAHO more fully in developing regional proposals. The PAHO representatives in each country should be contacted;

(b) The countries of the region must form strategic partnerships for tele-health projects. Countries with experience in tele-health projects and network implementation could share their experiences through such partnerships;

(c) Successful models of multisector participation should be documented and disseminated by international organizations such as WHO, PAHO, ITU, the World Bank and the Inter-American Development Bank, for the benefit of decision makers in the public and private sectors;

(d) Participants from Caribbean countries noted the importance of integrating those countries into regional tele-health initiatives, while taking into account their specific characteristics, such as the fact that most are English-speaking countries and their lack of experience in some areas of tele-health. In particular, those delegates expressed their interest in developing projects in teleconsultations and telepsychiatry;

(e) The European Commission, which had experience in the area of public and private initiatives, could provide guidelines, toolkits and mentorship to private and public organizations. The policy of the European Commission regarding assigned and future funding for fostering public and private participation should be disseminated more extensively and be implemented by international financial stakeholders;

(f) The aboriginal peoples of Canada had demonstrated successful projects to decision makers, resulting in support for local governments to develop further projects;

(g) A wide variety of telemedicine applications have a common quality of service but have very different requirements in terms of bandwidth and costs. When

using satellite-based solutions, telemedicine networks usually require an asymmetrical download/upload ratio, typically 4:1;

(h) Even when relatively low-cost equipment and narrow bandwidth connections are used, tele-health is not sustainable for small, remote communities when it is offered as an isolated service. Therefore, the network must integrate all required applications and services, such as Internet access, tele-education, e-government and other community services. By combining the various services, costs can be spread among the largest possible user base. When designing a network, local communities should identify and take into consideration all requirements and services to be provided. Community involvement is essential to the ongoing use and support of the technology;

(i) It is generally more expensive to provide telemedicine applications via satellite than to provide similar services using terrestrial networks;

(j) Tele-health projects can be made sustainable by providing training on appropriate software tools for tele-health applications and by making cost-effective use of idle connections;

(k) Satellite capacity is becoming scarce and more expensive. It is suggested that countries find alternative solutions in order to ensure the availability of satellite capacity for tele-health and telemedicine projects. It is necessary to review satellite capacity in the region, identifying the satellites operating in the region, their characteristics and the opportunities for using satellite services for tele-health.