TELEHEALTH IN LATIN AMERICA 2016

ICT FOR DEVELOPMENT STUDIES SERIES

Contents

PROLOGUE

Latin America is a region where a wide range of realities and different sectors of society converge. Future challenges include not only bridging gaps in economic development, but in a range of other areas as well, including health, education, public safety, democratic stability and many others.

These challenges also include Information and Communication Technology (ICT) deployment. This means pushing horizontal development to drive convergence among different sectors in order to increase and improve quality of life for Latin American citizens.

BrechaCero.com was created with this goal in mind, focusing particularly on the use of wireless broadband networks. This is a blog produced by 5G Americas to promote and raise awareness for this type of ICT initiative. This open-access blog will provide information a wide range of initiatives, services and trends and look at the way technology is used to improve people's quality of life. It will also have support from a number of contributors, such as analysts and other industry representatives who will provide interviews and write columns.

BrechaCero.com will also be producing a range of documents focusing on specific issues. This will provide greater insight into how ICT is being used to drive development in different verticals and will remain available as a permanent source of future consultation.

INTRODUCTION

Most Latin American countries meet the criteria for classifying Latin America as one of the world's emerging regions. This means the region faces significant growth challenges in various socioeconomic areas, including health, and particularly universal access to healthcare.

Information and Communication Technologies (ICTs) represent an opportunity to increase health care coverage. Better coverage can be achieved through nationwide public programs, involving state entities, such as universities or hospitals, the private health sector and investment from ICT industry companies.

Globally, health is one of the 2030 Sustainable Development goals, which are part of the United Nations Development Program (UNDP). The United Nations has reported that since 1990, preventable child mortality levels have fallen by more than 50%, while maternal mortality as dropped 45% and new HIV infections fell 30% between 2000 and 2013. However, the UN notes that every year, more than 6 million under five children die and 16,000 minors lose their lives every day from preventable diseases, such as measles or tuberculosis, and explains that AIDS is now the main cause of death among adolescents in sub-Saharan Africa[1].

In order to avoid these deaths, the Sustainable Development Goals included a commitment to end the AIDS, tuberculosis, malaria and other contagious disease epidemics by 2013. The UN has said that this goal could be achieved through treatment and prevention, education, vaccination and reproductive and sexual health campaigns.

The region poses a number of different challenges in efforts to control the growth of many types of disease: from noncommunicable diseases like obesity, diabetes and cancer, to those that have long been a threat, such as tuberculosis, dengue fever or malaria. There are also efforts to increase maternal and infant care, improve healthcare infrastructure and ensure services are more widely available.

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[1] http://www.undp.org/content/undp/es/home/sdgoverview/post-2015-development-agenda/goal-3.html

According to the Pan-American Health Organization (PAHO) Basic Indicators 2015[2], in 2001 the rate of "avoidable mortality"[3] in Latin America was 272 deaths for each 100,000 inhabitants; in 2010, the region's average rate fell 10.5% to 230.9 avoidable deaths per 100,000 inhabitants. The report points out that there has been a reduction in premature death from avoidable causes in real terms, although there are significant differences between the region's countries.

PAHO has highlighted the importance of continuing to drive down this indicator and work with health systems to improve public health services to help reduce the number of "avoidable deaths". It also highlighted the importance of preventive health programs, which are intended to improve diets, promote physical activity, reduce smoking and address other issues.

In this context, if healthcare networks are provided with ICTs, this could increase health coverage for many sectors of society; this would also be of great help in a region with continental distances to cover and infrastructure failings that mean healthcare coverage is not available to the entire population in every country.

With the situation as it stands, wireless technologies could offer alternative ways of increasing healthcare coverage to include populations living in remote locations throughout Latin America. This would provide quicker access to research and reduce the time needed to obtain a second medical opinion for specific health problems. However, the States must act positively to ensure these alternatives can be implemented. This means they must encourage development of wireless broadband access networks not only by auctioning off radiofrequency spectrums, but also by simplifying network deployment regulations.

Similarly, the adoption of nationwide Telehealth programs will break down infrastructure barriers and reduce distances while speeding up the exchange of information. There are many public and private initiatives supporting deployment of applications and/or services that would facilitate mass public access. Examples include applications that perform a number of functions, from weight control and dietary suggestions, up to periodic control of diseases requiring complex treatments.

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[2] At
http://www.paho.org/hq/index.php?option=com_content&view=article&id=2470&Itemid=2003&lang=es
[3] "Avoidable mortality" is an indicator that quantifies premature deaths as a result of health problems that could be avoided by preventing disease or delaying death by offering timely and effective health care.

Efforts to deploy ICTs to expand healthcare will depend heavily on mobile technologies, particularly mobile broadband technologies, mainly because many Telehealth applications operate on smart phones or tablets and require constant connections. This also means governments in every regional market face an additional challenge, supporting the sale and mass-market adoption of this type of device.

We note that when widely adopted, mobile services allow a larger number of people to access healthcare networks. According to figures produced by Ovum and published by 5G Americas, Latin America had 706 million mobile lines in 2015, 377 million of which were mobile broadband subscriptions (323 million HSPA and 54 million LTE).

Similarly, and looking to the future, Ovum points out that the regional adoption of mobile broadband services is growing. Mobile broadband is projected to reach a total of 696 million connections in 2020 – representing 88% of all mobile subscriptions at that time. As such, greater mobile broadband availability will create a significant opportunity to deploy Telehealth services capable of reaching a large proportion of the population via a range of solutions.

HEALTH AND TELECOMMUNICATIONS

There are various ways of defining telecommunications services used for Health: eHealth, Ciberhealth, Telehealth and Telemedicine[4]. The World Health Organization (WHO) describes these type of services as a cost-effective and secure method of supporting health and related areas[5].

Based on this wide-ranging definition, most current health industry practices involving telecommunications are classified as Telehealth. This is especially true today, when ICT's are strongly linked with health, even in basic processes.

It is therefore important to implement a range of public policies at a regional level to unite the ICT and Health sectors. It is also important for public, state-dependent organizations, like public universities or hospitals, to be allowed to implement their own projects in line with a nationwide implementation plan. Similarly, private sector initiatives that aim to bring health and medicine closer to patients suffering a wide range of diseases are also important, as are public-private initiatives.

Generally speaking, Telehealth is part of a transformative process that is changing healthcare on a daily basis and is increasingly present in some of the more efficient healthcare systems, particularly with healthcare's dependence on information and communication. Telehealth is intended to improve information flows using digital channels to support health care services and healthcare system management.

The World Health Organization (WHO) and International Telecommunications Union (ITU) recommendations for nationwide Telehealth deployment describe various contexts in which the region's various markets might implement this type of program. In broad strokes, these contexts can be summarized as follows:

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[4] When used in this document, Telehealth will include all of these approaches.
[5] Marcelo D'Agostino, Najeeb Al-Shorbaji, Patricia Abbott, Theresa Bernardo, Kendall Ho, Chaitali Sinha and David Novillo-Ortiz. In "eHealth initiatives to transform health in the Americas region". Panam Public Health Review 35. 2014. Page 5 and 6.

National context of eHealth deployment[6]
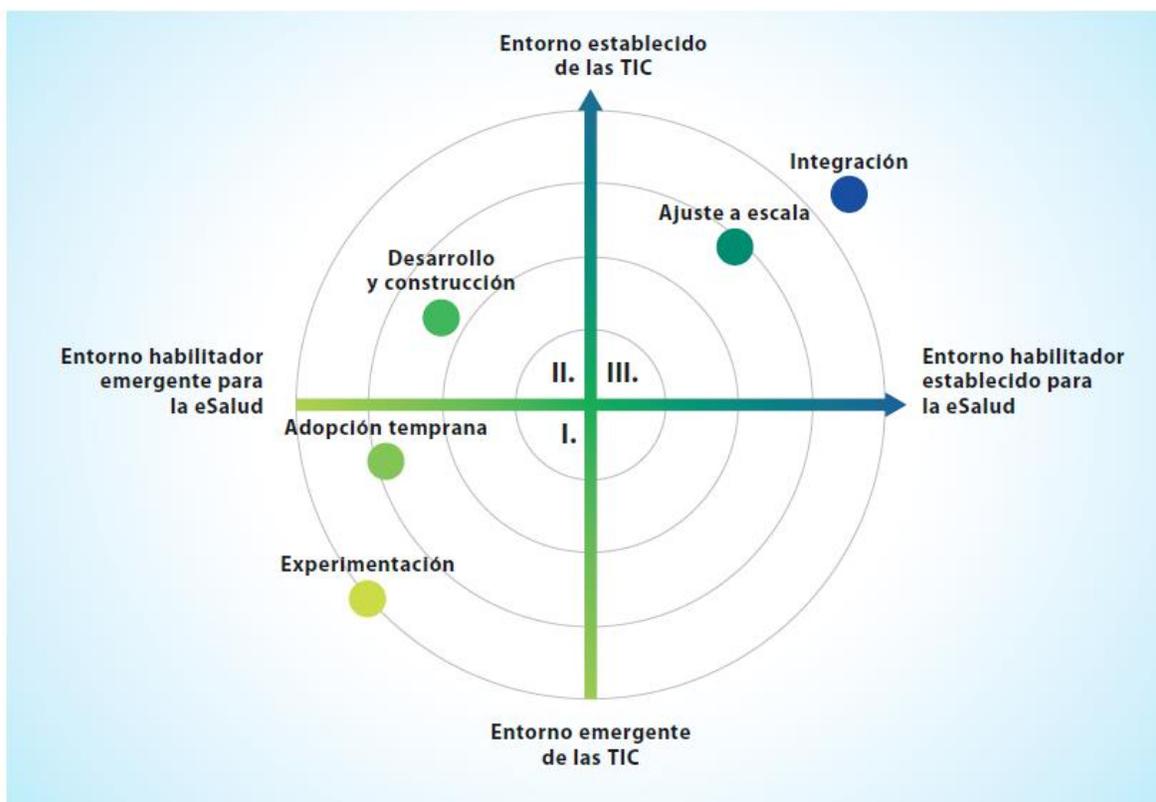
According to both organizations, the national context can be classified as follows:

- Experimentation and early adoption, where both the ICT environment and enabling environment are both in their early stages. Within this limited environment, a country is unable to fulfill all its international public health reporting obligations. A national plan for country in this context should focus on making the case for eHealth, creating awareness and establishing a foundation for investment, workforce education and adoption of eHealth in priority systems and services[7].

- Development and building up, where the ICT environment is growing more quickly than the enabling environment. There is a lot of ICT activity, learning by doing and significant project risk due to lack of standardization commitment to long-term investment. Aid agencies and donors are still active funders, with more private-sector involvement, and pockets of government investment seen in

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[6] In "National e Health Strategy Toolkit – Part 1: Context for eHealth". WHO – UIT. Page 21
[7] Ibid

areas such as research and development in high performance technologies. Public-private partnerships are characteristic of this context, and eHealth is still seen as part of a broader effort to expand ICT and economic development in general. Telehealth applications can provide valuable services and first successes and impacts on health outcomes are often seen here. The major drivers for this environment are access to care and quality of care. A national plan for country in this context should focus on strengthening the enabling environment for Telehealth, creating legal certainty, establishing the policy context for delivering Telehealth services more broadly and identifying the standards to be adopted to ensure that building ever larger vertical systems is avoided[8].

- Scale up and mainstreaming, when the enabling environment is mature enough to support widespread adoption of ICT's. This context encompasses aspects that can only be undertaken at the national level, including adoption of standards and laws, incorporation of ICT and health services and investment in policies for developing a capable workforce. There is broad uptake of ICT by the general public, and health professionals are already introduced in some ways to ICT. Drivers for Telehealth in this environment are cost and quality. Health systems are often cost burdened and both quality conscious and safety conscious, therefore efficiency in systems and processes is sought[9].

For its part, PAHO promotes better health through innovative ICT tools and methodologies. The goal is to offer universal coverage and ensure that societies are fairer and more democratic, using technology to make healthcare better and more accessible. States can also pursue this goal by driving collaboration between the various health and ICT departments and liaise with the private sector when planning for these targets.

However, the Telehealth ecosystem also includes start-up initiatives which generally focus on a small portion of the population and specific diseases. They are capable of creating significant improvements that raise patient quality-of-life. These initiatives are not restricted to the private sector; they are also developed by a wide range of entrepreneurs. In other words, this type of initiative enjoys significant support from a large part of the population.

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[8] Ibid
[9] Ibid

According to Visiongain, a consultancy, the arrival of low-cost smartphones has increased access to app stores and more than 100,000 mobile health applications are now available. These apps include free applications, focusing basically on diet or exercise, as well as premium apps that offer professional content, diagnostic imaging and features to control specific diseases.

Additionally, ICT's are very useful as a means of assessing the effectiveness of health systems themselves and as financial controls. Worldwide, many governments have acknowledged the need to incorporate ICTs into their health systems. There is a general trend towards developing an integrated, nationwide strategy in order to maximize existing capacity.

Visiongain reports that governments have implemented a number of economic austerity measures that are forcing health ministries and departments to optimize costs. As such, mobile health initiatives can offer major savings by allowing medical teams to diagnose, control and communicate with patients remotely.

Visiongain also noted that the mobile health industry generates income for network operators, software developers and data platform management providers. It calculated that the mobile health market generated global revenues of approximately $10.3 billion in 2015.

As a result, the ICT sector is a major player because it provides connectivity and plays an active role in providing mass market access to health, through either applications, smartphones or other smart, connected devices that provide patient monitoring.

These latter devices will play a greater role in the medium term as mobile technologies are deployed for the Internet of Things (CIoT). The CIoT will allow objects, machines and devices to connect over mobile broadband networks, without human intervention. These devices will include cars, vehicles, motors and sensors capable of transmitting information over the Internet.

The CIoT will provide remote control capabilities for patients with a variety of diseases, increasing health service efficiency and accuracy. This will also generate social and economic benefits and improve the overall quality of life. According to a number of GSMA surveys and forecasts, the CIoT will represent more than 10% of the global market in 2020.

States need to collaborate by creating conditions that support deployment of this type of technology in order to increase adoption. This means offering mobile sectors the radio frequencies recommended for mobile broadband service development by the UIT (a total of 1300 MHz in each market by 2020).
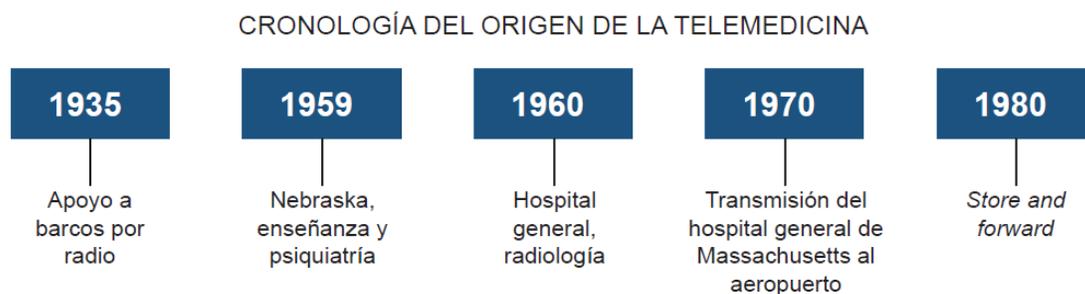
However, in order to reinforce these initiatives, regulations are also needed to facilitate wireless network deployment and provide access in remote locations, allowing Telehealth initiatives to benefit a larger proportion of the population. Furthermore, efforts to grow health applications based on mobile technologies require a high level of smartphone penetration. In other words, people need to own devices so that they are able to benefit from the applications.

The political work needed to support Telehealth initiatives clearly involves a wider effort and will require collaboration between various sectors. This means creating framework legislation to optimize network performance as well as regulation to facilitate growth for the various sectors involved, supporting not only health but facilitate access growth, network deployment and mass-market device adoption.

TELEHEALTH IN LATIN AMERICA

Telehealth was first reported in the Americas in 1925. According to the Economic Commission for Latin America and the Caribbean (CEPAL)[10], it began when the Maynard Columbus hospital sent a telegram requesting an antitoxin to battle a diphtheria epidemic that was affecting the local community. Information was requested by telegram from Alaska, becoming the first successful coordination effort mixing modern technology with old-fashioned methods of communication.

Over the years, there have been other events allowing us to monitor how the relationship between ICT and medicine has developed globally. Below is a diagram from CEPAL outlining this evolution:

CRONOLOGÍA DEL ORIGEN DE LA TELEMEDICINA

1935	1959	1960	1970	1980
Apoyo a barcos por radio	Nebraska, enseñanza y psiquiatría	Hospital general, radiología	Transmisión del hospital general de Massachusetts al aeropuerto	Store and forward

Telehealth has also advanced in Latin America. According to CEPAL, the region's first experiences date back to the end of the 1960s. However, it was during the last decade of the 20th century and the first decade of the 21st century that we have seen a greater proliferation of Telehealth programs and innovations throughout the region.

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[10] "Telehealth development in Latin America. Conceptual issues and current status". Economic Commission for Latin America and the Caribbean (CEPAL). Santiago de Chile, October 2013

TELEHEALTH EVOLUTION IN LATIN AMERICA AND MAIN EVENTS

1968	Dr. Ramiro Iglesia receives the first electrocardiogram from space.
1975	Mexico: IMSS-COPLAMAR, medical support over radio networks. CLIDDA, ISSSTE begin operations.
1985	Mexico's supports emergency disaster assistance using Telemedicine México: the CEMESATEL program at the Federico Gómez Children's Hospital of Mexico.
1986	Argentina, the National Research Network, OPAS, WASHINGTON/ARGENTINA report 2000 connected health care and hospital units.
1992	Argentina: First World Congress of the Medical IT Foundation
1994	Costa Rica: First video conference at the Children's Hospital in Liberia, UNED.
1995	Mexico: ISSSTE kicks off the national telehealth program.
1996	Mexico: Dr. Adrián Carbajal, robot assisted surgical procedures, Costa Rica: National telehealth program, which would later develop very slowly.
1997	Mexico: IMSS-Solidaridad-SEP-UNAM, health education via EDUSAT.
1998	Argentina: Garrahan Hospital connects with Patagonia to offer remote consultations. It is currently interconnected with other medical centers in the region.
1999	Mexico: CUDI.
1999	Argentina: Argentinian Cardiology Federation. First Virtual Cardiology Congress.
2000	Argentina: Foundation for medical informatics. I Ibero-American Congress for the Internet in Medical Informatics.
2000	National e-Mexico System: Training for state-owned company managers using distance learning. Telemedicine services at the National Orthopedics Center. Panama: meeting with the Arizon Telemedicine Program group.
2001	Mexico: e-Health Telemedicine Action Program (networks and Internet).
2002	Panama: National telehealth project for radiology and telepathology. Brazil: USP's virtual man project.
2003	European Community – @lis starts - telehealth project Implementation Plan Network: Healthcare Network, TELMED, EHAS, RedCLARA, Health for all, including the following countries: Brazil, Bolivia, Colombia, Ecuador and Cuba. Brazil: BHTelessaúde project implemented in Minas Gerais and HealthNet in Pernambuco.
2003	Argentina: Zalvidar Ophthalmological Institute, first telemedicine experiments.
2004	IMSS, electronic clinical treatment at second and third levels. European Community, RedCLARA created, Europe – Latin America.
2005	Panama: rural telemedicine program begins.
2006	Colombia: Resolution 1448 provides appropriate conditions for institutions providing telemedicine services. Brazil: Laboratory for innovation and excellence in telehealth Latin America – Europe is created, holding its first Seminar. Brazil: creation of the University Telemedicine Network. Ecuador: National Telehealth Plan.
2007	Brazil: National Telehealth Program which includes nine states, 900 cities and 10 million people. Colombia: National Telehealth Program, law 1122, 2007, provides telehealth resources in regions that are difficult to access. European Community: Eurosocial project, including a telemedicine component, used to exchange experiences. Includes the following countries: Mexico, Bolivia, Brazil, Ecuador, Panama, Argentina, Costa Rica, Chile, Honduras, Paraguay and Peru. Mexico: Telemedicine Specific Action Program 2007 – 2012. eLAC 2007, Action Plan for the Information Society in Latin America and the Caribbean. First seminar in Rio de Janeiro.
2007	American Telemedicine Association, Latin-American & Caribbean Chapter (ATALACC)
2008	Mexico: State and inter-institutional inter-operational testing. eLAC 2010: II, Regional Action Plan, San Salvador.
2009	Mexico: Telehealth and telemedicine graduate program. Colombia: agreement 03, includes planning for telemedicine activities. SELA holds the First Regional eHealth and Telemedicine seminar: connection and access for social well-being. CEPAL's eHealth advisory committee is created. Groups are created for regional telehealth political protocols in Latin America. II Meeting of Brazil's Telehealth Innovation and Excellence Laboratory: presentation of the Latin American Telehealth Review.
2010	Mexico: National Forum for Distance Learning. El Salvador: begins to draw up a national telehealth program. Quito: creation of the Ibero-American Telemedicine and Telehealth Association. Argentina: the province of Mendoza begins a telemedicine project. OPS and OCTA: Structuring Pan Amazonian Telehealth. eLAC 2015: III Regional Plan, Argentina.
2011	OPS: Creation of the e-health group; member states' approval of an e-health program for the Americas. Venezuela: begins formulating a national e-health program.
2012	Watson Marlow, Bolivia and Peru begin formulating national projects. The Latin American Committee for Best Practices in Telehealth is created (including health ministers and universities from around Latin America, CEPAL, IDB, OPS and ATALACC).

The medical technologies used for image diagnostics have advanced in recent decades. However, these advances mean that telecommunications have to offer greater bandwidth for real-time data transmission, something that has been difficult to achieve since the Internet was in its infancy.

Technological progress has driven an increase in global and regional deployment of Telehealth plans. Increasing broadband speeds mean projects can be implemented to provide remote consultations and even remote patient controls. Faster speeds have also improved efficiency of patient health care.

Similarly, wireless broadband means that these initiatives are able to reach into remote areas that were previously unreachable and unable to benefit from Telehealth technologies. Higher wireless speeds have meant that more complex studies can be carried out at remote health centers.

In Latin America, various socioeconomic indicators reveal social inequality problems. According to the World Bank, the Gini index of regional countries oscillated between 53.7 and 41.9 points between 2011 and 2015[11]. Elsewhere, the United Nations Development Program (UNDP) highlights that the recent deceleration in economic growth will push 1.5 million inhabitants into poverty throughout the region by the end of 2016. The UN warns that these figures stand alongside the 1.7 million Latin Americans who already fell into poverty (living on less than four dollars a day) in 2014.

These inequalities also exist in the health sector, particularly people's ability to access health systems. According to CEPAL, this gap has been caused by a lack of public sector investment in health. The OPS recommends investing a minimum 8% of GDP in a high-quality public health system, but in 2011 this figure was not achieved. The report states that countries such as Uruguay, Costa Rica, Brazil and Argentina invested around 6% of GDP in the health sector[12].

According to the UNDP, the region has been able to reduce infant mortality and improved its ability to combat disease despite these complications, with some countries leading worldwide innovation in universal access to HIV/AIDS prevention,

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[11] According to the World Bank. Includes Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Ecuador, El Salvador, Honduras, Panama, Paraguay , Peru, the Dominican Republic and Uruguay. Figures for 2011 – 2015. At http://datos.bancomundial.org/indicador/SI.POV.GINI

[12] "Telehealth development in Latin America. Conceptual issues and current status". Economic Commission for Latin America and the Caribbean (CEPAL). Santiago de Chile, October 2013. Page 60.

treatment and care. However, maternal mortality rates remain high and there is still much work to be done on reproductive health. Life expectancy throughout the region stands at an average 74.3 years.[13]

Another sector that requires healthy development in order to implement telehealth efficiently is ICT. Latin America presents gaps that still require bridging so that ICT, particularly wireless telecommunications, are able to offer wider coverage. At the end of 2015, based on estimates by Ovum published by 5G Americas, the region had 375 million mobile broadband connections although the same figures show that 48% of mobile lines still use GSM technology.

Furthermore, LTE adoption is not uniform throughout Latin American markets. On average, throughout the region LTE represented 8.9% of all lines in 2015. Differences between markets ranged between 48.9% in Uruguay and 0.11% in Nicaragua; the region also includes markets like El Salvador in Cuba, where LTE has yet to be implemented.

Nevertheless, moving forward we expect mobile broadband technologies to grow consistently in Latin America, representing 88% of all 791 million mobile lines in 2020. Mobile technologies present a significant opportunity for telehealth deployment, not only increasing the scope and penetration of telehealth services, but also increasing use of apps that increase people's ability to control their health and prevent disease.

However, regional governments need to ensure the conditions for growth exist so that and ICT is able to achieve sufficient penetration, allowing deployment of a wide variety of different telehealth projects. One area that requires further attention is spectrum, which is needed to deploy wireless broadband access services more efficiently. Regulations are also required to facilitate network deployment and a framework of competition regulations is required so that the various telehealth service players face fewer development obstacles.

Telehealth is needed to improve the region's various health systems. Telehealth will advance service offerings while speeding up diagnosis and treatment. Furthermore, it is able to reduce geographical barriers, facilitate services and improve the quality of

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[13] "About Latin America and the Caribbean". PNUD
http://www.latinamerica.undp.org/content/rblac/es/home/regioninfo/

healthcare. However, the region has yet to leverage the full potential Telehealth deployment will bring.

According to CITEL, referencing the WHO, the level of telemedicine service availability depends on national levels of income. In other words, countries with higher incomes show wider adoption of telehealth services, whereas countries with medium – high, medium – low and low income levels show little difference in adoption.

Additionally, the WHO has pointed out that around 30% of Latin American countries have an agency responsible for designing and implementing telehealth projects. This is close to the index reported by developed countries.

NATIONAL TELEMEDICINE POLICIES BY REGION (WHO)

Por región de la OMS
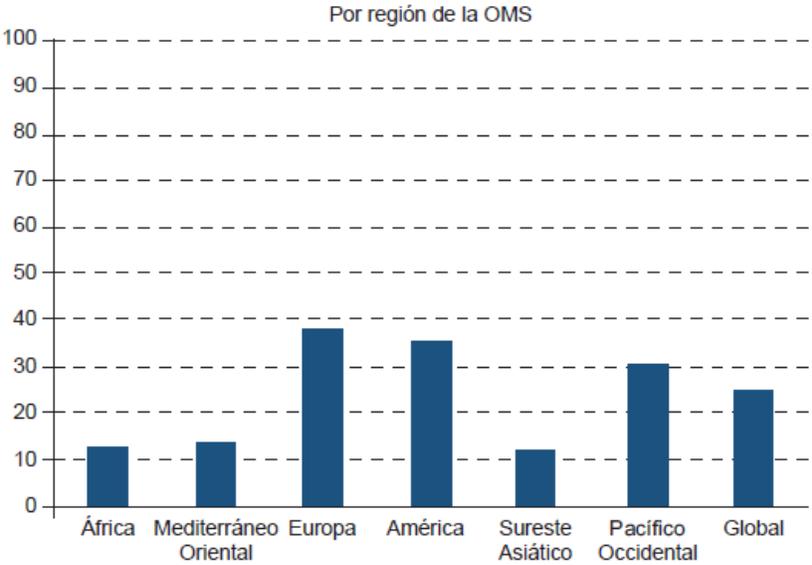
Fuente: Organización Mundial de la Salud (OMS), "Telemedicine: opportunities and developments in member states: report on the second global survey on eHealth", *Global Observatory for eHealth Series*, vol. 2, 2010.

At a state level, these policies are still under development and there is no regional uniformity. According to the WHO, these initiatives generally focus on primary care and more remote regions. Even so, public initiatives do show some hope for wider deployment of telehealth initiatives throughout Latin America.

According to a Frost & Sullivan report "eHealth Initiatives Across Latin America (LATAM) Impact and Future Direction of eHealth", from December 2015, the governments of the region's main markets have planned telehealth projects. However, as we can see from the following table, Brazil is the only country where these initiatives are only being accompanied by the private health sector. Telecom vendors are also active in Columbia.

eHealth Initiatives Across LATAM: Stakeholders Driving SNOMED CT Adoption, LATAM, 2015

Rank	Country	Government Agencies	Healthcare Providers	Vendors
1	Brazil	✓	✓	✓
2	Colombia	✓	✗	✓
3	Mexico	✓	✗	✗
4	Argentina	✓	✗	✗
5	Venezuela	✓	✗	✗

Source: Frost & Sullivan

However, according to the Frost report, the region's other markets still have no private sector input. The private sector is vitally important for telehealth policies to ensure that the general public can benefit from them, as these policies represent the main healthcare alternative for large swathes of society in many countries.

From the information on the following pages of this document, we can see that agencies representing various sectors of society have tested many different approaches. This confirms that telehealth alternatives are not only an area being pushed by the region's various states, they are also being driven by the private sector and other state bodies such as universities.

IMPLEMENTING TELEHEALTH

The health sector encompasses a number of different areas, ranging from food and prevention of sexually transmitted diseases to infectious diseases or mental health problems. In Latin America, different projects have been implemented by different sectors of society in an attempt to serve different healthcare areas.

Below, Brecha Cero will provide a number of examples showing various ways ICT can be leveraged by the health sector:

GAMES AND ICT FOCUSING ON CHILDREN WITH AUTISM – BRAZIL

A working group set up by the IT Department at the Scientific Technical Center of the Pontifical Catholic University (PUC) in Rio De Janeiro, Brazil, created a series of games to treat children and youngsters with autism, helping them to overcome the difficulties they face learning, interacting socially and speaking. The game application can be accessed using electronic devices running android, iOS or Windows and it can be downloaded or used online.

The project is sponsored by the Program to Support Development of Supplementary Technologies, which is managed by the Carlos Chagas Hijo Research Foundation in the State of Rio De Janeiro (FAPERJ). Support is also provided by employees from the Ann Sullivan Research Institute, which specializes in autism.

The use of devices like smartphones and tablets also allows each child easy access to games that help improve the way they react to their surroundings. The use of online games is a positive as it also allows them to interact with other people remotely. Furthermore, mobile broadband technologies have created an opportunity for them to connect with a larger number of people.

Autism is a global disorder affecting peoples' ability to communicate, create relationships and respond appropriately to their environment. It is also associated with repetitive behaviors, such as obsessively arranging objects or following very specific routines. The symptoms can range from light to very severe. Autism can be diagnosed at the age of six months and it is important to provide timely behavioral, cognitive and speech interventions, helping children with autism to develop the skills needed to take care of themselves, interact with society and communicate.

The first game to be developed was Aiello, designed to help autistic children and youngsters develop using an integrated platform. It was created by the PUC Rio Scientific Technical Center IT Department, with support from speech therapists and psychologists. The game is free to download and has been available since July 2012. It was designed to help children between five and nine years of age develop their vocabulary. It also helps them learn about objects and identify geometric figures.

The application is available in nine versions, with parents and educators submitting comments on how to improve the application based on their experience with students and children. The application went on to include other challenges such as recognizing voices, colors, numbers and new words, which increase the game's difficulty and help children to develop further.

The game helps children to increase their concentration and vocabulary, without infantilizing their behavior. For example, it offers controlled environments that help to focus their interest and avoid distractions. The positive results achieved by autistic children has not only helped to further develop the game and led to others, it has resulted in parents with children suffering from Down's syndrome using the application for stimulation.

Another game for autistic children is PAR (from "Peço, Ajudo, Recebo" or, Ask, Help, Receive) which uses a touch screen table. The goal is to help youngsters between 12 and 17 to integrate. The game can be tailored to patient requirements. It also allows these children to interact with other autistic children, encouraging them to integrate and interact with various participants.

ComFiM (Communication by Exchanging Figures for Mobile Devices) is another game developed by PUC to stimulate communication among autistic children. The game includes individual and collaborative phases user interaction gradually increases with each subsequent phase. The game is set on a farm where the autistic children are in charge and have to collaborate to perform certain tasks. The children's main issues are addressed in order to tailor the game to their individual needs. Like the majority of games, the main actions are performed using the "I give you" and "give me" functions to improve the way they interact.

These games are examples of how ICT can support the health sector. With smartphone access, this type of initiative can be expanded into other areas, particularly as smartphones cost less than other, more complex devices. This also highlights the

fundamental importance of faster connections, which will create collaborative environments, allow parents and teachers to interact and provide a wider range of options to support autistic children.

MOBILE APPLICATION FOR A BALANCED DIET – PERU

The National Health Institute (INS) in Peru has developed a mobile application to improve people's diet. The app is provided by the National Food and Nutrition Center (CENAN) and the app is called INS CENAN. It was designed to help users design a balanced, everyday menu.

Excess weight and obesity has become a major problem in many countries around the world and Peru is no different. According to the INS, six out of every 10 people in Peru face this type of problem. The application recommends foodstuffs according to the users' everyday activities, in an attempt to avoid health problems caused by poor dietary habits.

INS CENAN is available free of charge for Android smartphones and tablets.

Users simply download the app and provide some personal information such as their name, ID card number and email address. Uses then fill out a form to calculate their body mass index, so the app's recommendations can be calculated using each patient's specific requirements. It is also important to measure the abdominal perimeter, which should be no greater than 88 cm for women and 94 cm for men.

The application also includes a calorie calculator. The user selects a product from a list of foods for breakfast, lunch and dinner, including any beverages, and the app can provide the number of calories. It also offers a series of educational videos on adequate portions by gender and weight.

CENAN is the INS technical standards body and responsible nationwide for supporting, designing, implementing and evaluating research and development into appropriate technologies for human food and nutrition. It manages the nutrition oversight system and provides food quality control, particularly in social programs, proposing measures to provide healthy dietary habits that help improve people's lifestyles and reduce public health problems, such as chronic malnutrition, anemia, noncommunicable diseases related to dietary habits and styles and inadequate nutrition.

The application takes a preventive approach, making it an important tool for national healthcare planning. The goal is to reduce the number of people at risk of weight-related complications. By suggesting a range of foodstuffs, the app also helps to avoid other diseases like high blood pressure.

The app can be used on a personal device like a tablet or smartphone, which means it is available to a large proportion of the population. Additionally, this type of device means that users are interacting with their diet on a daily basis, helping them control their calorie intake and adapt their diet to prevent other diseases.

This application is an important tool for public health planning. First, it leverages devices like smartphones that already have a high level of penetration. Additionally, it is a quick and simple method of control, which does not need users to spend time on maintaining an adequate diet.

There is a very large universe of possible users; according to data from Osiptel, the telecommunications regulator in Peru, the country had 33.6 million mobile lines in September 2015. This represents service penetration of 112.5%. Osiptel also reported 15.4 million mobile Internet users at the end of 2015.

This means mobile services are an important channel for bringing the app to market. Although many lines do not yet include mobile Internet access, there are still many users. The fact that the app is available free of charge is a major advantage in efforts to implement preventive public policies.

Steps to help increase mobile broadband service coverage are an important driver for this type of application. Wider coverage also means a larger number of people can benefit from this type of service. Additionally, steps that help to reduce smartphone prices, such as lower import barriers, help to increase the number of app users.

Mobile broadband deployment and expansion are an opportunity not only to increase the app's reach, but also to increase functionality. This means that faster access speeds will help to further improve current Telehealth initiatives in Peru.

RESEARCH: MEDICAL MOOC - VENEZUELA

The Faculty of Medicine at the Central University of Venezuela (UCV) has an ongoing program called SOS Telemedicine. It is being run in partnership with the Latin American Development Bank (CAF). Massive Open Online Courses (MOOCs) are a free, massive and online teaching and learning channel for healthcare professionals.

Online SOS Telemedicine Courses are an academic initiative aimed at helping train healthcare personnel, providing useful and relevant content. The program offers free, online courses for anyone who speaks Spanish and has Internet access. Altogether, there are 11 courses backed by teachers and postgraduates from the UCV Faculty of Medicine. The courses are provided using ICT technologies and focus on recent advances in healthcare.

MOOCs are open courses available online. These initiatives are interesting because they increase educational inclusion by reaching a large audience and offering courses in a wide variety of areas. Most importantly, anyone can access the courses without needing to meet any academic requirements or enrolling at a university. Furthermore, with no geographic ties, student access is much more flexible.

MOOCs offered by the UCV as part of the SOS Telemedicine Courses include Information and Communication technologies, Pediatrics in the following specialist areas: Infectious Diseases, Neurology, Breast-feeding, Nutriology, Gastroenterology, Neonatology and Social Pediatrics; as well as Gynecology-Obstetrics, specializing in Maternal-fetal medicine, endocrinology, gynecology and infant-juvenile gynecology.

Each course includes video cases and tutorials from higher education professionals. Also, each course provides bibliographic references, presentations and support material, all of which is available for download. Each online course includes assessment tools so that a Certificate can be obtained for the SOS Telemedicine program at the Central University of Venezuela's Faculty of Medicine.

The program will also be used to train and educate healthcare personnel. The course content will be supplemented and updated to improve skills, increase networking and optimize treatment at remote clinics.

PRIMARY CARE: TELEHEALTH PROGRAM INCLUDES TELE-EDUCATION - BRAZIL

The Brazil Telehealth Network Program is available in Sergipe and managed by the State Health Foundation (Funesa), in partnership with the State Health Secretariat (SES) and Unified Health System (SUS). This is a federal initiative to improve the quality of basic care by integrating teaching and services using information and communication technologies (ICT).

The program has been offering telehealth and tele-education service since 2013. It is currently connected with the Family Health teams at the State Science Center, which faces the challenge of implementing 250 nodes throughout the state of Sergipe, with 133 being deployed in 70 cities.

Telehealth includes furniture, a computer, a printer, headset, webcam and Internet. It offers access to healthcare professionals over a virtual platform with remote medical consults. Each healthcare professional can request assistance from a tele-consultant (a physician, dentist or nurse) with primary care experience.

The program also includes tele-education via web classes, webinars and courses. It is also intended to improve the quality of SUS basic care, significantly reducing shift times, providing medical staff in difficult to access locations, speeding up care and optimizing resources within the system.

Nationwide, the Brazil Telehealth Networks Program will improve the quality of SUS case, integrating services and education through ICT. The Program began in 2007 with a Pilot Project to support Basic Care at telehealth centers based at universities in Sergipe, Amazonas, Ceará, Pernambuco, Goiás, Minas Gerais, Rio de Janeiro, San Pablo, Santa Catarina and Rio Grande do Sul, training approximately 2700 Family Health Strategy teams throughout the country. The program benefits 10 million SUS patients nationwide.

LOOKING TO THE FUTURE...

Telehealth initiatives in Latin America span various sectors of society and different health issues. Many States throughout the region have adopted nationwide projects.

This appears to be positive for the future, however the situation needs constant monitoring and cannot depend solely on State initiatives. The public sector must also provide a regulatory framework that also supports the private sector and offer incentives to encourage so that both can work in tandem. State-run organizations such as Universities also have an important role to play.

We should bear in mind that generally speaking, public Telehealth policies are intended to provide care quickly. However, many private sector initiatives either take a more preventive stance or are used to monitor chronic diseases. These are two very important factors in any attempt to improve national healthcare systems.

Another regional issue is the way different areas of government work together in each country. This means analyzing how the ICT and Health sectors collaborate and implementing policies that pursue common goals. This is essential for the future success of Telehealth projects.

When planning a fully-fledged Telehealth project, it is also important to consider telecom network deployment. This is particularly true in Latin America where networks provide access in rural areas, which usually have the greatest need for healthcare. This means wireless broadband networks are particularly important, especially since implementation of mobile broadband.

Furthermore, mobile broadband networks are not only an important tool for connecting regions without cabled networks. They also encourage app-based initiatives that prevent and control disease. Markets also encourage this type of initiative when they are equipped with mobile broadband systems.

As such, States need to create an environment that supports adoption of new wireless broadband technologies, not only by releasing spectrum but also by facilitating network deployment and mass ownership of devices that offer people greater access to this Telehealth services. Governments also need to increase ICT actor involvement in their Telehealth initiatives, not only through connectivity, but also by creating – or supporting – Telehealth apps and content.

Basically, the future growth of Telehealth in Latin America not only need to encourage State ICT and Health areas to work together, it also requires private sector investment and better telecommunication services, especially wireless, to increase the mass-market reach of these programs.

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TELEHEALTH IN
LATIN AMERICA

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