e-Health in Peru

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Abstract

Today, early in the twenty-first century, there is a general awareness about the great potential of Information and Communication Technologies in society and in particular with regard to health and improved quality of life of people. The expansion in the use of ICT has led to the emergence of a new field: e-Health. E-Health has been defined as "the application of information and communication technologies in all functions health care from diagnosis to monitoring". ICT have much to contribute in achieving the elements of the mission of the health system. In this sense it is committed to the introduction of telehealth in health facilities in the country. Poverty levels are not homogeneous nationally. Region-level poverty is concentrated in the mountains and jungles of the country. In the highlands, 72% of the population live in poverty, similar to that found in the jungle. At the departmental level, recent estimates of the INEI indicate that the poorest departments are Huancavelica (88%), Huánuco (78.9%), Apurimac (78%), Puno (78%) and Cajamarca (77.8%). However, one has to think of all the rural areas of Peru and there is a great challenge, the distribution of the 36 native mother-tongues spoken in Peru. Advances in Information and Communication Technologies have created a new scenario in accessing information and the globalization of communications, business and services. The e-health sector is involved in this trend, which can be seen with the growth and consolidation of telehealth. These services include: *electronic history and medical records; telemedicine; electronic prescription; biomedical informatics; health information; telehealth. E-Health is a new field where information is expanded enhancing its reach to benefit the individual and collective health.*
In our country there is human potential and experience to contribute in building a democratic and sustainable health, focusing on the needs of patients, users-citizens.

Key words: *Telemedicine; Health Services Accessibility; Information Technology; Peru.*

Resumen

e-Salud en el Perú

Hoy en día a principios del siglo veintiuno hay una amplia concientización sobre el gran potencial de las Tecnologías de la Información y Comunicación en sociedad y especialmente en relación a la salud y a una mejor calidad de vida para la población. La expansión del uso de las TICs ha llevado al surgimiento de un nuevo campo: la salud electrónica. La salud electrónica ha sido definida como "la aplicación de las Tecnologías de Información y Comunicación en todas las funciones de la atención sanitaria, desde el diagnóstico al monitoreo". La contribución de las TICs es muy relevante para alcanzar los elementos de la misión del sistema de salud. En este sentido está comprometida con la introducción de la telesalud en las instalaciones sanitarias del país. Los niveles de pobreza no son homogéneos a nivel nacional. La pobreza a nivel regional está concentrada en las montañas y las selvas del país. En el altiplano, 72% de la población vive en la pobreza, cifras parecidas se encuentran en la selva. A nivel de departamentos, cálculos recientes del INEI indican que los departamentos más pobres son Huancavelica (88%), Huánuco (78,9%), Apurimac (78%), Puno (78%) y Cajamarca (77,8%). Sin embargo, tiene que pensar en todas las áreas rurales de Perú y es aquí donde encontramos un gran desafío: la distribución de las 36 lenguas nativas habladas en el país.
Los avances en las Tecnologías de la Información y Comunicación han creado un nuevo escenario en el acceso a la información y la globalización de las comunicaciones, negocios y servicios. El sector de salud electrónica está involucrado en esta tendencia que puede verse con el crecimiento y consolidación de la telesalud. Estos servicios incluyen: *historias o registros médicos electrónicos; telemedicina; prescripción electrónica; informática biomédica; información en salud; telesalud. La salud electrónica es un nuevo campo donde la información se amplía y mejora su alcance para el beneficio de la salud individual y colectiva.*
En nuestro país hay potencial humano y experiencia acumulada para contribuir con la construcción de un sistema de salud democrático y sostenible, enfocado en las necesidades de los pacientes, usuarios-ciudadanos.

Palabras clave: *Telemedicina; Accesibilidad a los Servicios de Salud; Tecnología de la Información; Perú.*

Resumo

e-Health no Peru

Hoje no início do século XXI, existe um amplo conhecimento sobre o grande potencial das Tecnologías de Informação e Comunicação na sociedade e, em especial, em relação a saúde e a uma melhor qualidade de vida da população. A expansão do uso das TICs tem levado ao surgimento de um novo campo: a saúde eletrônica. A saúde eletrônica tem sido definida como "a aplicação das tecnologias de informação e comunicação em todas as funções da atenção em saúde, desde o diagnóstico até o monitoramento". As TICs têm contribuído muito para alcançar os elementos da missão do sistema de saúde. Neste sentido estão comprometidas com a introdução da telessaúde nas instalações de saúde no país. Os níveis de pobreza não são homogêneos em nível nacional. A pobreza em nível regional está concentrada nas montanhas e na região de selva do país. No altiplano, 72% da população vive na pobreza, situação semelhante a encontrada na região de selva. Em nível estadual, cálculos recentes do INEI indicam que os estados mais pobres são Huancavelica (88%), Huánuco (78,9%), Apurimac (78%), Puno (78%) e Cajamarca (77,8%). Entretanto, tem-se que pensar em todas as áreas rurais do Peru e um grande desafio a ser enfrentado é a situação das 36 línguas nativas faladas no país. Os avanços nas Tecnologias de Informação e Comunicação têm criado um novo cenário no acesso a informação e a globalização das comunicações, negócios e serviços. O setor da saúde eletrônica participa desta tendência, que pode ser vista com o crescimento e consolidação da telessaúde. Estes serviços incluem: *história e registros médicos eletrônicos; telemedicina; prescrição eletrônica; informática biomédica; informação em saúde; telessaúde.*

A saúde eletrônica é um novo campo onde a informação é ampliada melhorando seu alcance para o benefício da saúde do indivíduo e da comunidade. Em nosso país temos potencial humano e experiência para contribuir com a construção de um sistema de saúde democrático e sustentável, focado nas necessidades dos pacientes, usuários-cidadãos.

Palavras-chave: *Telemedicina; Acesso aos Serviços de Saúde; Tecnologia da Informação; Peru.*

INTRODUCTION

During the last years Latin American and Caribbean countries had experienced an important development in the use of Information and Communication Technologies (ICTs), more than other regions of the world. For instance, the use of internet in the region increased 272.8% between 2000 and 2005, whereas personal computers and mobile phone lines increased 65.3% and 171.5%, respectively, between 2000 and 2004. These figures show the double digit annual compound growth rate, much higher than that of the United States, the European Union and the member countries of the Organization for Economic Cooperation and Development (OECD). Despite this progress, the levels of ICTs use in the region together with the uptake of the countries are still lower than the levels seen in industrialized countries. In 2005, only 15.2% of the Latin American population had access to Internet, whereas in the United States it was 68.7% and more than 50% both in the European Union and the OECD countries. With regard to personal computers, only 8.1% of Latin American and the Caribbean population had access to a computer at home compared to 74.1% in the United States and 45.0% in the OECD countries in 2004. GAL remains similar regarding the ownership of fixed and mobile phone lines between Latin America and the Caribbean and the industrialized countries. Internet in Latin America (15.2%) since 2005 was higher than the global figure for Middle East (9.6%), Africa (2.5%) and Asia (9.9%)[1].

E-Health is the use of information and communication technologies for health.[2] ICTs had led to a new field: e-Health. E-Health has been defined as *"the application of information and communication technologies on all those functions affecting healthcare from diagnosis to follow-up"*[3]. The intended use of ICTs, mainly, although not exclusively, internet and cell phones in all the processes related to health promotion, disease prevention, healthcare and rehabilitation, with the aim of improving public and individual health is called electronic health (e-Health).

Accessibility to Information and Communication Technologies benefits us all. Although it implies some more work when designing interfaces, it also means the removal of barriers that will provide greater communication coverage to our rural and urban population. It is often said that "information is power" and new ways of life, economic activities, services and businesses connected to information appear. All sectors of contemporary life, finances, leisure, health and education are related to information and, of course, information uses communications to spread well-being or control.

The contents of this new multidisciplinary field include a set of services located between medicine, public health and ICTs. These services include:

- Electronic Medical Records;
- Telemedicine;
- Electronic prescription;
- Biomedical Informatics;

- Health Information;
- Telehealth.

E-Learning is another alternative solution for people who wish to get training from anywhere at anytime and the number of times they require, according to the time they have available, especially in this time and age when the amount of information to be learnt and the limited time available had become critical factors.

POPULATION AND ACCESS TO HEALTHCARE IN PERU

In Peru, access to health services is a serious problem. The fact that only 51.5% of the population who reported disease or accident could access institutional health services shows great inequality and the need for urgent measures that reinforce the demand for health services. Thus, 48.5% of those individuals who do not go to a health service not only mean that they go to an "alternative" service such as pharmacies and healers or that they simply do not seek any help. This also reflects the serious limitations in structure and organization of healthcare services and the serious issues of the population for acknowledging the disease and the consultation place when having a health-related problem.[4]

The extremely complex topography of Peru makes transportation and communications very difficult, limiting access to health services. If one examine the geographical accessibility, it find that 79% either walk or use public transportation. For the low income population who lives in the rural area, going to the healthcare center is a big problem. Therefore, there are deep inequalities in the medical resources distribution among the regions and within them.[4]

TELEPHONE COMMUNICATIONS IN PERU

After privatization in 1994 and the opening of the telecommunication market in 1998, the number of telephone lines in Peru has significantly increased, as shown in Table 1.

MAIN EXPERIENCES IN PERU

Several experiences had been developed in Peru. Below, they are described in detail:

- Project *Enlace Hispano Americano en Salud:* It is the connection of communities without access to telephone services through an adequate technology using radio with solar energy panels for transmitting voice and data (e-mail). It has been used for sending and receiving information, as well as for health training. The pilot project started in 2001 in the Alto Amazonas province in Loreto. Its outcomes had been published in several places.[6] The project has been carried out by the Foundation *Enlace Hispano Americano en Salud (EHAS)*, the Pontifical Catholic University of Peru and the Peruvian University Cayetano Heredia.
- Telemedicine Prototypes in Peru: They had been developed by the assistance area of Telemedicine of the National Institute for Telecommunication in Peru (INICTEL). Some of them are: 1) Computerized Audiometer. This equipment gets an accurate measurement of the minimum hearing threshold using a computer. It has a modular design and it is made of Hardware and Software phases; 2) Cardiomatic. This equipment sends a cardiac signal using a computer and a modem on each one of the two connected points; 3) Telecardio 2. This equipment enables to send a cardiac signal through the phone line without having to use a computer or a modem on the side of the patient. Simultaneous transmission of voice

Table 1 - Number of telephone lines in Peru. Years 2000 to 2006.

Service	2000	2001	2002	2003	2004	2005	2006
Fixed phone lines							
Installed lines	2.021.689	2.027.355	2.045.435	2.249.508	2.395.262	2.650.259	2.811.441
In use lines	1.617.582	1.570.956	1.656.624	1.839.165	2.049.822	2.250.921	2.400.512
Mobile phone lines							
In use lines	1.339.667	1.793.284	2.306.943	2.930.943	4.092.558	5.583.356	8.772.479
Public Phones *							
In use lines	84.087	96.036	113.834	123.002	139.923	147.746	158.314

* It includes rural telephones.

Source: OSIPTEL, 2007.[5]

and cardiac signal is possible enabling communication between the physician and the patient during the exam; 4) Telecardio 12. It is a digital transmitting equipment of the complete cardiac signal (12 channels), allowing the cardiologist to give the diagnosis to the patient under observation and 5) Cardiocell B138. It is a digital transmitting equipment of several biological data using the cellular phone network. [7]

- EsSalud Scientific Information Network: It is a set of thirty six Information Centers (computerized libraries) connected among them through Information and Communication Technologies (ICTs), located on the main healthcare centers of EsSalud in each state of Peru.
- INFOSALUD: It is a free information and phone counseling service of the Ministry of Health. It is made of a team of healthcare professionals (doctors, obstetricians, psychologists and social communicators) who provide counseling on overall health, institutional information, citizen based public health surveillance and support on emergencies and disasters. It was created in July 2001 at the Ministry of Health.[8]
- EsSalud on Line: It is the EsSalud telephone service Center which offers medical appointments, health counseling and administrative services by phone to customers. It substitutes the previous service called Alo EsSalud.
- Virtual Doctor's Office. Developed by the National Health Institute (INCOR) of Health Social Security (EsSalud). It has a virtual doctor's office which offers remote consultations from Lima to physicians of this same institution who are in other cities. It is also possible to consult its virtual files.[9]
- Alert: During 2002 the Head Office of Health II Lima Sur developed a pilot Project in order to test and evaluate the use of a technologic platform for communicating and reporting public health data electronically, using Internet and any type of telephone. It was tested in epidemiological surveillance. More than 26.000 cases of diseases and disasters were reported in seven months of operation.[9] In 2004, CESEPI at the National University Mayor of San Marcos assessed the project and found that it was cost-effective, sustainable and easy to use.
- DISAMAR Alert: This program started at the Peruvian Naval Health Bureau (DISAMAR) with the technical and financial support of the Naval Medical Research Center on Tropical Diseases of the United States (NMRCD) Lima, Peru, in 2002, and it is now operating at the Health Bureau of the Peruvian Army and it is about to start at the Health Bureau of the Air Force in Peru.
- NACER: It is a technological solution addressed to strengthen mother-neonatal healthcare allowing health providers to do a timely referral for pregnant women and newly born babies in an electronic manner in real time when they need a service that is not offered at their home town. Similarly, with this service it is easier to follow up these patients when they are discharged (counter-referrals). It also includes modules for monitoring critical supplies (medicines and raw material), operability of medical equipments and disease control on epidemiological surveillance. NACER was implemented in Peru in projects carried out by the Regional Department of Health in Ucayali (2003-2005) and by the Health Ministry in Lima and Callao (2004-2005) with the technical and financial support of Pathfinder and USAID-Peru.
- Cell PREVEN: It is an application developed to transmit information in real time on adverse effects of metronidazole given to female sex workers in Chincha, Huánuco and Piura.[10] Health providers gathered information and entered the data in their cell phones using Voxiva infrastructure. Information was stored in an online database, allowing health professionals to see this information in real time. Additionally, key staff was warned through e-mail and text messages to their cell phones, when patients had severe adverse effects such as vomiting.
- e-Learning: Education for Preventing HIV-AIDS and Sexually Transmitted Diseases in the Andean Region and the Caribbean. It is a platform with the goal of meeting the training and orientation needs on the field of preventing HIV/ AIDS and STDs. The project is carried out by the Tropical Medicine Institute Alexander von Humboldt (UPCH). It was awarded with the Global Junior Challenge 2009 Award. Two modules were developed in order to achieve the goals previously established. One on HIV/AIDS and another one on Sexually Transmitted Diseases (STDs). Strategies of the modules:
  1. Students were trained in order to achieve certain knowledge on these two topics and two assessment tests were done at the end of the course. A pre-test and a post-test were done to evaluate the knowledge level of the participants before and after the course;
  2. Forums – they were carried out through the technological platform. Students were able to ask

questions, giver their opinion and share their experiences. This section was supervised by a member of the Multidisciplinary Team;

3. E-mail.- Questions sent by e-mail to the *prevencionlac@gmail.com* course. These individuals questions were evaluated before sending them to a specialist of each module and give them the corresponding answer (*http://www.upch.edu.pe/tropicales/AIDSITS/*).

Figure 01 - The challenge is huge: all the national territory needs improved healthcare in rural areas. Also, it has to be remembered that there are more than 36 different languages in the rainforest.

CONCLUDING REMARKS

The benefits of accessibility are clear, it is time to start working and applying the recommendations made to remove the barriers in digital communication. Perú has human potential and, although the experience it has is not articulated, it is able to implement electronic health interventions that will improve not only the efficiency and effectiveness of the interventions but the building of a democratic and sustainable health system, focused on the needs of patients-users-citizens.

The challenge is to find a way to bring together these two worlds in an effective way. It is possible to imagine what a man or a woman can feel when sitting in front of a computer screen anywhere in the world seeing the image of an indigenous person, what it cannot imagine yet is that technological development will reach every corner of the planet where extreme poverty and hunger are the true priorities. It must take medical and health knowledge to communities with access problems. The focus must be providing this population with better health. Human intelligence should not depend on the country or the geographical place, social-economic condition, race, culture, etc.

"An individual without information or without the right to communication is not able to have access to a full human and social development"

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