

**Politics of Regulation of ICTs for Telemedicine:
Analysis of Rural Areas of Peru**

A Dissertation

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List of Abbreviations

AIEPI	Strategies of Comprehensive Attention of Infant Prevalent Diseases
ADD	Acute Diarrheal Disease
AECI	Spanish International Cooperation Agency
ARI	Acute Respiratory Infection
ASIS	Analysis of the situation of health in Loreto
ATA	American Telehealth Association
CAN	Community of Andean Nations
CBO	Community Based Organization
CCD	Constitutional Democratic Congress
CEPAL	Economic Commission for Latin America and the Caribbean
CRP	Congress of the Republic of Peru
CODESI	Commission for Development of the Society of Information
CEDISAP	Center for Informatic Development in Public Health
DIRESA	Regional Direction of Health
ECLAC	Economic Commission for Latin America and the Caribbean from United Nations
EHAS	Hispano-American Health Link (NGO)
FISSAL	Intangible Fund for Health
FITEL	Fund for Investment in Telecommunications
HC	Health Centers
HP	Health Posts
HR	Regional Hospital
IAD	International Agents of Development
ICTs	Information and Communication Technologies
IDB	Inter-American Development Bank
INEI	National Institute of Statistics and Informatic (Peru)
INFOMED	National Center in Information and Medical Sciences
INICTEL	National Institute of Research and Training in Telecommunications
ISF	Engineering without borders (NGO)
GOREL	Regional Government of Loreto
GTR	Group of Rural Telecommunications
MEF	Ministry of Economy
MDG	Millennium Development Goals
MIDIS	Ministry of Social Inclusion and Development
MINSA	Ministry of Health (Peru)
MTC	Ministry of Transport and Communications of Peru
NGO	Non-governmental organization
ONGEI	National Office of Electronic Government
ORAS	Andean Organism of Health
OSIPTEL	Organism of Supervision of Private Investment in Telecommunications
SIS	Comprehensive Health Insurance
SERUM	Marginal Urban and Rural Health Service
UN	United Nations Children's Fund
UNAL	National University of Colombia
UNICAUCA	National University of Cauca
UNDP	United Nations Development Program
UNICEF	United Nations Initiative
UNSAAC	National University Antonio Abad from Cuzco
UPCH	Peruvian University Cayetano Heredia
PAHO	Pan American Health Organization

PCM	Presidency of the Council of Ministries
PUCP	Pontifical Catholic University of Peru
RCP	National Scientific Network
V-SAT	System of Satellite Internet Connection
WB	World Bank
WiLD	Wireless network adapted for Long Distances
WHO	World Health Organization

Chapter I.

Information and Communication Technologies in Rural Health

1. Introduction

From the decade of 1990s the Information and Communication Technologies (ICTs) has been considered as an important transversal tool for different public sectors such as health, education and government in small and big economies, providing an opportunity to meet vital development goals (UN 2009: 14-19). Due to its relevance in the field of development, the definition of ICTs has been included in the declaration of the United Nations Millennium Development Goals¹ (UN 2000). Since then, ICTs have taken a place as transversal and multisectoral tools to support the social priorities for achieving the MDGs in the areas of health, education, governability, environment and entrepreneurial networking (Bebea et al. 2011: 14-18).

The World Economic Forum affirms that using ICTs as a catalyst for social and economic progress is an opportunity long held in high regard by the international development community (WEF 2010: 1-4). What these technologies do is to provide the means for people's voice to be heard by others facilitating communication and coordination of individual or group actions and the capacity of immediate response. The WEF report indicates that ICTs cause impact at the macro and micro levels as a powerful tool to address those social, economic and environmental challenges. Thus, in the public administration at the macro level, they promote dialogue between the strong powers of society members such as governments, policy makers, entrepreneurs, international associations, civil organizations, etc. At the micro level, these communication technologies are the tool for private sectors and individuals to express themselves and exchange opinions with other individuals. These conversations have the capacity to provide incentives for the reunion of citizens for several purposes, promoting the capacity of association and organization of civil society members. In the

¹ MDGs Goal no. 8: "In cooperation with the private sector, make available benefits of new technologies, especially information and communications".

meanwhile, macro and micro levels interact using ICTs to find each other's opinion in an informal platform that facilitates communication from both sides for strategic and practical decision making.

The World Health Organization (WHO) defined in 1997 the concept of telemedicine as “the provision of services of sanitary attention in which distance means a critical factor, listed by professionals who are using the technologies of information and communications with the objective to exchange data for diagnosis, treatments and prevent spreading of diseases and lesions, as well as for the permanent formation of health care professionals and in activities of research and assessment with the solely objective to improve people's health and their communities”(WHO website). The WHO also, established four elements are germane to telemedicine related to its aims in developing countries: (i) it's purpose is to provide clinical support; (ii) it is intended to overcome geographical barriers, connecting users who are not in the same physical location; (iii) it involves the use of various types of ICTs and, (iv) its goal is to improve health outcomes² (WHO 2010:9).

According to Wootton et al. (2009), same as in the concept of ICTs, there is no universal agreement about the definition of Telemedicine or Telehealth as a divided or an inclusive concept. The history of Telemedicine has been written as a loose terminology determined by practitioners and users of the systems as they were spreading from the starting of usage. The terms “telehealth”, “online-health”, “connected health”, “e-health” etc., has been randomly used in the literature for referring to the same system of using ICTs for distributing health care or health services through distance. Thus, telemedicine may represent health care practiced in real time, using video links, for example, or supporting

² According to the Report of Telemedicine and E-health from the WHO, Telemedicine is a term coined in the 1970s, which literally means “healing at a distance” and signifies the use of ICTs to improve patient outcomes by increasing access to care and medical information (WHO 2010). “The delivery of health care services, where distance is a critical factor, by all health care professionals using information and communication technologies for the exchange of valid information for diagnosis, treatment and prevention of disease and injuries, research and evaluation, and for the continuing education of health care providers, all in the interests of advancing the health of individuals and their communities” (WHO 2010: 22).

the administrative processes required for spreading health attention by using e-mails (Wootton et al. 2009, ch.1).

The use of information technologies

The internet is no longer a program sitting on the computer but it's part of people's lives. People with connection to the internet can read the newspapers on their mobile phones, chat with friends or sending and receiving e-mails, feeding social media links and exchanging opinion as they go on the trains to work. Today, most of the important contents are gravitating in a parallel universe of information and certainly the biggest database humanity has ever known.

The internet is useful for connecting people and promoting the creation of communities around topics of interest that can be named as clusters. Those clusters of interest make the ICTs to act as a targeted tool for facilitating remote access to services that cannot be delivered any other way. From educational systems, economic systems, and health systems, ICTs enhance people's ability to participate in issues that are happening in the world and get involved into action groups as individuals or as a community.

ICTs have evolved successfully and are still getting to meet the potentials of their capabilities. The implementation of the concept of e-governance, as the spread of government services using ICTs make authorities and policy makers to rethink about processes of attention and the ways to deliver their services in order to use the lower cost opportunity of these modern tools. Thus, elaborate platforms of public and private access are providing governments the opportunity to communicate directly with citizens as individuals addressing their needs and targeting strategies for improved results.

Potentiality of ICTs for development

The deployment of ICTs to support the development of various sectors of the economy is having impact on economic growth directly by increasing the demand of the ICTs sector and indirectly through its enabling impact on other sectors of the economy.

Consequently, ICTs have an impact in the promotion of economic growth³. For example, the growth of the mobile communications sector in Latin American countries in recent years has created avenues for poverty reduction through the creation of jobs for the youth in both the urban and rural areas and facilitating communication between small services and their clients such as transportation services, domestic sales, etc., having impact on poverty alleviation efforts directed at poor rural and urban areas (Wootton et al. 2009:14-20).

The use of ICTs facilitates access to timely information to trigger rapid responses by relevant government agencies and other bodies to combat hunger. In a way, access to timely information by government agencies can impact on poverty eradication and on combating hunger⁴.

ICTs also have an impact in the provision of health services and access to primary healthcare in remote areas⁵. The use of ICTs to promote and facilitate the delivery of health services has been recognized by a number of African countries. A number of these countries have put in place as part of their ICT4D process, ICTs-in-Health policies and strategies to drive their efforts in this area⁶. Another area of applications of ICTs within the health sector in a number of developing countries relates to the use of these technologies to widen access to health

³ This growth can positively impact on poverty reduction efforts in both poor rural and urban communities (Wootton et al. 2009:17-18).

⁴ Also, these technologies have been used during humanitarian emergencies in African countries as a critical tool for monitoring and managing the procurement, storage and distribution of essential food to combat hunger and malnutrition during these emergencies. For example, emergency teams during the Darfur crisis in the Sudan; the emergencies created by the war in Somalia and the Democratic Republic of Congo (DRC), and the flood that recently hit a number of countries in the West African region all made use of ICTs resources and tools to assist them in their work and by so doing improve the effective management of the crisis at hand (UNDESA 2010). ICTs are also being used in a number of African countries to support and facilitate poverty monitoring, mapping and assessments through the use of geographic information systems (GISs) to facilitate timely and informed decision making to either prevent or minimize the impact of poverty or hunger among vulnerable groups and poor communities.

⁵ A number of the e-health efforts in African countries are targeted to facilitating improved access to health care facilities and services to poor rural and remote communities and as well as to those living in poor urban communities. Some of these countries have implemented a number of pilot and demonstrative e-health and telemedicine systems aimed for improving and widening access to health services and facilities for their citizens. A number of these initiatives have demonstrated the use of ICTs to extend to reach of the limited health services to underserved communities in rural and urban areas in these countries.

⁶ Some of these countries include: Ghana, South Africa, Gambia, Nigeria, Egypt, Tunisia, Rwanda among others.

education⁷ and awareness targeting the poor and the economically vulnerable groups within the society⁸. These efforts can impact on health education and awareness creation efforts targeted at combating for example HIV/AIDS, malaria and other diseases and as well as on improving maternal health and reducing child mortality rate in these countries. ICTs can also contribute toward the provision of education and training services⁹.

From a different perspective, the use of ICTs can facilitate community-based decision making by offering free online spaces for promoting the exchange of opinion and debate of the citizens about community issues and governmental proposals. The difficulty is related to the availability of infrastructure of telecommunications, especially in rural areas. Once overcome these barriers, ICTs have the capacity of promoting the use of virtual platforms for formal and informal open communication amongst individuals and community representatives either reducing or eliminating social, economic and geographical barriers for effective community-based interaction and access to public information.

ICTs in health for developing countries

In the health sector, the use of ICTs started an innovative process of delivering health attention named Telemedicine. In developing countries, Telemedicine services facilitate the delivery of health care services to isolated areas with limited access to medical practitioners or specialists.

⁷ Achieving universal primary education has for some years been a priority educational policy area and some of them have explore ways that ICTs can be used to enable them make progress towards this goal.

⁸ For example, South Africa which is one of the leading countries in Africa at deploying e-health solutions to support health care service delivery to the public at large has implemented a number of e-health initiatives including: an Electronic Health Records system; e-Health Smart Card 26 system; Cellphone for HIV", involving the use of cell phones for mass messaging on issues relating to HIV; Electronic TB Register; a pilot Telemedicine project among others. Also, in the health sector a number of African countries had required the private sector involvement. Private clinics, pharmacies and other health centers are found in most neighborhoods and localities in most African countries.

⁹ A number of African countries including Rwanda, Ghana, Ethiopia, Nigeria, South Africa, Algeria, Tunisia and many others are implementing various forms of e-education programs and initiatives using ICTs to improve and widen access to educational resources in a number of ways including: improved access to learning materials and resources, widening of access to education through e-learning etc. (UNDESA 2010:12-14).

In practice, several studies¹⁰ had shown the capacity of ICTs to support the processes of coordination for transfer and attention of medical emergencies, second consultation, reference and dereference of patients, distribution of medical supplies, processes of continuous formation of technical personnel and health workers and transmission of data for epidemiologic surveillance, among other services. However, the use of ICTs demands the capacity of access connectivity services and at least basic knowledge to use these tools. In developing countries, these are translated as a requirement of communications infrastructure and the necessity to develop certain abilities of people to deal with processes through a computer and basically understand the language of this new concept of communities and networking.

Usage of ICTs in the medical sphere also enhances the application of new techniques and sanitary instruments to the health professionals. For example, access over the internet to information related to advanced methods of diagnosis or therapeutic methods based on the analysis of images and signals using systems of tele-stethoscope to support the diagnosis of ARI (acute respiratory infections) and cardiovascular diseases. Also services of tele-microscopy to support the diagnosis of malaria, tuberculosis and ADD (acute diarrheal disease) (for analysis of blood and stool) and cervical cancer or tele-ultra-sonography for diagnosis related to pregnancy and fetal condition. The use of these tools makes possible the immediate diagnostic and treatment for a patient using remote connection or consulting over the phone with a specialist (Sanoni 2012).

ICTs in the context of Latin America

In several Latin American countries, the implementation of effective ICTs policies could become a challenging effort. Poverty and inequality are two important characteristics of the Latin American society (Ferrer 2009: 163). Commonly in Latin American countries, small groups can have access to urban residences and wide access to sophisticated ICTs'

¹⁰ Several studies in ICTs for health shown the capacity of these technologies for supporting medical services such as (Wootton R. 2009; Martinez et al. 2005; Martinez 2004; Rey-Moreno et al. 2010; Bebea 2010).

infrastructure through their cooperative job positions and the biggest mass of people reside in depressed and marginal urban areas or rural isolated terrains in extreme and chronic poverty (Sagasti and Bazan 2008).

From another perspective, many studies highlight the capacity of ICTs in developing countries for promoting economic growth, improving health access and social development (UNDP 2013, WHO 2005, WHO 2010). Also, considerable empirical researches have been centered on finding correlations between ICTs' adoption and economic growth in Latin American countries¹¹. Experiences in Brazil, Chile, Cuba, Colombia, Nicaragua and other countries show that governments in the developing world can effectively take advantage of ICTs (CEPAL 2013, Wootton et al. 2009, Martinez et al. 2005). Though, despite the increasing interest of governments in implementing ICTs initiatives, the opportunities for the success of these initiatives in developing countries have been largely unexploited (Ferrer 2009: 162-163).

In this scenario, ICTs' use in the world have shown evidence of being useful tools to contribute to the mechanisms of the State to provide services to isolated populations (such as education and health) and to provide tools for promoting horizontal dialogue between authorities and citizens using the benefits of technology to overcome the barriers of access for the mass in poverty. Then, it is the role of the State as a legitimate elected entity with power, authority and resources to promote and incentive the spreading of infrastructure of ICTs and to provide the aims for training of public servants to develop technical capacities that enhances the use of ICTs as tools for increasing efficiency in the public services. Also, it is the role of the State to design the strategy and the plans for using ICTs in other sectors such as health, education and citizens' empowerment to contribute towards the improvement of living conditions of the most deprived groups.

¹¹ Several studies such as Martinez et al. 2005 and Martinez 2004 with his experiences in several Central and Latin American countries, Rey-Moreno et al., 2010 with his studies in Colombia and Bebea 2010 on her study about the network of Ehas-Napo in the Amazonia of Peru.

Urban and rural access to communication technologies

The difference between the urban capacity of access to the internet and the rural capacity is called the Digital Divide (OECD 2001: 5-7). This Digital Divide is caused by unequal access to infrastructure of telecommunications, IT training and the economic constrictions imposed on rural populations by a sort of Darwinism on the rules of the market, as most of people living in isolation cannot afford ICTs equipment on their own or reach the knowledge to handle it.

The digital divide is a concept largely examined with care from the 1990s where internet community users from the developing world started working in clusters of interest toward the concept of the Society of Information. The Society of Information is an imaginary social construction where it is believed that internet and ICTs promote the creation of communities beyond the barrier of distance or poverty with the only interest of including as many people as possible to the creation of a global society where everyone has the right to express their opinion (Mattelart 2001: 27.). The idea behind the creation of the Society of Information is for the world to contribute to a social construction found in the values of open democracy, open knowledge, universal participation and a dynamism only comparable to the conquer of the space back on the 20th century (Requejo 2003: 150-152). Still, in the real society, ICTs are tools that have potential benefits for developing countries and small economies that require deep knowledge of the reality of their citizens for the development of effective strategies of their governments as the only organic institution with the power to address these tools to tackle and solve the felt needs of their inhabitants.

Relation between ICTs and Telemedicine

ICTs are tools for providing Telemedicine services for the purposes of health care in distant geographic locations where the patient is not close to a medical practitioner or a specialist¹². The same way can be used for

¹² According to the American Telehealth Association (ATA) and confirmed by further studies (Wootton et al. 2009, Bebea 2010, Martinez et al. 2005, Rey-Moreno et al. 2010, Sanoni 2012), it is possible to summarize the main uses of remote health services for these purposes: (i) specialists referral services

processes of consultation where medical practitioners or technicians of lower levels of knowledge can contact a professional of higher capacity to help them to resolve their problems, to facilitate administrative and coordination procedures for the management of health services, to share immediately information in health using the internet service, or exchanging training sessions using video tools online.

ICTs in Peru

Peru is recognized as a developing country, where society has significant inequalities between urban and rural development. Inequality in Peru is reflected in a high Gini coefficient of 0.52, representing that the richest 10% can consume 30.4 times more than the bottom poorest 10% (UNDP 2009, UNDP 2013, Ferrer 2009). Health, education and social inclusion are major issues in rural areas and there is historical evidence of the intention of any and every political party in government to tackle these problems. In this scenario, ICTs for health provide an easy to reach set of tools to overcome the difficulties of distance and high costs by using low cost appropriate technologies¹³.

typically involve a specialist assisting a general practitioner in rendering a diagnosis. This may involve a patient “seeing” a specialist over a live, remote consult or the transmission of diagnostic images and/or video along with patient data to a specialist for viewing later; (ii) direct patient care such as sharing audio, video and medical data between a patient and a health professional for use in rendering a diagnosis, treatment plan, prescription or advice such as Direct patient to monitoring center links¹² are used for pacemaker, cardiac, pulmonary or fetal monitoring and related services and provide patients the ability to maintain independent lifestyles; (iii) remote patient monitoring uses devices to remotely collect and send data to a monitoring station for interpretation. Such “home telehealth” applications might include using telemetry devices to capture specific vital signs, such as blood pressure, glucose, ECG or weight. Such services can be used to supplement the use of visiting nurses. Health provider to the home connections involves connecting primary care providers, specialists and home health nurses with patients over single line phone-video systems for interactive clinical consultations. Such services can also be extended to a residential care center such as nursing homes or assisted living facility; (iv) medical education and mentoring, which range from the provision of continuing medical education credits for health professionals and special medical education seminars for targeted groups to interactive expert advice provided to another professional performing medical procedure, and ; (v) consumer medical and health information for consumers to obtain specialized health information and on-line discussion groups to provide peer-to-peer support (ATA 2014, website).

¹³ Appropriate technologies are those able to cover the needs with the minimum technological requirements (for example, to use an original software and hardware instead of buying it from providers). Robust technologies mean that the infrastructure and architecture of the network can support the needs of the communication in terms of capacity, memory, transmission, velocity, etc. Sustainable technologies refers to the capacity of the institutions involved to keep on providing the services of communication for the purposes that it has been installed on first place through the times, even after the initial support had finished. It involves the appropriation of the project from the beneficiaries and also the involvement of the personnel that works on the maintenance of the systems. At the end, the idea is to maintain the performance of the services in the long wind to integrate isolated

In Peru, from 1999 there were several private initiatives of ICTs to increase access to public health services to isolated rural populations that has been the object of impact studies offering positive outcomes¹⁴. These initiatives aim to provide ICTs for Telemedicine in the health posts of isolated areas and connect them with their reference centers using the resources of connectivity for increasing the capacity of resolution¹⁵ of rural health workers. In this bases, it has been shown that ICTs are effective to provide connectivity for the transmission of data and voice for the health establishments, promoting coordination of health services such as transportation of patients, immediate consultation with a specialist general practitioner of medicine in voice and video, provision of drugs and supplies for the health establishments and health posts at low cost using appropriate technologies¹⁶.

ICTs in rural health

From a national perspective, the purpose of the government is to propose and lead strategies for addressing the fight against poverty by promoting inclusion of their citizens living in rural and remote areas to

populations and this study also pretends to be able to explain how it could be achieved.

¹⁴ Several ICTs Impact studies such as Ehas-ALIS (Sanoni 2007, 2008), previous studies in Central America and Peru (Martinez 2004, Martinez et al. 2005), Study of Impact of the project Ehas-Napo (Oña 2010, Bebea 2010, Bebea et al. 2011).

¹⁵ Capacity of resolution refers to the capacity of administrative, technical and medical personnel for having the criteria for determining processes and make decisions immediately for solving problems in the rural and isolated health centers as well as in regional installations. Since technologies also have to contribute to reduce the gap on knowledge, these networks are meant to be useful to help the health workers on the improvement of their diagnostic and therapeutic capacities by extending their knowledge to be able to use such as tools. Also to potentiate their coordination with the highest levels of authority and reference centers located into the cities.

Capacity of resolution is also related to the sufficiency of resources to support such a decision, and not only related to the personal or professional capacity of the health worker. For example, a health worker may know well the procedures for attending a particular emergency, but if it is impossible to find transportation or medical supplies, his capacity of solving the problem is limited on the constrictions provided by the health system. Therefore, working on the capacity of resolution of health stalls or health centers, refers to the situation where it is required to provide support on management of resources, but also promoting the need between the authorities for sensitization toward the accomplishment of the minimal requirement on each health establishment.

¹⁶ Appropriate technologies are defined as those able to cover the needs with the minimum technology requirements (for example, to use an original software and hardware instead of buying it from providers). Robust technologies mean that the infrastructure and architecture of the network can support the needs of the communication in terms of capacity, memory, transmission, velocity, etc. Thus, these technologies have to be appropriate, robust and sustainable and also low consumption, low cost and low maintenance demands. Also, these technologies also have to contribute to reduce the gap in knowledge and to increase the capacity of solving problems in the technical health personnel who works in the isolated installations (Sanoni 2012).

improve their living conditions. According to the Analysis of the Situation of Health Report 2012 processed by the Ministry of Health through the Regional Directions of Health in Peru, the highest risk factors affecting the quality of health in Peru include under-nutrition, chronic diseases and lack access to public health care and drugs (DIRESA 2012).

In the context of the delivery of health care services in Peru, Telehealth systems are able to provide the following services: support for administrative systems and facilitating logistic coordination on remote bases; communication services between the regional hospitals and the local health attention establishments; support for coordination between the peripheral establishments and the hospitals for reference of emergency patients; support for breaking the isolation of medical personnel; facilitates on-line consultation and promotes exchange of medical information such as second consultation, patient referral and counter referral, epidemiologic incidents, casualties and deceased etc. (Martinez et al. 2005).

ICTs, policy and politics

From 1999 in Peru, most of initiatives for using ICTs for delivery of health care services are commonly identified as Telemedicine projects, and are promoted and financed by private initiatives. The political relations between the government and the organized civil society are important for the establishment of Telemedicine services because the authorization of the regional governments and Ministry of Health is required for installing and using the services. Later, policy is essential for the continuity of the services and maintenance of the technologies.

The problem for Telemedicine in Peru is about the administrative and institutional difficulties in the regional and local health establishments for delivering health care services in rural areas caused by the lack of standardized and formal procedures for implementation and maintenance of Telemedicine services. These difficulties are often caused by unclear policies reflected in irregular and bureaucratic administrative

procedures, coexisting in an environment where the roles of the government institutions are also unclear, dysfunctional or duplicated.

Telemedicine initiatives in rural areas of Peru started with political agreements and political support of the local governments of the rural areas interested on improving their health care services. In the lack of availability of health services provided by the state, the infrastructure of Telemedicine has been generally based on donations granted by international agencies of cooperation, and administrated by the private institutions which promoted the initiatives such as universities, NGOs and community organizations. Thus, infrastructure remains in the private administration for two to three years as proposed by Telemedicine projects in their initial formulation¹⁷. After this period, the projects are transferred from private ownership to a local government's administration, most of the difficulties registered by users and administrators of the systems are related to the processes of maintenance and sustainability.

In the context of ICTs for rural health in Peru, the regulation and policy are highly important because they establish the formal basis for the provision of services using the resources of the state for ensuring equity in the provision of health services for the most deprived populations¹⁸. In the case of health, the regulation is essential for organizing the processes and resources required for accomplishing the function of delivery of health care services nationwide. The existence of several difficulties in the delivery of health services in rural and isolated areas of Peru obliged the community members and the members of the civil society to think about alternatives to attend the underserved areas such as Telemedicine.

¹⁷ The period of two to three years has been estimated as an average from most of Telemedicine projects in Peru as it is the time that may take to develop technical capabilities on health workers, technical workers and local government representatives to learn about the operation of the systems and to increase their capacities of resolution to solve processes using ICTs.

¹⁸ In the field of public policy, the pragmatic character of the discipline indicated that the actor which produces a public policy is a public actor as a representative of the citizenship that had expressed their needs orally, in written forms or through their behavior in society. In the present study, actors are also the recipients of the actions (actors from civil society and private industry), and not only the policy makers (ministries and multisectoral committees).

The projects of Telemedicine in Peru

Most of the implementations of Telemedicine in Peru from the past two decades correspond to private initiatives¹⁹. The Technical Norm in Telehealth was created in 2008 with the intention to provide the guidelines for further private projects and as a proposal for the incorporation to the Telemedicine services to the national health system. In this scenario, for studying the implementation of ICTs in health in Peru is essential to use information from private projects of development.

Consequently, for the purpose of analyzing the effects of politics in the processes of ICTs policy making, this study proposes an analytical framework including the study of the effects of policies in the use of Telemedicine. Thus, this study had selected three projects of Telemedicine developed between 2003 and 2012 in rural areas of Peru which were implemented in similar conditions. These projects were assessed and given as a donation to the national health system. Their results may explain the effects of ICTs regulation in the spreading and maintenance of Telemedicine services for delivery of health care in rural areas.

Relevance of the study

This study is relevant because it aims to discuss the importance of the establishment of a regulation of ICTs as a feasible alternative for the delivery of health care services in rural areas of Peru. Rural population represents about 24% of population in Peru and they are often living in condition of poverty or extreme poverty (MINSA 2012:2-12). These groups are severely affected by geographical isolation and social exclusion²⁰.

¹⁹ The Telemedicine services in Peru started in 1999 with research projects promoted by the Pontifical Catholic University of Peru and their partners in the Politecnico University of Madrid for developing improvements in quality of the radio communications between the health posts using improved telecommunications technologies (HF and UHF¹⁹) in Alto Amazonas (Sanoni 2008). In the 2000's, international cooperation agencies provided their support and in partnership with the NGO Engineering Without Borders and the local governments several projects of Telemedicine were in the Peruvian forest. These projects lasted between two to three years and included activities of implementation of the infrastructure of the networks and empowerment of health personnel in the use of ICTs for health. Then, the projects are given as a donation from the cooperation agencies and become part of the technical equipment of the national health services and the local governments.

²⁰ According to the statistics, in 2012 about 5.8 million people was registered on the social insurance SIS, but still the portion of population without insurance are living in a situation of extreme poverty, malnutrition and isolation (MINSA 2012:2-12). According to the statistics of the National Institute of Statistics and Informatics of Peru (INEI), in 2007 at least 6.5 million people live in rural areas (about

Consequently, this study is important because it aims to analyze the mechanisms of accountability of the regulatory institutions in Peru, recognizing the responsibility of the government bodies responsible for the delivery of health care services and the articulation of ICTs for the public administration of the health system, the processes of policy decision making, and the actions to be taken legitimately in favor of rural isolated populations. Furthermore, this study is pertinent because by making a review of the past experiences in private investments it may aware project managers and current policy makers about the difficulties and the nature of problems of ICTs in health.

The argument of this research

In the situation presented by this introduction, the problem of Telemedicine in Peru is about a poor regulation system for the spreading and maintenance of ICTs which does not enforce compliance, establishing a barrier for the delivery of remote health care services in rural areas. Then, the institutions and private enterprises concerned about ICTs in health do not feel pressure about the need for extending the infrastructure of telecommunications to the rural areas as they offer low revenues, and in consequence, the rural health establishments lack of communication tools for coordinating health services.

Thus, this dissertation aims to analyze the effects of politics in the regulation of ICTs in Peru, and contribute to the literature with an original research in the topics of politics, health policy and technology implementation. Also, this research aims to contribute with an original analytical framework for the analysis of the effect of policies in the outcome of development projects.

For this purpose, the research departs from identifying the stakeholders of the process of policy making in the scenario of the politics of Peru, and discusses the influence of the characteristics of this political system in the processes of ICTs policy making. This analysis is made applying an original framework based in a Neo-institutional approach and

24% of total population) and only 3.8 million was registered on the Comprehensive Healthcare System (SIS) in the same year which is roughly 60% of rural population (ibid).

analysis of the interaction of the institutions and highlighting the importance of the context in the politics and the policy decision making. Then, the study presents three cases of study of Telemedicine implementation in rural areas of Peru, and analyses the effects of the ICTs' policies and health policies applied from 2002 until 2012 and explains how these policies influenced the outcome of these projects.

Furthermore, this study aims to explain the organization of the state in the context of ICTs identifying institutional accountability²¹ in the policy making process and identify different outcomes as effects of policy implementation. Thus, this research deepens in the process of policy making and regulation of ICTs for supporting the delivery of health care services and explains the mechanisms of coordination of the institutional actors in the formulation of strategies and execution of the national plans for the deployment of Telemedicine networks as an alternative for facilitating access to remote health services interpreting information obtained from the results of three projects of Telemedicine in rural areas of Peru.

1.1 Objectives of the study

The main objective of this study is to introduce an original analytical framework to recognize the effects of the national politics in the policy making for ICTs in Peru. For this objective to be accomplished, three important objectives of research are defined.

The first objective is to explain the influence of the dynamics of politics and their effects in the regulation of ICTs. For accomplishing this objective, the study is based on a Neo-institutional approach which affirms the importance of the dynamics of the institutions in Peru in the policy making processes and analyses the impact of these dynamics in the processes of improving access to ICTs for rural health. For example, this

²¹ According to Ochoa Henríquez and Montes de Oca (2004: 458), accountability is an old concept that had acquired a new meaning through the evolution of the processes of governance. This topic is developed in detail in Chapters V and VI of this dissertation.

objective aims to explain how the dynamics of the inter-institutional relations may affect accountability and policy compliance²².

The second objective is to analyze the current regulation of ICTs, the characteristics of this regulation and the role of the governmental bodies in the implementation of this regulation for ICTs in the public administration. This objective aims to analyze the institutional accountability of the stakeholders in the establishment and compliance of the regulation for ICTs.

The third objective is to identify the effects of the policies in the implementation of Telemedicine systems in the reality of rural areas of Peru. This objective proposes to analyze the effects of the regulation and policies in the delivery of health care services and to identify how it affected the health access for rural populations. For this purpose, this research analyzes the outcomes of three cases of study²³ which are introduced on detail in Chapter IV of this dissertation.

Consequently, it is by accomplishing this objectives of study that this thesis aims to contribute to the literature by providing an innovative model of analytical framework to understand the importance of regulation and to explain the relevance of coordination in the process of policy making as a product of the institutional interactions with private agents and individuals to incentive and promote compliance.

Furthermore, this research emphasizes the importance of the analysis of the current mechanisms for coordination and communication from the central to the local governments in the cycle of policy making. Also the study is based in the experience of three cases of study of Telemedicine in rural areas, proposing an innovative approach in policy research.

²² This objective aims to find the effects of the characteristics of inter-institutional relations such as lack of coordination, affects to the processes of ICTs' policy making.

²³ These cases of study are developed in similar political environments but in different moments of the public administration. The three cases of study are projects of Telemedicine and promoted by actors from the civil society as a response to the need of health services in rural areas.

2. Rationale

This research aims to distinguish the effects of politics in regulation of ICTs at two levels: micro and macro. For the purpose of the macro-analysis, the idea is to identify the characteristics of the Peruvian politics as the dynamics of interaction of the governmental institutions and how they affect were the processes of policy making for ICTs since 2002 until 2012. For the micro-level analysis, the core is to identify the effects of the policies and the changes in the political context over the reality of the application of the ICTs' policies in the delivery of public services, with emphasis in rural health.

For these purposes, this study proposes to use a qualitative method to compare the actions and results of three private initiatives of Telemedicine in rural areas of the country and through a close observation identify and analyze the political issues that were determinant for their success or failure²⁴.

These projects are “Project EHAS-ALIS” in Cusco, the “Project EHAS-Napo” in Loreto and the “Project Putumayo” in the frontier area between Peru and Colombia. These three projects have a common origin and shared geography; a standardized organizational environment and the advocacy of providing technical training, guidance, management, monitoring and infrastructure of telecommunications to the rural health establishments in three provinces in Peru for improving access to health care services by empowering health workers on the using of informatics tools and training local authorities to support sustainable Telemedicine systems.

Furthermore, the cases of study selected were installed and assessed at different moments of ICTs development in Peru in a timeline from 2002 until 2012. Then, the analysis of politics and policies is determined by the political events that had happened in the context of changes in the policy, enhancing to observe the dynamics of the

²⁴ The idea of collecting data from similar cases of study with same inputs bringing different outcomes has been inspired in the method of differences developed by John Stuart Mill (1843: 159-162). Mill's logics applied to three cases of study of ICTs for health suggests that in similar of circumstances and similar organization in a common political ground, the differences may come from individual issues.

institutions under the scope of other political changes that may influence their actions and behavior.

2.1 Premises

Premises are defined as the group of assumptions used as a starting point of this research. The reason for defining premises in this study is because they are important definitions that do not need to be demonstrated along this dissertation. These are affirmations evidenced by other authors in the specifics of Telemedicine in rural environments in Peru, and other countries in similar conditions and largely examined in previous studies²⁵.

Thus, ICTs are defined as useful tools for tackling the felt needs of remote populations in Peru and can be associated in four dimensions²⁶:

- ICTs are a feasible alternative for delivery of health attention;
- ICTs are pertinent tools for promoting social inclusion providing tools for citizen-government communication in remote areas;
- ICTs are useful to promote popular participation; and
- ICTs contribute to promote transparency in the use of public resources fostering equity in public administration.

3. Problem Statement, Hypotheses and Research Questions

In this section, and according to the objectives proposed by this research and the reality described above about the situation of ICTs for health care services in rural areas of Peru, the main problem, hypotheses and research questions are introduced.

3.1 Problem Statement

In Peru, the processes of Telehealth are partially incorporated in the health system, and not supported by policies designed to address the services for access in rural areas. Also, the ICTs and Telehealth regulation systems had shown compliance issues.

Therefore, the research departs from the assumption that there are gaps between the reality of Telehealth systems and the current regulation

²⁵ Largely explored in the following studies: Bebea 2010, Oña 2011, Martinez et al. 2005, Yellowlees 2005, Wootton et al. 2009.

²⁶ Text summarized by the author.

representing an institutional barrier for deployment of infrastructure and assessment of performance of the Telemedicine systems in every rural health establishment in Peru. This situation generates an unequal development of the networks on the national territory, privileging the localities which can afford the installation of private networks depriving rural populations of access to ICTs resources, and shortening the access of ICTs for the public administration of health care services as it is currently happening.

3.2 Hypothesis

The hypothesis of this dissertation is as follows: there are gaps between the strategies and the plans of the governmental institutions for the implementation of a regulation in ICTs which enforces compliance.

This hypothesis supposes a lack of institutional coordination between the governmental structures in charge of the policy making processes. Also, it supposes the existence of a current regulation in ICTs as a transversal tool for development, but a lack of strength of this regulation due to the disarticulation of the institutional structures weakening their power for demanding compliance from other institutions, from the civil society actors including the private enterprises. Thus, the research will be addressed to find those factors that may cause these gaps and the possible solutions for the implementation of a regulation which enforces compliance.

3.3 Research Questions

These research questions are the guides for the following chapters of this research and a brief explanation of their meaning toward finding a solution to the problem statement. These research questions are intimately related to the main research objectives proposed in the section 1.2 of this Chapter.

3.3.1 Research question no. 1: Who are the protagonists of the process of policy making for ICTs' regulation in Peru?

This question aims to accomplish the first objective of this research referred to the identification of the effects of policy in the regulation of

ICTs, as it departs from identifying which institutions and actors of the civil society are involved in the policy making process. Thus, this research question aims to identify the stakeholders of the ICTs' policy making process, their attributions, and their organizational limitations.

Also, this research question aims to provide information about the mechanisms of interaction of the governmental institutions among themselves and with other stakeholders. The characteristics of this interaction are determinant for the nature of the relations and influence that one stakeholder has over another, and how this relations have effects in the institutional accountability and policy compliance.

3.3.2 Research question no. 2: Which are their institutional strategies and policies for improving health access for rural populations?

This question is addressed to accomplish the second objective of this research about analyzing the characteristics of the current regulation of ICTs and their effect in the rationality and coherence of the formulation of policies. This question aims to analyze the accountability of the government stakeholders in the implementation of a policy that enforces compliance and focused on promoting equal access to ICTs and health services for social inclusion in Peru.

3.3.3 Research question no. 3: What are the mechanisms proposed by the state for promoting equal access to health services for isolated populations in Peru? And what are the effects in real applications?

This question is addressed to accomplish the third objective of this research about identifying the effects of the policies in the implementation of Telemedicine in rural areas. This question answers if the current policies in ICTs are effective for their objectives and the mechanisms of interaction implemented are useful to promote institutional compliance and citizens' participation in the policy making systems. Thus, it aims to find out about the impact of the current legal framework and political context into the practical application to identify what are the effects in the application of such as policies.

4. Methodology

This research is a unique piece that puts together three disciplines (Politics, Policy and Technologies) to serve the objective of mapping the politics and accountability of policy making in Peru. For this purpose and according to the objectives proposed by this research, many methods of analysis of public policy were reviewed, deciding to propose an original method which combines quantitative and qualitative techniques.

Quantitative methods were not sufficient for contemplating the context of politics, and qualitative methods were more accurate, but did not contemplate all the variables considered on this study. Thus, since none had offered the resources for completing the analysis, it was required to adapt the synthesis of different methods to analyze the full spectrum and solve the research questions.

The methodology for this research considers observation and analysis of the interactions of the main actors of the process of policy making for ICTs for health in Peru using three cases of study of private initiatives which had concluded the processes of implementation and have been transferred to the local governments.

4.1 Qualitative method

Qualitative methodology has been used for the analysis of empirical data published on the official government websites and collected from the internet about institutions, regulation and policies discussed and approved in Peru between 2006 and 2013 regarding politics of ICTs and policy decision making about health access.

4.2 Obtaining information

The information for this thesis has been compiled as follows:

- a. Documents from official institutions of Peru²⁷,
- b. Documents from International Institutions related to Telehealth²⁸

²⁷ Official institutions such as the National Institute of Statistic and Informatics (INEI); the Ministry of Transports and Communications; the Ministry of Health, the Regional Hospital of Loreto, and Regional Direction of Health of Loreto and Cuzco (DIRESA).

²⁸ International Organizations such as UN, WHO, UNICEF, IDB, PAHO, CEPAL, ECLAC, UNDP. Also considered the official reports from International Cooperation Agencies such as Spanish International Cooperation Agency (AECI) and European Union (EU) with information about the situation of Peru compared to other countries in the world in the case of Telemedicine in rural areas.

- c. Documents elaborated by local participants and members of the private institutions in charge of the initial formulation and implementation of telemedicine projects ²⁹,
- d. Documents of the studies of assessment of the three projects of telehealth installed and assessed between 2006 and 2012: the Project EHAS-ALIS, the Project EHAS-Napo and the Project Putumayo,
- e. In-depth personal interviews from the assessment of the cases of study³⁰, and
- f. Articles from the newspapers *El Comercio*, *Gestion*, *La Republica* and *El Peruano* for reviewing media opinion in context.

4.3 Criteria for selection of the cases of study

The criteria used for the selection of the cases of study were:

- a. Cases of implementation of ICTs for health in Telemedicine formulated and deployed in rural areas of Peru with similar development characteristics. These characteristics can be summarized as follows: isolated locations; population in poverty or extreme poverty; low levels of population density; and regional health systems³¹.
- b. Projects administrated by private management organized by NGOs, universities and local and regional government representation.

²⁹ NGO Hispano- American Health Link (EHAS) and the EHAS Foundation; NGO Engineering Without Borders (ISF)²⁹; the Andean Community of Nations (CAN); the Andean Organism of Health (ORAS); and the Group of Rural Telecommunications of the Pontifical Catholic University of Peru (GTR-PUCP). These groups, NGO's and associations had active roles in the administration and assessment of results of the projects of ICTs for health in Peru and several countries of Latin America, which enriches their point of view. Documents such as the internal reports, meeting reports, and middle term reports about the problematic in the area of intervention, the progresses and difficulties on the implementation of the network, the training programs for technical and medical personnel and the assessment studies of the projects. Also, there was access to the evidence of previous academic and non-academic research elaborated by members of the EHAS Foundation and GTR-PUCP (Bebea 2009, Oña 2011, Martinez 2005, Martinez et al. 2007, Martinez et al. 2009, Bebea et al. 2011).

³⁰ This empirical evidence samples were collected in-situ by the author in a joint effort with the members of the evaluation team in 2006 (Cusco, Project EHAS-ALIS), 2008-2009 (Iquitos, Project EHAS- Napo) and group discussions in 2012-2013 where the author was part of the formulation of the project, the design of the study of assessment and contributed toward the redaction of the final report (organized from Lima in collaboration from Japan, Project Putumayo). Such as group conversation were from talking with members of the beneficiary groups of the projects (administrative, technical and health attention personnel); members of the local governments; and members of the management groups from Universities and NGOs also involved in the projects.

³¹ Regional Health System implies the presence of one or two regional hospitals of levels II or III for the entire province. Hospitals of level I have lower resources of resolution and complexity than hospitals at level III. For further information refer to Chapter III.

- c. Finished projects. It means that training processes had finished, assessment study has been presented to the donors and the infrastructure and systems were completely transferred in property to the local governments, and reported to the donors;
- d. Projects that were finished at different moments along the evolution of ICTs regulation with intention to analyze the effects in a timeline³².

Following these four criterions, these three projects were selected for the analysis of this dissertation:

Case 1: Project EHAS-ALIS from the chapter Peru³³ implemented from 2003 to 2006 in the department of Cusco, districts of Acomayo and Quispicanchi in the south west of the department by the NGO ISF, EHAS Foundation, GTR-PUCP, with support from European Union (1.5 million Euros), transferred to the Local Government in 2006 and assessed in 2007.

Case 2: Project EHAS-Napo, implemented from 2006 to 2009 in the department of Iquitos, province of Maynas in the north-east by the NGO EHAS Foundation, GTR-PUCP and the Regional Government of Loreto, supported by from The Global Fund of United Nations to fight Aids and the Andean Organism of Health (ORAS), transferred to the DIRESA Loreto in 2010 and assessed in 2011.

Case 3: Project Putumayo, implemented from 2010 to 2011 in the department of Iquitos, in the north-west frontier with Ecuador by the NGO EHAS Foundation, GTR- PUCP and the Municipality and the Local Government of Loreto, supported by the Andean Organism of Health (ORAS) and the Chancelleries of Peru and Ecuador and transferred to the Local Government of Loreto in 2011, and assessed in 2012.

4.4 Tools for collection of information

The information about the cases of study and field work has been collected in the framework of the studies of results coordinated by the

³² The idea of this criterion is to use the temporary condition of the political situation of Peru as a guide of the political actions taken through the years, and see how it affects the implementation and development of ICTs projects.

³³ The Project EHAS- ALIS was implemented in parallel in the Pacific Coast of Colombia and the rural area of Guantanamo in Cuba. The assessment of the project has been done in the three countries by the same team of evaluation between 2006-2007 in-situ.

administrators of the projects³⁴. The tools for the collection of information were semi-structured interviews, in-depth interviews and discussion groups. Also, surveys and personal conversations with health workers and technical personnel in the health centers helped to nurture the reports³⁵.

5. Organization of the thesis

The present study is accounted by seven chapters and following a brief explanation of the content of each chapter. These notes correspond to the end of Chapter I, which was introductory to the topic of research. Chapter II presents the literature review and theoretical framework used for the analysis of this dissertation.

Chapter III presents a succinct context of ICTs for health in Peru and Chapter IV presents the three cases of study and the results of their assessments including political, institutional and impact in the health services.

Chapter V introduces the findings of this research contrasting the reality of politics and policy making process of ICTs for health in Peru and their effects in the three cases of study. The analysis highlights the challenges in policy for the development of Telemedicine services for rural areas in Peru. Chapter VI is dedicated to the theoretical discussion, integrating the theoretical framework, the literature review and the findings of this research.

Chapter VII presents the conclusions of this dissertation, highlighting the contribution of this dissertation with the literature, recommendations and future work in the topic of rural Telemedicine in developing countries.

³⁴ About the study of assessment and impact of the cases of study, it is important to highlight the active participation of the author of this dissertation in these processes in 2007, 2009 and 2012. In 2007, the author of this dissertation has also collected information in-situ in the area of the project EHAS-ALIS (Peru, Colombia) and written a memory document as a result of the experience (Sanoni 2007). Years later, the author also participated from the formulation of the project until the preparation and direction of the tables of assessment and workshops in the Regional Hospital in Iquitos and the Health Center of Santa Clotilde (Loreto-Peru). In the cases of EHAS-ALIS and EHAS-Napo, observation for the collection of empirical data has been very important also for verifying the lacks and needs of the health system. In the project Putumayo, the author of this research played an active role in the formulation of the project, and assessment through surveys in 2012. Though, the execution of the assessment study was in charge of other members of the EHAS team.

³⁵ Further reference about the interviews and workshops achieved as part of the processes of assessment of the projects can be found in Appendix 3: List of interviews.

Chapter II.

Literature Review and Theoretical Framework

This Chapter aims to present a selection of the existent literature and theories used for scoping the topics of analysis of the present dissertation. This Chapter establishes the theoretical guidelines for the analysis of the data collected in three cases of study of Telemedicine in rural areas of Peru presented in Chapter IV.

This Chapter has three parts: literature review, literature gap and theoretical framework. The literature review presents a criterion used for the selection of the relevant literature organized in three topics of analysis: public policy, health administration systems and ICTs in health. This section aims to summarize the efforts of the selected previous studies to delve into ICTs regulation for the specifics of delivery of health care such as considerations in the analysis and design of public policy, typology and models of healthcare systems, characteristics of public health and Telemedicine systems in developing countries. The literature gap is a consequence of the scarcity of studies addressing the analysis of the effects of politics in the health policy and ICTs' policy making.

The theoretical framework used for the analysis proposed in this dissertation was constructed in the bases of the position of several specialists in the topics of politics and ICTs' policy making in developing countries. The analysis is based in three main theories related to the delivery of basic services in developing countries.

First, the dissertation applies the theory of Neo-institutionalism which studies the institutions of the state and the effects of the characteristics of their interactions in the public administration. Second, the study applies the fundamentals of the theory of Structured Pluralism which in the scenario of health services determines precisely four basic functions of the state in the administration of public services: financing, modulation, articulation and delivery. Third, this framework includes a model for analysis of the accountability of government institutions in the delivery of health care services.

1. Literature review

This section aims to summarize the selection of relevant information from previous studies and the opinion of experts in the field of policy analysis, policy making, ICTs and Telemedicine. A wide variety of publications is available in the field of ICTs and public policy as separate research topics, but during the research process for this dissertation. Still, not many writings were been found that integrate a critical view about public policy, health policy and technologies in the public administration.

1.1. Criterion for selection of papers

For the selection of relevant research papers, the entire universe of ICTs for health care has been divided in two main groups: (a) evidence based research papers and (b) review based papers. The terms Telemedicine and Telehealth were used as a search criterion to find the information related to these concepts (Telemedicine/Telehealth) and for a clear interpretation of the literature³⁶. Consequently, extended written material was found about health policy in evidence based policy papers and in review papers, but not many on issues related to Telemedicine and policies, and none from the combination that relates politics to the policy decision making in ICTs. Despite of the extended number of reviews existing about health policy as a topic of research, the coincidence of Telemedicine and health policy as keywords appears as incipient or emergent research.

Thus, due to the insufficiency of evidence-based policy papers, and in the views of the scarcity of literature produced related specifically to the main topic of interest of this research which is politics in ICTs regulation

³⁶ In the search for evidence based policy papers from the specialized engine Cochrane library applied the corresponding terms (which is a library specialized in evidence based papers for health and related) these were the results found: search term (number of papers); Telehealth policy (2 papers), Telehealth regulation (1 paper), Telemedicine policy (1 paper), Telecare regulation (2 papers). In the topics of health policy, the selection available was larger, but such as criteria excludes the term technologies: Health Policy Making Process (17 papers), Health Policy (191 papers). In the search for review based policy papers from Pub Med and MedLine Libraries (specialized on health reviews), applying the corresponding terms, these were the results: search term (number of papers); health policy (199 papers), ICT/ICTs and health policy (12 papers), health policy case of study (179 papers); Telemedicine case of study (87), Telemedicine policy (6); Telehealth policy (8).

for rural health in developing countries, it was necessary to organize the existing material by specific areas of interest.

This organization divides the transcendental topics of this research to help the selection of the literature to be used for the construction of a critical framework for this research. The idea is to classify the universe of literature available in groups or clusters of knowledge according to their predominant topic of analysis. This criterion groups the literature by three dominant topics: Public Policy; Public Health and Health Policy; and ICTs in the context of health applications such as Telemedicine and Telehealth.

This literature review establishes the conceptual base for interpreting the results of the three cases of study to be presented in Chapter IV. Also, this knowledge facilitates the identification of the mechanisms of the health policy and the process of policy making for ICTs in Peru.

1.2.Literature review on Public Policy

This section provides a selection of the most accurate literature related to the topic of Public Policy addressing the problem of policy analysis and policy making in ICTs for health. In this regards, the methodology used for this dissertation indicates preference for the selection of writings relevant to the other two topics of interest of this dissertation such as public health and communication technologies in the public administration.

According to Hernandez, a political analyst from the Latin American Region in the field of public policy, the interaction between institutions and policies can be observed in the reaction of lower level institutions, civil society and individuals toward the decision processes of the State (Hernandez 1999). In this circumstance, Peru is a State articulated by several regulatory bodies with different roles and reach, but basically it is institutional and hierarchically oriented. Therefore, this study had selected an approach consistent with the analysis of the role of institutions in the policy making process. For this purpose, it is necessary to start from understanding the concept public policy.

1.2.1. The Analysis of Public Policy

Following Parsons (1995) and his review of Public Policy, he divides the analysis of policy in four main aspects: meta-analysis for basic definitions and approach to the policy process; meso-analysis bridging the divide between the individual and the social and public aspects of the analysis; decision analysis examining from an institutional view of the attributions and accountability of the state; and delivery analysis for considering implementation, monitoring and assessment of a policy that has been created and observe the reaction of citizens and institutions.

From Parsons' point of view, policy cannot be divided arbitrarily but carefully and tailored to the needs of the context where policies are to be analyzed. Thus, ICTs policies for Telemedicine in Peru are in the situation of this last stage of analysis suggested by Parsons, where the policy is accompanied by several social processes in the delivery of governance.

For the purpose of this research, the ideas of Parsons are important for interpreting the effects of public policy in a macro and micro perspective. The macro perspective corresponds to the analysis of the influence of the political actions and dynamics of the political actors in the context of ICTs' policy making. These actors are defined as stakeholders of the policy making process. The micro perspective corresponds to the analysis of the effect of these policies in the reality of the delivery of health care services such as the three cases of study of Telemedicine in rural areas of Peru.

1.2.2. Lasswell and the Policy Stages Approach

Referred by many authors, Lasswell is considered a promoter of the logics in politics in the Political Science for his perspective of problem orientation and pragmatism (Farr et al. 2006, Turnbull 2008). Lasswell represents the return to the basic concepts of public administration and democracy in the middle 1950's.

Lasswell suggested that to define the object of study is necessary to understand the abstraction of observing a policy from its policy making process in the policy cycle. The idea is to disaggregate the process of

production of public policy in a sequence of stages functional and temporally different. The Policy Stages approach divides theoretically the process of production of policies in seven different stages: (i) intelligence, (ii) promotion, (iii) prescription, (iv) innovation, (v) application, (vi) termination and (vii) evaluation. Thus, the Lasswell approach suggests considering a process for the production of policies which is integrated to the model of analysis of the current dissertation in combination with other theories³⁷.

The Lasswell model has been criticized for not considering elements from the environment and external influences to the process of governance that may affect its activity and considering the process of policy making as a linear activity (Hernandez 1999: 4-6). Despite of not being a perfect representation of the process, it has the virtue of reducing its complexity.

1.2.3. The New Social Contract for Peru

The New Social Contract for Peru³⁸ is a study made by the World Bank (WB) and reviewed by a team of experts headed by David Cotlear³⁹. The study was achieved by the WB research groups installed on each developing country and is based in a combination of quantitative data from surveys and administrative information systems, and qualitative information from the interviews achieved by the team between 2004 and 2005 (Cotlear 2006:1-5).

The objective of this book is relevant for this research because it develops an analysis of the barriers of developing countries for the delivery of education, health care and anti-poverty programs, and proposes alternatives and strategic options for dealing with those issues. Thus, this book has the main objective of proposing an agenda for Latin American governments for improving education, health care and what the

³⁷ Other theories such as the macro and micro analysis proposed by Parsons (1995) and the theory of policy cycle proposed by Bridgman and Davis (2003). Both theories are presented in this Chapter.

³⁸ This document has been written directly for policy makers with the intention to make recommendations on policy making and processes of governance to improve the quality of living of people in poverty in Peru, and the document is based on the World Development Report: Making Services Work for the Poor People (WB 2004). This book was the first on series trying to approach to the problem of one country at the time making A New Social Contract for Peru, the second of its nature, showing the new character of policy analysis of the new decade.

³⁹ David Cotlear is considered an expert in health policy and policy making in Latin America.

authors describe as the social safety net⁴⁰. The study presented has four main characteristics: (i) it brings together people with a detailed knowledge about the issues confronting the delivery of public services empowering people; (ii) it aimed to go beyond a pure technical and economic analysis including an analysis of the institutional context for service delivery; (iii) it used comparative approach, having lessons from other countries from the region and the results of actions and programs in similarity of conditions; and (iv) it aimed to consider recommendations prepared and organized in a consultative and participatory manner that incorporates the view of as many stakeholders as possible (Cotlear 2006).

This book presents the topic of the pro-poor policies in the Peruvian public sector as social programs and introduced the Accountability Triangle as a model of analysis. This triangle formed by Central Government, Citizens and Coalitions and Providers proposes an analysis of the interaction of these actors toward policy compliance. This triangle is presented in detail in the section 3.6 of this Chapter.

The main options for compliance proposed in this piece of work can be summarized as follows: accomplishment of the standards proposed; establishing a system of accountability based on the use of those standards for public management assessment; and investing on strengthening the institutional capacity of the service providers, as well as adjusting the rules for the deliveries of the private enterprises on the public services.

The conclusion of the book is that Peru needs a change of culture to shift the system out of the low-level equilibrium or status quo⁴¹. Also, the book highlights the need to instruct people mainly in rural areas about what are the things to be expected from their governments⁴².

⁴⁰ The main topic of discussion of the book is an examination of the accountability of developing states in the delivery of public services. The discussion is also addressed to consider other topics such as improving quality of services; promoting incentives and small changes of corporative behavior and the attitude of public servants facing the public; designing standards on the delivery of services; and promoting equal of transfers to the regions and municipalities nationwide (Cotlear 2006).

⁴¹ The authors affirm that the change of culture reflects in a society where the stakeholders of the social services start watching after the quality of services delivered, making a revolution from the bottom toward institutions.

⁴² “Mothers need to know whether they are entitled to health insurance that will cover the delivery of their baby in a hospital, and whether their local hospital performs deliveries safely” (WB 2002: 2).

1.2.4. The Design of Public Policy

In a book designed and written for authorities of the governments and policy makers, Osuna et al. recommends an exhaustive examination about two elements of vital importance in a policy before it becomes official: the analysis of rationality of the policy and the analysis of its coherence (Osuna et al. 2011).

The analysis of rationality responds to the relevance and pertinence of the policy in its context based on an impartial judgment about the political concept of the problem. Relevance is the assessment of the diagnosis proposed in the program and legitimacy of the problem that attempts to solve. It aims to analyze the nature and dimension of such a problem, the distribution of the problem. Pertinence assesses the quality and accuracy on tackling or facing the problem toward a solution. It estimates if the magnitude of the problem has been quantified and its known how it affects the public administration or the public order and if corresponds to the sizing of the proposed solution.

The analysis of coherence focuses on the effects of the actions and processes established in the policy and if it corresponds in magnitude and impact to the problem that is going to be solved⁴³. This analysis shall consider the values of the authorities as representative of the citizens and how they correspond to the solution of the problem proposed, and a second thought about if the problem will sit precedent toward future situations that make important to proceed toward the design of a policy. It has the implication of analyzing the priorities of these objectives and strategies, the actions to be taken, the resources to be required and if the problem worth to design a program of it requires a permanent change in the organization of the local jurisdiction that finally requires a policy to be implemented, monitored and object of compliance.

⁴³ The analysis of coherence of policies shall be internal and external to the design of the policy. Internal coherence will consider the analysis of the strategy to address the corrective actions and stay free of further problems from the same cause in the future, whilst external coherence looks into the context of the policy and observation of other plans, programs and norms that probably attempted to solve the problem in the past (or not) and if finding them, then analyze the effects over compliance to determine enforcement or review of the current norms.

1.3. Literature review on Public Health and Health Policy

The literature selected in public health and health policy for this dissertation has given priority to the writings which include critical knowledge about the process of formation and design of health policies in the world, and the particular successes and pitfalls from the health systems in the global context. Also, writings that explain the nature and typology of the health systems were selected to understand their advantages and disadvantages, and to identify the characteristics and challenges of the Peruvian health system.

The World Health Organization (WHO) quotes on their official website about Health Policy as follows: “Health policy refers to decisions, plans, and actions that are undertaken to achieve specific health care goals within a society. An explicit health policy can achieve several things: it defines a vision for the future which in turn helps to establish targets and points of reference for the short and medium term. It outlines priorities and the expected roles of different groups; and it builds consensus and informs people”⁴⁴ (WHO: Health Policy website).

Then, what is research in health policy? Again, according to the WHO “research policy involves the strengthening of health research systems. It aims to contribute to health system development and health improvement particularly in poorer countries by: (i) the dissemination and translation of valuable knowledge or research; (ii) the creation of ethical and evidence-based research policies, including norms and standards; [and] (iii) the promotion, monitoring and implementation of high quality health research evidence” (ibid).

Following the argument of this dissertation, the chances for incorporating Telemedicine and the use of ICTs in health providing sustainable services for rural populations are liaised with the establishment of supporting policies and enforcement of institutional compliance. Thus, this section also includes the issue of sustainability of Telemedicine services for the delivery of health care services in rural areas.

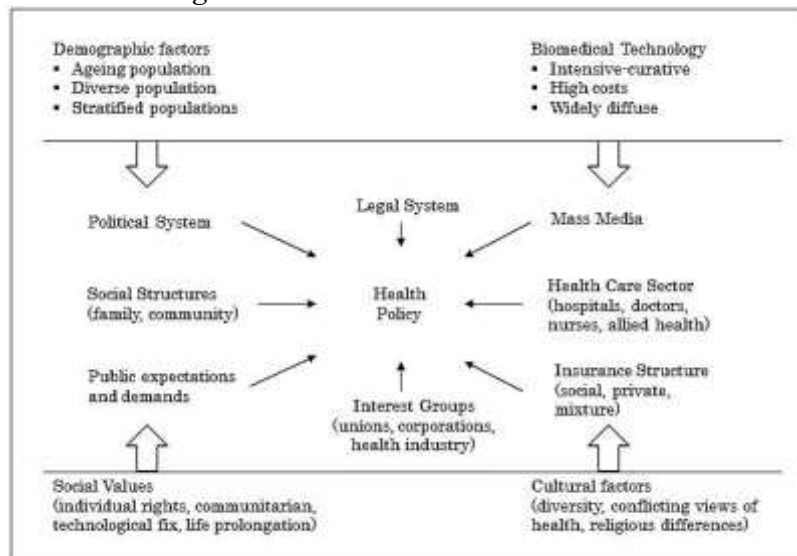
⁴⁴ Source: <http://www.who.int/rpc/en/> (last visited February 4, 15, 2014)

1.3.1. Global Context of Health Policy (Blank and Burau 2010)

Blank and Burau are two experts in comparative health policy who have written at least three books in comparative health policy and also directed other publications related to health policy assessment in developed and developing countries. In their book *Comparative Health Policy*, the core of their analysis is focused on the presentation of the characteristics of the common and uncommon elements of the national legal systems of different countries, and the tension of the interaction of the governmental institutions with the groups of interest of society such as political party members, unions and corporations (Blank and Burau 2010).

For the purposes of this research, the most relevant part of the analysis of these authors is about the identification of the social actors concerned about the health care systems and concretely the health policy making process (Figure 2.1). Later in this dissertation, some of these actors will be interpreted as stakeholders of the process of health and ICTs' policy making.

Figure 2.1 Context of Health Care



Source: Blank and Burau, 2010, p.33.

In this figure, Blank and Burau are including the factors of pressure over the determination of a health policy and the parts of society susceptible to be affected by changes in health policy. The authors are including the concept of Biotechnology in this model which at the same time includes Telemedicine as a technology for health care.

1.3.2. Four Models of Health Care Systems (Reid 2009)

On his experience, the journalist Thomas Reid has extensively traveled in different countries of the world doing research on health systems. He summarized four health care systems in the world: the Beveridge model, the Bismarck model, the National Health Insurance model and the out-of-pocket model (Reid 2009). With limited exceptions, every health system fits in one of these categories from the point of view of their relation with their governments. Understanding the four basic models significantly narrows down the global study of health care systems.

The Beveridge model⁴⁵ has been named after William Beveridge, the social reformer who designed the National Health Service of England. In the Beveridgian models, health care is provided and financed by the government through tax payments in such a redistribution process. Countries using the Beveridge model with variations are Great Britain, Spain, most of Scandinavian countries and New Zealand. Hong Kong still has its Beveridge style health care. Cuba represents the extreme application of the Beveridge model, but there is no other country in Latin America that had adopted the model historically.

The Bismarck model⁴⁶ has been named after Otto von Bismarck who implemented the welfare state as part of the unification of Germany. This system provides health care from an insurance system usually financed by employers and employees through payroll deduction and co-payments are used on the basis of the capacity to pay of the citizens, and the availability of several sources of the government to partially support the finances of the disadvantaged ones, but maintaining high standards of health. This model offers more cost-control than the single payer Beveridge model. The Bismarck model is being used in Germany, France, Belgium, The Netherlands, Japan, and Switzerland and to a degree with

⁴⁵ In the Beveridge model the health employees and private doctors collect the fees from the government. In England nobody gets a doctor's bill. This kind of system tends to have low cost because the government controls the amount to be paid to doctors per procedure and can estimate and predict the variants on procedures for patients, making the costs more controllable (Reid 2009).

⁴⁶ In the Bismarck model the idea is that the system does not make profit out of the health care system, and the price of services is regulated by the states as doctors and hospitals tend to be private (ibid).

exceptions in some countries of Latin America such as Chile and Argentina.

The National Health Insurance Model takes elements from both Beveridge and Bismarck models. It uses private sector providers such as private insurance companies but the bills are getting paid by the government run insurance program that is financed by payroll deduction and discounts to the citizens. This model privileges partially, the attention to employees on a payroll but offers parallel systems of subsidized attention for unemployed and people in poverty.

The National Health Insurance model is used by most of universal insurance programs as it seems to be cheaper and much simpler administratively than for a profit system, but many systems tend to use it as a parallel option to the out-of-pocket and private insurance such as the case of Peru. The idea of the state being a single player to compete against in the health care market is an incentive for better negotiations from local providers competing for lower prices. Pharmaceutical companies compete to sell their products to several distributors improving the offer for patients. This model also includes a cost control system by limiting the medical services they will pay for (according to layers of complexity of the treatments and establishing standards of attention for each level) or making patients wait to be treated. Canada, Taiwan and South Korea have adopted this model.

The Out-of-Pocket model has been adopted by most of the countries in the world which lacks the organization to provide a national fund to standardize health attention for their citizens. This is a market driven model was adopted by United States of America and many of the countries following the capitalist model of development⁴⁷. Many countries in Latin America such as Ecuador, Colombia and Brazil have adopted intermediate models with participation of the private offer and the public coverage,

⁴⁷ Perhaps about 40 countries in the world are considered as developed and industrialized countries have established health systems, whilst the other 160 other developing countries have found difficulties on the choice and implementation of a model. Most nations are too poor or disorganized for providing any kind of massive care. Then, it becomes a market issue where medical care becomes another product and the ones who can afford it are privileged in health access.

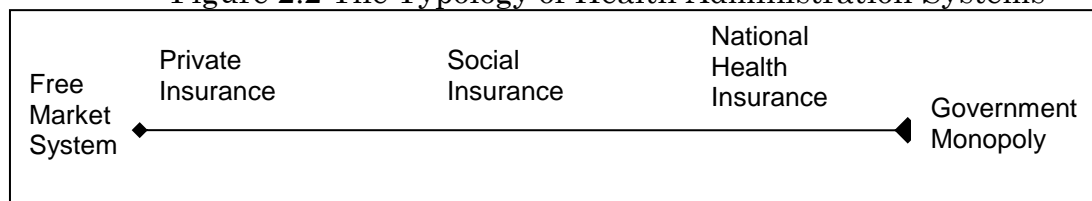
where the difference it makes is the prevalence of out-of-pocket and capability of payments of users, but it does not seem to contribute or enhance equity in health care access.

In Peru, the health system is a model that combines the National Health Insurance model having the state as a main provider, and the Out-of-pocket model which includes the participation of private health care enterprises and private insurance companies. The part of the health system that corresponds to the National health care system has two organizations running the health services nationwide: the National Health and Pension System (ESSALUD) based in payroll discounts, and the Comprehensive Health Insurance System (SIS⁴⁸) based in social programs and supported by the government for people in poverty and extreme poverty who often live in rural areas. The organization of the Peruvian health system is explained in detail in Chapter III of this dissertation.

1.3.3. Typology of Health Administration Systems (Blank and Burau 2010)

Blank and Burau established that the key to understand the health administration systems is to associate them by typologies (Blank and Burau 2010). In an effort for finding commonalities between the health administration systems in the world to make them comparable in structure and estimate their inputs and outputs, the authors developed what they called typologies or ideal models. The typology of health administration systems presented in Figure 2.2, associates the specific sets of macro-institutional characteristics and the bases of the variations in the funding source or the organization of the health care provision. Thus, public funding of health care (or the lack of it) is often a defining characteristic of the degree of public involvement (ibid: 12-14).

Figure 2.2 The Typology of Health Administration Systems



Source: Blank and Burau, 2010, p. 12.

⁴⁸ Comprehensive Health Insurance System SIS for its initials in Spanish: *Sistema Integral de Salud*.

For establishing this classification, Blank and Burau made a systematic review of ten countries⁴⁹ and compared the effects of the characteristics of the historical background of policies, the characteristics of the policy making processes, the application of health policy and the effects of policy in their current health systems.

No one country will be completely framed into one of these categories, but along the life of the systems, they oscillate more or less in between three categories: the private insurance, the social insurance and the national health services (ibid). The Peruvian health system corresponds to the characteristics of the National Health Insurance (ESSALUD), the Social Insurance (SIS), and incorporates elements such as out-of-pocket payments that relates to the tendency of a private insurance in a free market system.

1.4. Literature review on ICTs in the context of Health Applications

This section presents the different points of view about ICTs at the service of citizenship from the perspective of the governments and the effect of the government actions in the public administration.

1.4.1. Categorizing Telehealth policy response

Varghese and Scott (2004) categorize the reactions of the institutions of countries across the world regarding the application of telemedicine for their health attention systems and the implications for their Telehealth policy. They prepared a chart to classify the results of Telehealth policies in a range of countries with similar political characteristics and proposed strategies for the formulation and the implementation of policies.

The authors classify the countries in three types by initiatives and response of the systems as follows: (a) proactive governments as they are interested in supporting alternatives for overcoming the difficulties of their populations; (b) reactive governments as they that react against strong challenges to their health systems such as plagues and massive diseases, and (c) “none” which is the category that corresponds to countries

⁴⁹ The ten countries considered in the review of Blank and Burau are Britain, Japan, Sweden, New Zealand, Germany, Australia, Taiwan, Netherlands, USA and Singapore.

that do not have a national support policy.

According to Varghese and Scott (2004), current e-health policy development is strongly shaped by local health, social welfare, and telecommunications needs; multiple ministries and stakeholders; and individual country legislative organization (for example, federal, regional, or decentralized control). Policy may also be driven by a government's need to provide an enabling environment for e-health through specific actions such as funding, legislation, or special programs. In some countries, industry groups, standards organizations, or even academic institutions and health service providers may initiate e-health activities.

Furthermore, the author affirms that policies are, in effect, living documents that change over time. Issues under active policy-level discussion will change as responsibilities are moved from policy makers to those who implement the policies and confront the new issues that will inevitably emerge.

1.4.2. Seven Core Principles for Telemedicine systems (Yellowlees 2005)

The rural environments of Australia and Peru share a common reality in isolated geography, low density of population in a vast rural area, indigenous populations in a disadvantage condition of development, lack of electricity, lack of paved roads, a national health system with an out-of-pocket private system, and lower development conditions in rural areas than in the big urban cities⁵⁰. In this scenario and after his experience of over 15 years assessing projects of development in rural areas of Australia, Yellowlees makes an analysis of the most important factors that are important for ensuring the chances of success of telemedicine systems in

⁵⁰ In the field of Telemedicine, in Australia as in Peru, the initiatives of technologies for delivery of health in rural areas started originally in the private sector in the middle 1990s. In 2003, most of state universities liaised with hospitals due to their medicine faculties incorporated the concept and practice of Telemedicine as a tool for delivery of health care and also as a sensitization campaign for encouraging physicians to use the technologies. In the fiscal year of 2009, important changes occurred in the political system such as the implementation of the National Broadband Network (NBN) bringing changes in the availability of infrastructure of telecommunications and connectivity for supporting the telehealth system in Australia, and for the first time the Telemedicine consultation was included in the reimbursement policy for physicians and economic incentives were paid for their affiliation to the systems. IN 2012 the incentives decreased as most of physicians were already enrolled in the Telemedicine systems and the coordination of the appointments was officially implemented in most of the regional hospitals, offering political sustainability to the Telehealth systems.

rural environments.

The important factors considered by Yellowlees for sustainability of Telemedicine systems are as follows:

- Telemedicine applications and sites should be selected pragmatically
- Clinician drivers and telemedicine users must own the systems
- Telemedicine management and support should follow best-practice business principles
- Technology should be as user-friendly as possible
- Telemedicine users must be well trained and supported, both technically and professionally
- Telemedicine applications should be evaluated and sustained in a clinically appropriate and user friendly manner
- Information about the development of telemedicine must be shared⁵¹

As well, Yellowlees indicates important aspects for consideration related to the sustainability of projects in the process of transfer and maintenance of the equipment and makes suggestions about the best choices on technology decision making that make a significant difference in the transfer of the projects to the public administration which later will become into health policy from the local actors (ibid).

2. Literature Gap

During the process of reviewing the available literature, writings about the specifics of health policy for Telemedicine in Peru were not found. Most of writings found were addressed to put on relevance the advantages of Telemedicine in use in Peru and Latin America, and some articles were related to the impact of ICTs in health economy and relief for medical personnel such as impacts for the beneficiaries (medical and technical personnel or users).

Journal articles about the relation of Telemedicine or ICTs in health with policies were scarce, and there were no articles in the topic of ICTs policies for the specifics of rural health but mostly education. There was also a lack of evidence based research and empirical research writings

⁵¹ Yellowlees 2005.

about the influence of politics in the ICTs' policy making for Telehealth process.

Thus, the literature gap that this dissertation aims to cover is about the importance of the political environment and its effects in the policies for ICTs for the specifics of health services. Therefore, this research aims to find the point of convergence of the interest of three areas of research which scarce literature has been found just yet: Technologies, Health and Governance. These three areas of research coexist in the universe of knowledge, finding their field of interaction in a National Agenda. Speaking about technologies, every country takes sides through the decision to use ICTs for the public administration or not.

In this scenario, this dissertation is original and unique, due to the linkage of three areas of emergent interest in developing countries: technologies, government and health policies, making this piece of work an important landmark and a contribution toward the literature gap in the field of public policy. Thus, there is much yet to be done in the topic of health policy and ICTs in rural areas and addressing the issues of regulation for improving rural access to ICTs.

3. Theoretical Framework

This part of the study presents the theories which represent the bases of the analysis for this dissertation. This theoretical framework provides the guidelines to address the complexity of the politics in Peru, its effects in the policy making for ICTs, and the effects of ICTs and health policies in the delivery of health care services in rural areas.

Corresponding to the first objective, this research analyses the influence of the dynamics of politics from the lenses of the Neo-institutional approach due to its relevance in the study of the characteristics and dynamics of the institutions. Also, following the hypothesis of this dissertation which affirms that there are gaps between the strategies and plans from the government and that the complications may occur in the interaction of the institutions, this theoretical framework incorporates an analysis of the dynamics of the stakeholders of the ICTs

policy making process such as governmental institutions and actors of civil society.

This theoretical framework includes an analysis of the current regulation of ICTs corresponding to the second objective of this research. Using the model of the Cycle of Health Policy of Bridgman and Davis, it is possible to identify the characteristics of the current policy in Telemedicine. Additionally, for analyzing the role of the government institutions in the regulation of ICTs in health, this framework includes two important theories. First, the theory of Structural Pluralism which establishes that for accomplishing population needs the institutions behind of the health systems must perform four basic functions: financing, modulation, articulation and delivery of the health services (Londoño and Frenk 1997). Second, the model of the Accountability Triangle developed by the World Bank for the analysis of institutional accountability in the provision of basic public services.

Furthermore, for identifying the effect of the policies in the implementation of telemedicine systems and accomplish the third objective of this research, this theoretical framework incorporates the principles of the method of Mill's for comparing the outcomes of the three cases of study introduced in detail in Chapter IV of this dissertation.

3.1.Neo-institutionalism

The Neo-institutional approach provides theoretical support for deploying the argument that the problem of regulation of ICTs in Peru is caused by the dynamics of institutions. This interaction creates a causal relation between the actions and the consequences of the political decisions at institutional levels affecting compliance.

The Neo-institutional analysis focuses in the origin, structure and function of the governmental institutions and their role as creating the rules of the system in this interrelation of the social actors with emphasis in its interaction and influence in the political system (Altamirano and Martinez 2011:59). The idea of this approach is to make the changes in politics observable through the dynamics of changes of the institutions,

the social actors and their environment, emphasizing the organizational advantages and barriers of the institutions toward policy compliance⁵² (Hernandez 1999, Parsons 1995).

According to the Neo-institutional approach, the institutions set the rules of the game for the society describing the relations between the institutions, the organizations and the individuals as transactions⁵³ (Fernandez-Baca 1989: 31) which is useful to explain the importance of the role of institutions in the economic development of Latin America (Altamirano and Martinez 2011:57-59, Charnock 2009:68-69). However, the scope of the neo-institutionalism in this dissertation is related to the analysis of the role of the institutions, the organizations and how their interactions hinders or promotes the implementation of ICTs in the public health services in Peru.

In this approach, the institutions are considered as the policy makers and the ones that establish the rule of the law (Burki and Perry 1998: 126-129). In parallel, the organizations are the sub-systems with an important role in enforcing the law and following the rules, emerging and growing according to the institutional conditions (ibid: 26-28, 75). The organizations as sub-systems of the institutions are not only at government levels, but include those in the private sector as actors of the development of a nation, increasing the complexity of the organizational analysis due to the multiple relations between the organizations and their institutional frameworks (Arias 2008: 60).

Arias establish the concept of entrepreneurial field to facilitate the understanding between the institution and the organization, explaining that the institutions set the rules of the game for the economic agents to play and the organizations to follow. The author also identifies institutions

⁵² The followers of this approach do not agree in several points such as the prioritization of aspects to be analyzed from the organization: roles, routines, processes, accountability and institutional symbols (sociological institutionalism). Other authors gave importance to history and try to trace in the past the continuity of governmental activities to observe its effect over the current reality highlighting the importance of the social context to explain institutional performance (historic institutionalism).

⁵³ For the effects of the economic theory, these transactions are interpreted by the neo-institutionalism as the cost of exchanging property rights and enforcing compliance of the contracts of exchange where the market offers a service or product in exchange for an established compensation (Fernandez-Baca 1989: 31-35).

as strategic actors of the context as they contribute to reduce uncertainty in the transactions and reducing its economic costs (Arias 2008:61, Fernandez-Baca 1989: 31-35).

In order to give an adequate interpretation to the Neo-institutional approach for the analysis of the politics and policies in ICTs in Peru, it is important to explain that the proposed research aims to analyze the social and organizational spectrum of the functioning of the concerning institutions. Thus, the concept of transaction of the Neo-institutional approach defined as an economic exchange by the economic theories, for the purpose of this study is interpreted as the interactions between the formal institutions and the organizations as institutional sub-systems.

In the context of ICTs in health, there are formal institutions, informal institutions and organizations (Zenger et al. 2001:1) The formal institutions are represented by the regulations and laws, the formal agreements and contracts, and the political processes. The informal institutions are interpreted as exogenous forces that alter the formal procedures changing the formal structures, leaving the formal institutions as functional elements of government (ibid). Thus, the organizations are the sub-systems where the interactions take place (Arias 2008: 60-61).

The institutions are elements of the society that involve normative obligations but are usually embedded in the political context. According to Hay and Wincott, this approach proposes to observe the institutional changes in three dimensions: the architecture of the institutions, the institutionalized actors and the institutional environment as the shape and dynamics of the institutions are relating the actors to their context (Hay and Wincott 1998: 951). Thus, the Neo-institutionalism tried considering a more dynamic perspective than the classic institutionalism by incorporating an interactive relation between the changes in the institutions and its context (Altamirano and Martinez 2011:59-60).

In this scenario, the government must accomplish a double role: first making the rules of the game through the formal institutions of the government, and second by enforcing compliance through the organizations

linked with the public administration and concerned with the implementation of ICTs policies and their use for the administration of public health services.

According to a study of the World Bank, in the Peruvian culture the most evident feature of the public administration appears to be the informality of the institutions acting as a parallel organization and representing a barrier for compliance (Burki and Perry 1998: 126-129). Then, the policy making process in Peru comprehends two parallel scenarios: the arena of the formal processes where the norm is written and the institutions make the rule of law, and the arena of the informality with a parallel government where the social agreements literally surpass the institutional structures (ibid: 129). Thus, in the Peruvian reality, the characteristic of informality is present in the policy making process: from the decision making to the implementation of the policies. For example, when the decisions are made at the high levels without consultation or when the local governments hide expenses of maintenance of equipment in the budgets of other items, it hinders transparency and may protect corruption.

The Neo-institutional approach included in this theoretical framework addresses the analysis of politics toward the dynamics of interaction of the government institutions⁵⁴ and their effects in the ICTs' policy making process. On the other hand, this approach looks deeply into the analysis of the cultural factors that influence the interactions among the institutions and the political system (Altamirano and Martinez 2011:59). This analysis also considers the moral values, preferences, reasons and incentives for the individuals and the organizations of a society to respond to the institutional rules in certain ways (Burki and Perry 1998: 126-129).

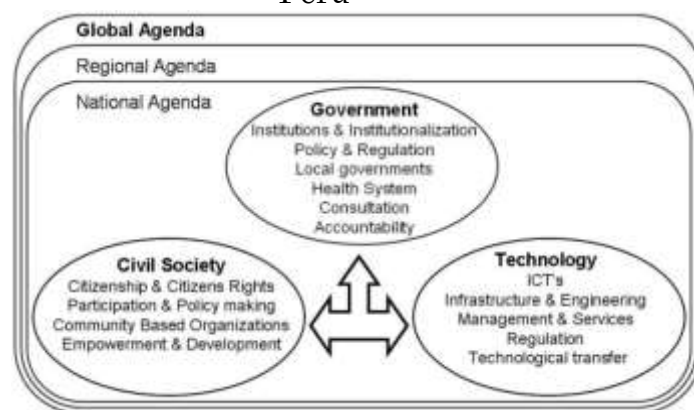
⁵⁴ The Neoinstitutionalism is the approach that proposes a clear focus on the analysis of the institutions and their roles in the policy making processes. The selection passed by many other schools such as Public Choice which focuses in the behavior of individuals; Welfare Economics focused on a the provision of social needs by a regulated function of markets; Neo-Marxism explaining the phenomenon of policies according to the prioritization of certain social elites understood as capitals; Pluralism and Corporatism explaining the state as a product of society; Statism explaining society as a product of the state and political institutions; finally, the Neo-institutionalism offered the best choice.

From a different perspective, the Neo-institutional approach questions the origin of the constant financial crisis in the economy and administration of resources in the developing nations. Thus, the informality in the public administration explains the permanent uncertain or policy makers regarding the availability of resources as they cannot distinguish the real from the informal expenditure in the local and regional governments (ibid: 11-15, 126-127).

3.2. Dynamics of the Stakeholders

In Peru, the actors of society assume important roles for the development of the state, and their interactions determine the levels of compliance of regulation. Figure 2.3 shows a three layers scenario where governance representatives, members of civil society and technologies are inserted in the national agenda of the country, and at the same level subscribed into the regional and global agenda as changes in any sphere may influence one another. The three angle arrow indicates the multilateral relations between civil society, government and technologies.

Figure 2.3. Three Layer Analysis and the Stakeholders of Telehealth in Peru



Source: elaborated by author

Thus, in the scenario of three layers (global, regional of Latin America and national for the domestic politics of Peru), three big groups have been identified associating their roles and presence in the process of ICTs to support the delivery of health care services organized by the association of their interest and common interest: Government, Civil Society and Technologies. The role of Technologies in the interaction of

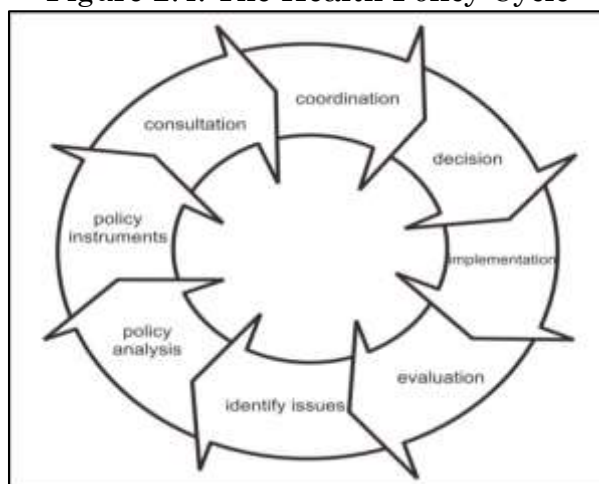
policy making for Telemedicine is to convey the strategy of the government towards development of the members of civil society (Figure 2.4).

The center of the three roles highlights citizenship and citizen rights⁵⁵, as all the dynamics among these roles and the institutional character of each of them remarks the importance of equal access to basic services. For the purpose of this study, health is considered as a right of the highest importance, being governance, civil society and technologies for the service to facilitate access for rural areas. Further detail of this analysis including information from the cases of study is developed in Chapter V as findings of this research.

3.3. Adapted model of the Cycle of Health Policy for ICTs in Telehealth

The policy cycle of Bridgman and Davis established a temporary line to analyze a policy. This cycle makes visible the political actions of the institutions as objects of accountability for providing health services in rural areas using communication technologies (Bridgman and Davis 2003).

Figure 2.4. The Health Policy Cycle



Source: Bridgman and Davis, 2003, p.100.

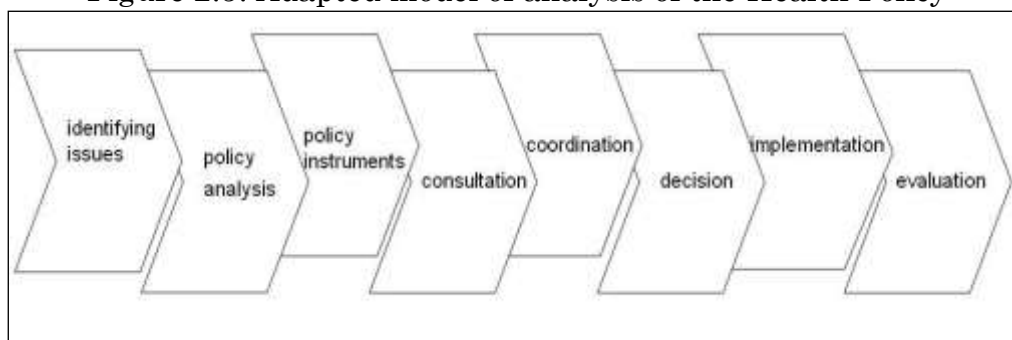
The *policy cycle* model disaggregates the health policy in eight steps for its analysis and identification of the advantages of the policy or its areas of opportunity: (i) identifying issues, (ii) policy analysis, (iii) policy instruments, (iv) consultation, (v) coordination, (vi) decision, (vii) implementation, and (viii) evaluation. According to Bridgman and Davis, the analysis of the policy cycle is useful to find out the sequence of steps to

⁵⁵ Referring to the right to have access to public services and the right to participate from the policy making in the use of the resources of the state.

turn ideas into cabinet recommendations, and to find the gaps between the formulation of a policy and its evaluation in arbitrating the matter that it aims to rule. Then, since no policy model can claim universal application, every policy process has different ground and institutional base.

For the effect of this research, the model of the Health Policy Cycle of Bridgman and Davis was adapted to be used, but instead of a proposal of continuity, a cut in the last step enhances to look into the reality of ICTs in health as a photograph and theoretically stops the time in a shot to provide objective analysis as indicated in Figure 2.5.

Figure 2.5. Adapted model of analysis of the Health Policy



Source: elaborated by author based in the Model of Health Policy Cycle (Bridgman and Davis 2003: 100).

In the context of health policy in Peru, ICTs have a practical application for the public administration of the health services, but not a role in the coordination of medical attention. Telemedicine offers an alternative method for remote delivery of health care for the particular case of rural areas, but there is an absence of a policy for coordination of the actions between the health systems and the infrastructure of telecommunications required for this purpose. In this scenario, the coordination of the services from ICTs to reach the health systems has been designed from the individual interest of service providers and technical availability, expecting technologies to fill the gap between administrative pitfalls and the provision of medical services.

3.4. Theory of Structured Pluralism

Londoño and Frenk (1997) introduced the theory of Structured Pluralism in the scenario of health reform in Latin America as a proposed method for integrating the different elements that shall be considered for

achieving a comprehensive health policy. This theory has been thought for the specifics of finding the structural needs of the health system reform in Latin America and incorporates elements of judgment about the essential functions of the institutions of the state toward integration of policies in the plural reality of interconnected multi-function institutions (Londoño and Frenk 1997:1-17).

This theory considers that in a scenario of integration of multiple functions of the public institutions, and in order to meet the population needs, health systems must perform four basic functions: financing, delivering, modulation and articulation. Financing and delivering refers to the nature of public services: reach population and how to afford that from the point of view of the governments (budget) and organization (management). Modulation refers to the mission of the institutions such as the Ministry of Health to assure the balances, efficient and equitable interaction between the actors of the process of health care attention system. Articulation refers to the organized work between the members of the population through participative processes, financial agencies and providers based on community organized services (ibid: 17-23).

These four functions are important as they are essential for the functioning of the health system. The use of Telemedicine is only an instrument for facilitating the accomplishment of these functions in the health system, but the regulation of ICTs for the public administration is a transversal requirement for supporting other sectors of development making this analysis transcendental. From this perspective, the four functions correspond to the political actors as they are accountable for compliance.

3.5. The Accountability Triangle

The Accountability Triangle proposed by the World Bank through the study *The New Social Contract for Peru*, puts in context and organizes the environment of health policy making within the stakeholders of the process and assigns roles for reporting and coordinating as part of their responsibilities. In this analysis, the authors highlight the importance of

the mechanisms of communication and coordination between the institutional actors and assess the effects of dysfunctional relations on compliance.

The Triangle considers as three angular pieces the central government and their representatives in the process of policy making for the specific case of health, and puts them in a scenario where citizens and providers of the services exchange feedback from each other (Cotlear 2006: 110-112). From the citizens to the government, there is a political voice which means the sense of transforming the needs of the citizenship in official documents in terms of policy demands to be understood by the central government and become into an official requests for the members of the congress.

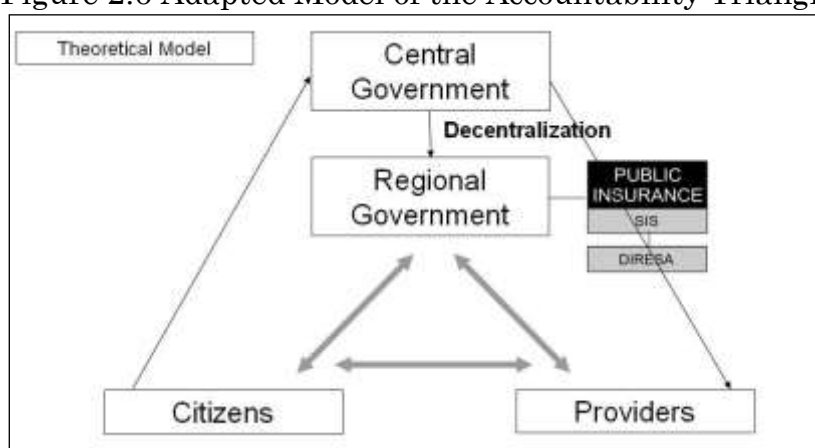
According to Ochoa-Henriquez, accountability is an old concept that had acquired a new meaning through the evolution of the processes of governance. In the speech of the 1940's and 1950's in Latin America, accountability was considered as "the call of the governors to give counts of their acts" but not considered an obligation but a political advocacy (Ochoa-Henriquez 2004:458). Later, as democracy finds its ways, the meaning of accountability gets translated as the obligation and responsibility of the governors to give accounts of their acts and inform about their decisions. These days, the concept of accountability implicates the obligation of the governments to give accounts to the citizens and society which has a lot of influence from the changes in the world (Ochoa-Henriquez 2004: 459).

For this dissertation it was necessary to adapt the original model of the Accountability Triangle for integrating in one system the stakeholders of the process of policy making identified and for considering the elements of coordination, regulation enforcement and compliance for ensuring sustainability of the initiatives.

As the original document is a proposal for the generality of Latin American countries, for the purposes of this research, the figures were simplified and the actors named accordingly to the domestic terminology

with the purpose to interpret the terminology used in the cases of study. The following diagram is the adapted model and concentrates the main actors of the policy decision making of ICTs in Peru and the politics surrounding this process (Figure 2.6). It is important to highlight that this model is an abstraction of the theory and the analysis includes the results from the cases of study and it is presented on detail in Chapter V of this dissertation.

Figure 2.6 Adapted Model of the Accountability Triangle



Source: adapted by the author, from the original model Cotlear 2006, p. 111.

The Triangle shows how the process of consultation is a flow that passes through the organs that are accountable for their actions in the process of policy making. If the flow gets interrupted by any circumstance at any of the institutions involved, then that institution may generate the domino effect toward the falling of the initiative that was consulted and none of the institutions are accountable for a policy that has not taken place but they are all concerned by processes that are not regulated such as ICTs for health. That is the key element of this triangle.

This model is important for the analysis of the institutions in this research because it includes the stakeholders in a model of inter-institutional relations for the assessment of accountability. It also highlights the needs of these relations for the process of policy making and the needs of coordination and communication from the high level of the government to the citizens' level. For the central government it is essential to open communication channels with the regional governments as sub-national authorities. Also, it needs to coordinate with the health authority

in the region, in order to receive feedback from the citizens and to be in control of providers of the services for ensuring compliance.

Furthermore, through the regional governments, the central government shall find the strategy to respond toward the needs expressed by the citizens. Then, there shall be a process of internal consultation in the Ministries at the level of the executive power (Ministry of Health, of Economy, and of Transports and Communications) for internal decisions or further thoughts about the effectivity of current regulation for serving citizens and controlling providers for ensuring compliance. These processes are not always fast or formal.

In practice, at the level of regulation and policy making in Peru, there are processes established for revision of the budgets (such as citizen's control and participative budget annual reviews) but they are found by the current governments as designed according to the interest from the previous partisans in governance. Though, participative decision making⁵⁶ in local governments increased its practice in rural towns due to the scarcity of resources to satisfy a list of demands and with intention to prioritize according to the needs expressed by the inhabitants and their representatives. Also the media plays an important role on highlighting the accomplishments and pitfalls of the governors in charge and mobilizing political power toward irregular procedures.

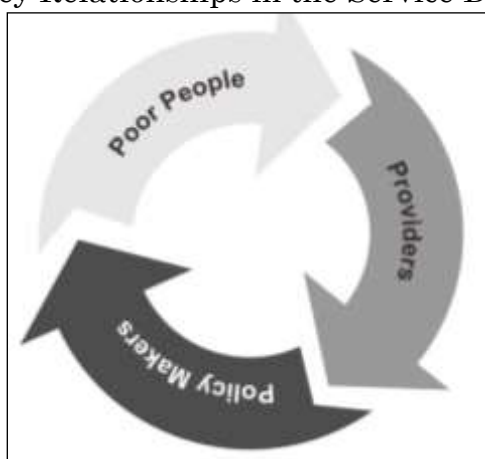
3.6. Three Key Relationships in the ICTs service delivery chain

In the World Development Report 2004: "Making Services Work for poor people", the World Bank had recognized a three key relationship in

⁵⁶ Participative decision making: According to the Political Constitution of Peru of 1979 (Article No. 2) citizen's participation is recognized as a civil right for election and revocation of authorities, legislative initiative and referendum. There are policy making mechanisms proposed by the central government and applied on regional and local governments for establishing processes of public consultation denominated commonly as participative decision making processes. Other initiatives toward promoting participative democracy have been implemented to provide incentives for the engagement of citizens with their local and regional processes of governance. Several mechanisms have been promoted such as decentralization, participative democracy, citizen's control, participative budget and several other international mechanisms had impact in Peru, such as the Law of previous consultation to indigenous populations (2011) based on the convention 169 of the International Labor Organization which enforces indigenous citizen's participation before making any political decision that may affect their collective rights, physical welfare, cultural identity, quality of life or development. Still, on issues related to policy making in the field of informatics for health, scarce evidence has been found to affirm that health workers have been consulted in the decision making process.

the service delivery chain: between poor people and providers of the services, between poor people and policy makers and between policy makers and providers of the services (Figure 2.7), therefore the importance of standards for compliance. This circle of three actors shows the interaction between the stakeholders and its functions as a chain since the consequences of the good or bad relation between two of the actors will necessarily be reflected in the relation of the second one toward the other.

Figure 2.7 Three Key Relationships in the Service Delivery Chain



Source: adapted by author with data from the original graph in Cotlear 2006, p.23.

In the particular case of ICTs for health, the problems between citizens and providers of the telecommunication services are related to the lack of availability of communication lines and the lack of availability of health care services in rural and isolated areas. The citizens require a mediator for finding a solution emerging the representatives of the NGOs and the CBOs for expressing the voice of the citizens in terms of policy demands. Next, the problem is transferred to the policy makers in a circle due to the lack of clear policies in ICTs in health, and the lack of regulation for demanding compliance as from the institutions and the private telecommunication enterprises. Then, the problem stays in the policy makers which cannot reach an agreement to provide sufficient and good quality services to the people, ordering providers to solve the problem and to stretch resources and deliver partially the services. Still, the solution is partial and the problem of policy does not get solved.

Thus, the idea of this model is to implement agreements where the providers and the citizens have a point of communication and coordination where effective solutions are delivered through an accurate service and expressed in a policy. Although in the three cases of study the providers of Telecommunications are private companies, the local governments were the mediators between the companies and the health system. Still, the outcomes of each project were different according to the relations between the local governments and the providers.

3.7. Adapted Method of Mills for Comparative Analysis

Mills proposed that in a similar context and having similar inputs the different outcomes of a situation become the explanation of the analysis. This research strives to find the reasons why those different outcomes had taken place, and what is the role of institutions and regulation on the processes of implementation of ICTs projects for supporting health management processes from the public administration.

Thus, using the bases of the inductive logic (which assumes that anything that is not included is excluded), the Method of Differences of Mills (Mills 1843) often used for compared politics, proposes the construction of a framework of analysis considering the different effects of ICTs regulation in the reality and context of three cases of study. These three cases have a common origin, a standardized organizational environment and a universal objective of providing technical training, guidance, monitoring and infrastructure of telecommunications to the rural health establishments in three rural provinces of Peru, and share the common objective to improve access to health care services by empowering health workers on the using of informatics' tools, empowering technical personnel to acquire networking knowledge and training local authorities to support sustainable Telemedicine systems.

In the adapted method of Mills proposed for this research, the analysis departs from considering the elements of the environment of the current regulation for ICTs in the public administration in Peru as inputs and analyzes the diversity of their effects as outcomes of the cases of study

for the specifics of rural Telehealth. According to the original Mill's method, the three projects are compared by their variables in quantitative measurements and used a statistic model.

In the three projects selected for this analysis ICTs are used as means to connect local nurses, medical personnel and technicians who work in isolated health posts with medical doctors and specialists working on the hospitals of reference to deliver medical services such as diagnosis and treatments avoiding life's risk and high costs of transportation.

3.8. Relation of the Theoretical Elements

The combination of the literature review and the theoretical framework of this dissertation aims to contribute to the literature in ICTs and health policy by providing an analytical framework sufficient to explain the effect of the institutional relations in the policy making process with emphasis on the effects in rural health. This contribution is appreciated in the application of the theories to the analysis of the three cases of study as it addresses the theoretical discussion toward the role of the institutions in the policy making and the effects of these policies in the provision of health services in rural areas.

The theoretical framework of this dissertation reflects the thinking process of the author in relation to the three topics of this dissertation such as politics, ICTs and health policy and its application in the reality of the cases of study. The literature review and the theoretical framework are the fundamental pieces of the analysis framework for ICTs policies that this dissertation aims to accomplish.

In logical order, the analysis of this dissertation starts from the health systems, characteristics of the dynamics of interaction of the institutions and their policy making process, and analyses the effect of the current policies in ICTs and health in three cases of study. These cases of study offer results from the application of Telemedicine initiatives that are currently part of the ordinary processes of health attention from their provinces, and that received the changes in policies which affected their outcomes and their impacts in the rural areas of Peru.

Summarizing the literature review, Osuna et al. highlights the importance of the rationality and coherence of the policies to recognize if they are pertinent and sufficient for addressing the problems that they aim to solve. From another point of view, Lasswell proposed to center the identification of problems in policy making on each stage of the process from the initial idea of a policy to the implementation. The theories of Reid, Blank and Burau are helpful to identify the Peruvian health system as a mix of national insurance and out-of-pocket, and to define the health services oscillating between the free market systems and the government protective systems. Later, Varghese and Scott introduced an analysis of the proactive/reactive character of the policies in the health system, creating a cause-effect relationship between political changes of the government institutions and the creation or modification of policies. Thus, a reactionary system may implement temporary solutions for urgent problems, whilst a proactive one would search for long term solutions to avoid or minimize future problems in the same areas (Varghese and Scott 2004).

Complementarily, the theoretical framework applies a Neo-institutional approach for the analysis of the role of the institutions and their dynamics in the policy making process for ICTs and to explain the importance of defining rules for the institutional interaction for policy compliance. The interaction of these institutions with the actors from the civil society defines the roles of the stakeholders of the policy making process for ICTs.

The theoretical framework also includes the analysis of ICTs policy using an adapted version of the model of the Cycle of Health Policy developed by Bridgman and Davis in 2003. The adapted model proposed by the author of this dissertation cuts the original model of the Cycle of Health Policy making it a one direction model for the purpose of using it as a model of observation of the current ICTs policy in Peru. This adapted model aligns with the idea of the policy stages of Lasswell for analyzing the ICTs' policy issues in a sequence of steps.

Finally and following the last part of the analysis of this dissertation, the theory of Structured Pluralism of Londoño and Frenk established four basic functions of the health systems to respond to the needs of citizens such as financing, modulation, articulation and delivery of health care services. Therefore, institutions can be accountable for the accomplishment of such as functions as explained in the model of the Accountability Triangle developed by the World Bank. This model integrates the stakeholders of the process of policy making and enhances the analysis of the interactions of the government institutions, citizens and private providers in a cause-effect relationship highlighting the importance of the use of regulation systems and policy compliance.

Chapter III.

Context of Policy Making for ICTs in Health

This chapter aims to explain the advantages and problematic of the use of ICTs for healthcare. The perspective is focused on contrasting the reality of ICTs with several sources of information such as governmental documents, writings and regulations which reflect the reality of politics of ICTs and its possible influence over the process of policy making for establishment of a proper regulation that enhances Telemedicine to be supported by the political system as part of the regular health systems.

The main idea of this section is to highlight the importance of ICTs for health services and to explain the capacities, value and significance of ICTs for helping people around the world to have a better living. Also, this section aims to show the efforts that other countries have done for taking the risk of change and implement ICTs in their public administrations and in healthcare. Furthermore, this chapter aims to present how the administration of those countries implemented Telemedicine for the delivery of healthcare in remote areas by using ICTs.

Following the methodology of analysis proposed in the previous Chapter, this part introduces the context of ICTs from a global perspective to explain the point of view of the international organizations about Telemedicine for developing countries. This Chapter includes an explanation about the Latin American region where neighbor countries such as Ecuador and Colombia have implemented ICTs for health in similar of circumstances than Peru. Also, it presents a national perspective and the main characteristics of the current situation in Peru.

1. Global context: ICTs for Health in the Millennium Development Goals

The World Health Organization (WHO) defined in 1997 the concept of telemedicine as “the provision of services of sanitary attention in which distance means a critical factor, listed by professionals who are using the technologies of information and communications with the objective to exchange data for diagnosis, treatments and prevent spreading of diseases and lesions, as well as for the permanent formation of health care

professionals and in activities of research and assessment with the solely objective to improve people's health and their communities" (WHO website). Using this concept, the Millennium Development Goals (MDGs) were proposed in the year 2000⁵⁷ declaring ICTs as a useful tool to facilitate achievements particularly in the reality of developing countries.

In summary, from the eight MDGs, at least four had highlighted on their content the implementation and use of ICTs as tools for promoting development (Appendix 1: The Role of ICTs in the accomplishment of MDGs). Also, at least the third part of the MDGs is directly related with health⁵⁸ and one represents advocacy for equal universal access to healthcare: (goal 4) reduce by two thirds the under-five mortality rate; (goal 5) reduce by three quarters the maternal mortality ratio; (goal 6) reduction of the spreading of HIV/AIDS and reverse the incidence of malaria and other major diseases; and (goal 8) provide universal access and treatment for all.

2. Regional context for developing countries

This section explains the situation of ICTs for delivery of health services in neighbor countries to Peru such as Ecuador and Colombia. These countries started using ICTs for health from late 1990s, but implemented policies and regulatory framework faster than Peru, facilitating the integration of Telemedicine services to their health systems.

The regional context of Latin America is important for this dissertation because it explains the conjuncture of neighbor countries in similar conditions than Peru and look into what these countries had achieved and how they have done it. In the field of Telemedicine for

⁵⁷ The decision of the United Nations Millennium Summit in September 2000 in New York, to adopt eight specific Millennium Development Goals (MDGs) provided an agreed political benchmark line for measuring the progress of global development. The MDGs were adopted as part of the Millennium Declaration, and signed by 189 countries, including 147 Heads of State and represents an unprecedented agreement among developed and developing countries and international agencies, to work towards a world in which sustaining development and eliminating poverty were having the highest priority. From the point of view of the MDGs and United Nations in general, ICTs play an important role for the achievement of each of the goals because support communication and promotes understanding to find solutions to the world's problems (UN 2000).

⁵⁸ Source: <http://www.un.org/millenniumgoals> (last visited January 14, 2015)

support health attention services in developing countries from Latin America, experience of previous studies show the constrictions and disadvantages of rural areas to face every day's challenges. Therefore, Telemedicine appears as an alternative solution for saving money on transportation, provide several communication services for a minimum fee, and also provide information services (Wotton et al. 2009:12-18, Martinez 2004:1).

Following the MDGs, the International Agents of Development (IADs) have been making efforts for providing rural areas of developing countries with infrastructure and conditions for connectivity and access to information networks, mainly telephony and Internet. Nevertheless, all efforts for generalizing the access to infrastructure and services of communications contrast with the absence of appropriate conditions or practical and technical solutions which are consistent and realistic with the needs of the population in terms of economy and technical maintenance. All these conditions can be considered as endemic characteristics of the rural environments in developing countries. Thus, Latin American countries in these conditions are implementing gradually ICTs as part of their processes of development to support and facilitate the deployment of e-government systems that could improve government service delivery and information provision activities targeted at poverty alleviation (Wootton et al. 2009).

2.1. Problematic of ICTs in rural areas of Latin America

In rural areas of developing countries of Latin America, the first concern is about the lack of infrastructure of telecommunications to extend the lines to the isolated towns and the scarcity of infrastructure of electrification in the most isolated communities. Low population density and reduced expenditure capacity due to low incomes makes it particularly difficult to support periodical payments from private providers of services, infrastructures or expensive costs of maintenance. It also makes the business of internet as not profitable for the big operators, and without the right policy for enforcement of the mandatory network

extension from the private companies, the spreading of the optical fiber in rural areas becomes a challenge. Thus, there is a need for provision of telecommunication systems which include an electric source for functioning and challenging the technical barriers⁵⁹.

Second, rural towns are in scarcity of technical qualified personnel for maintenance and operations of technologies. They usually live within the cities and it is expensive to bring them every time their services are required. Therefore, the continuity of technical services becomes difficult as it is required to have trained people at the service of the networks.

In this circumstance, all efforts for generalizing the access to services of communications in isolated areas of developing countries are usually encountered by the absence of appropriate practical technical solutions⁶⁰. Thus, these difficulties such as availability of technical and financial resources may jeopardize the sustainability of the systems.

2.2. Telemedicine and Regulation in Ecuador and Colombia

As stated by various authors, cross country comparison generates an abundance of information. According to Blank and Burau, given the complexity of Health Care and the extensive variety of potential health care systems, only comparative studies can generate the necessary evidence to consider the full range of policy options (Blank and Burau 2010: 20-25).

Colombia: The National Plan of ICTs

In Colombia, started in early 2000s the initiative of telemedicine and implementation of this practice in rural areas was promoted by the

⁵⁹ From a different perspective, Andres Martinez has been working on these concepts and actors within the scenario of Telemedicine in rural areas of Central and Latin America from 1996. On his literature, he had identify these main targets to be analyzed and statistically described in order to identify viable lands for ICTs implementation to support the delivery of health services: profile of health personnel (profession, age and experience); profile of health care establishments (buildings, transport vehicles, medical equipment, and computer and telecommunication infrastructure); features of the administrative and health information systems (sufficiency, precision, acceptance, satisfaction, easy of use actual systems and time and cost to prepare and send reports); drug acquisition systems (orders, travels and costs); travels out of the town to work (for training, coordination and consultation); training needs, access to health publications and information, work conditions (isolation feeling, possibilities of promotion and motivation); and perceptions on using telecommunication systems at work such as communication flows, costs, priorities and acceptance (Martinez et al. 2005).

⁶⁰ This sentence refers to appropriate solutions to those tailored to the resources and needs of rural communities.

collaboration of international cooperation agencies and local governments. Although, in Colombia and Peru, most of the projects are the results of private initiatives that stopped working short time after they were transferred to the respective health care institutions (Rey-Moreno 2010). The requirement for a regulation in ICTs for health comes from the need to standardize the use of the resources of the regional and local governments for supporting the spreading of technologies in their health systems.

The National Plan of Technologies of Information and Communications has been released in Colombia in May 2008 by the Ministry of Communications and the Law of Strategies of Telemedicine presented by the Ministry of Health and approved in 2009. In his systematic review of telehealth projects in Colombia, Rey-Moreno identified at least 45 projects implemented from 2002 in two groups: research projects and telehealth projects for providing health care services funded mostly from private sources. Though, a common feature in all projects is the lack of assessment of the performance of the telehealth systems and the evaluation of their real impact (Rey-Moreno et al. 2010).

Ecuador: The National Plan of Telemedicine and Telehealth 2010

In Ecuador, the New Constitution of the State of 2008 established the National Plan for Good Living (in Spanish “*Plan Nacional para el buen vivir*”). In this plan, the main objective is to improve the quality of living of population proposing Telehealth as one of the lines of action from the National Strategies for improving access to health in isolated areas.

Different from Peru and Colombia, the National Plan of Telemedicine of Ecuador (2010) is supported by the central government and led by the Ministry of Public Health and the Ministry of Telecommunications in a joint effort. The plan contemplates three stages for national deployment of infrastructure of telecommunications from north to south to build a National Network of Telemedicine that communicates the country with their centers of reference (Lopez-Pulles 2010: 295).

3. Local Context: Situation in Peru

In Peru, as a developing nation, universality of health care services is restricted by distance and situation of isolation, absence of roads to transport health supplies and mobilization of medical personnel and patients. Peru has a population of about 29 million people and at least 26.7% live in rural areas (INEI website, INEI 2014 a:1).

Peru is a democratic republic with a multi-party system. According to the Political Constitution of the Republic of Peru (1993) the elected President is the head of the State elected for five years. The State has a unicameral congress with 130 members democratically elected for a five year term. The State comprehends three powers: executive, legislative and judicial. The Ministries of the State are in charge of the executive power which controls the mass of the government's budget.

3.1. Geographic and Territorial Situation

The Republic of Peru is an autonomous estate located in South America between Ecuador, Colombia, Brazil, Bolivia, and Chile. Peru is accounted with 200 miles of autonomy over the Pacific Ocean along of 3080 km on the side of its west coast⁶¹.

The Peruvian territory is subdivided by 24 territorial circumscriptions named as Regions and the Constitutional Province of Callao⁶². Each department is subdivided in Provinces, these in Districts and these in Towns from the biggest to the smallest in the correspondent order. The country accounts by 195 provinces and 1834 districts. Figure 3.1 shows the Political map of Peru, showing the division of territory in departments and including neighboring countries.

⁶¹ National Geographic Institute of Peru. National Geography of Peru 2011.

⁶² In the country is possible to distinguish up to three regions well differenced. The Coast on the west side between 80 and 150 kilometers width is predominant in desert areas and the sites of the biggest cities along the country. The Sierra crossed by the Andes Mountains, which constitutes the high plateau (Altiplano) and two chains of mountains: the occidental and the oriental range with the highest top named *Huascarán* (6768 m) and the biggest navigable freshwater lake in the entire world Titicaca (3800 amsl⁶²). Finally, the Jungle crossed by the Amazonas River and drained by the Marañón (*Marañón*) and Ucayali Rivers. It has the lowest population density and together with the Sierra, the highest levels of maternal and child's morbid-mortality in the country (Sanoni 2012).

Figure 3.1 Map of The Republic of Peru



Source: <http://www.mapsopensource.com/>

Functionally, every department corresponds to a Regional Government becoming the principle of regionalization as a tool for decentralization of the country. Thus, central government corresponds to the National level; Regional governments correspond to the 24 Regions comprehended by several provinces and the Constitutional Province of Callao. The Provincial level groups the districts and finally the local level corresponds to each district and municipalities as local governments.

3.2. Demographic and Socio-economic Conditions

Total population of Peru by June 2014 has been measured by the Institute of Statistics and Informatics as 30 million 814 thousand 175 inhabitants⁶³ (INEI 2014a:1). According to the 2009-2013 Technical Report of the Evolution of Monetary Poverty from the National Institute of Statistics and Informatics in 2012 at least 26.7% of population lived in

⁶³ The rate of population growth for 2014-2021 was estimated in 1.6% which represents a growth approximate of 385.000 people per year. The deceleration of the birth rate in Peru is experiencing a steady reduction on the raw rate of births from 1980-1985, estimated in 33.4 births per 1000 inhabitants reaching 22.6 per 1000 on the period comprehended between 2000-2005, and about 19.30% for the period 2005-2013 (INEI 2014a:9). Also, the process of aging in Peru had become longer as in the pyramid of population of Peru, 60 year old citizens and older represent about 9.4% of the total population of the country.

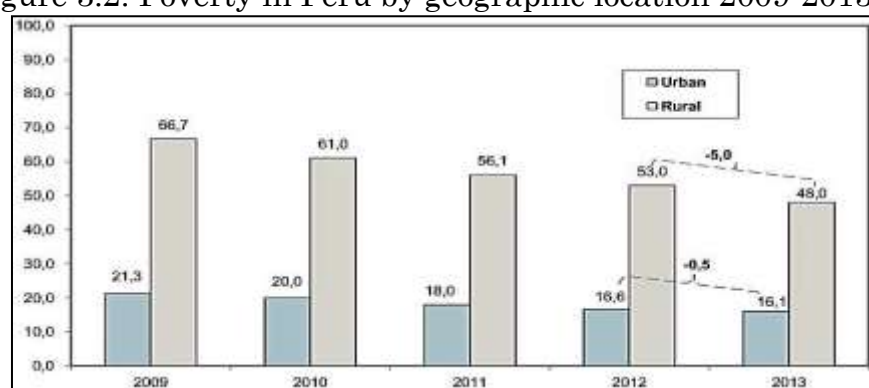
rural areas, and at least 53% of rural population lived in condition of poverty (INEI 2014:35).

3.2.1. Condition of Poverty and Inequality in Peru

Poverty and inequality are two of the most significant problems of Peru. At least one quarter of the Peruvian population (25.8%) lives in condition of poverty⁶⁴ (INEI 2014:35). Despite the decreasing of extreme poverty from 9.5% in 2009 to 6% in 2012, still 19.7% of rural population was considered to live in extreme poverty (INEI 2014:40).

The most acute poverty of Peru is in rural areas where the indicators of quality of living are comparable with the average of sub-Saharan African countries. In rural areas, the level of poverty is more difficult to overcome due to the combination and nature of determinants and factors such as low productivity, infant malnutrition, low access and low quality of education, geographical isolation, little access to services and infrastructure, and cultural barriers including language, and so forth.

Figure 3.2. Poverty in Peru by geographic location 2009-2013 (%)



Source: elaborated by author with data from INEI 2014, p. 34.

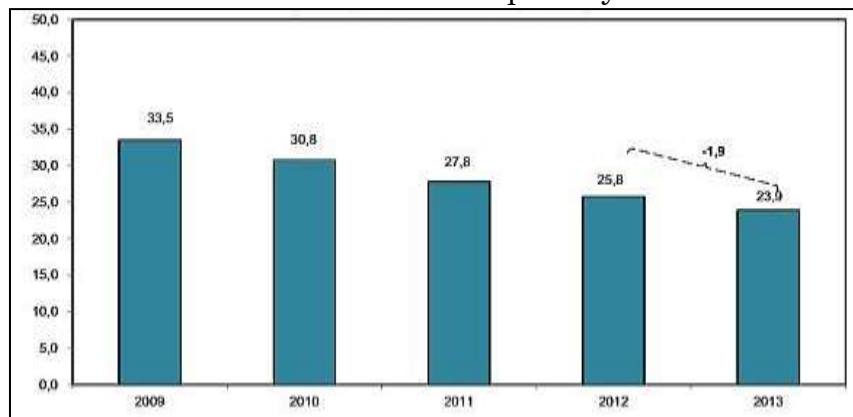
The fundamental challenge is to raise the capacity of income generation of people in situation of poverty⁶⁵, which has been the goal of

⁶⁴ Related to the inequality on the distribution of wealth of the country, in 2001 the index GINI of Peru was on 0.536 against 0.525 estimated in 2004 and being both numbers inferiores to the medium coefficient of Latin America (0.56) (Mendoza and Garcia 2004).

⁶⁵ The discussion about how to face rural poverty had generated different opinions but most agree on the need of generating productive projects with support of programs of social aid and parallel development of social and economic infrastructure. In this sense, experience on the review of productive projects organized by the governmental and non-governmental initiatives, shown that brings better results to emphasize the support from the government in the development of conditions for facilitating access to regional markets which aims working on development of infrastructure of economy, coordination and information between agents and technical assistance, than to enforce the direct support of the state in productive projects.

most strategies from the government and non-governmental sectors. From all sectors, poverty in the agricultural sector is the most relevant in Peru and is geographically located in the jurisdiction of the rural domains concentrating 32.5% of the employees on agriculture in Peru related to conditions of extreme poverty (MTPE 2012:20).

Figure 3.3 Evolution of the incidence of poverty in Peru 2009-2013 (%)



Source: elaborated by author with data from INEI 2014, p. 34.

Meanwhile, the national results of the economy of Peru are showing a steady development and ascendant road. According to the National Institute of Statistics and Informatics of Peru (INEI) on their last assessment of national economy, the poverty in Peru had reduced in 2013 to levels of 23.9% from 25.8% measured at the end of 2012 (Figure 3.3). It means that about 490,000 people stopped being poor in 2013 but there are still 7.3 million of Peruvians in situation of poverty and extreme poverty.

In the analysis of areas of residence, the rural area is still poorer than the urban. Urban area shows that at least 16% of people are poor in 2013 but rural area affects 48% of population. INEI details that the reduction of poverty in rural areas corresponded to 5% decrease whilst in urban areas only 0.5%. Apparently, Andean areas concentrate higher level of extractive industries, but in fact this area registered the highest level of poverty, reached by 37.4% of their population, in the forest 31.2% and 15.7% in the coast. Despite of the fact that in the past two years, at least a

million people left the condition of poverty, the numbers hide the reality of rural populations in the mass of the totals of the country, and ignore the condition of sub-employment and rural unemployment (INEI 2014).

3.2.2. Poverty, Extreme Poverty, Isolation and Exclusion

This section aims to consider the condition of poverty, isolation and exclusion in Peru. These are considered as social phenomenon that partially can explain the limitation of rural populations in Peru to have access to basic services, such as health.

Poverty is a criteria based on the monetary income of a person, the basic needs they have access to satisfy and the daily calories intake. The category of poverty includes people with daily income under two American dollars a day. Extreme poverty includes populations with incomes in lower levels than the regular budget for covering the basket of products and services to satisfy their basic needs. This phenomenon is affecting over three quarters of the world's population caused for a long list of factors.

Sagasti and Bazan have written a review of diverse studies of poverty, inequality and exclusion in Peru from 2003 until 2007, and had identified three categories of poverty: conjunctural poverty, chronic poverty, and endemic poverty. Conjunctural poverty affects mostly urban areas due to social and economic changes such as crisis, temporary unemployment, debts, and so forth⁶⁶. Chronic poverty often affects rural immigrants' second or third generations in process of urbanization who are struggling for welfare⁶⁷. Endemic poverty affects people with low level

⁶⁶ Conjunctural poverty is the result of factors that are out of the control of the people in that level, and generally is related to the current context and the unexpected changes awarded in politics, economy, natural disasters, etc. They are literate, some had partial or complete access to superior education and at least one family member of the household is usually employed permanently, temporary or sub-employed. This is the phenomenon of the growing upper and middle class mostly in urban areas.

⁶⁷ Chronic poverty affects Peruvians living in the periphery of urban and the rural areas that are in process of urbanization. They have better access to the basic social services even when they may not satisfy their needs appropriately. Unemployment levels are lower in these circles, but most of them are in the informal sector and has been obligated to produce their own income in the back of the system, without being incorporated to the national systems of taxation, health or retirement. Chronic poverty is often to be found in second and third generation of migrants to the cities, squatter settlements and people who lives in the skirts of the big cities who did not find the means for being incorporated into the economy of the cities but are also excluded from the scarce services they could had access from the rural close. Chronic poor have a higher degree of participation of community based organizations (CBOs), family organizations and several sources of mutual help. Religious organizations also have participation for improving the quality of living of people living in chronic poverty. They have better

of capacity of consumption and high proportion of their needs unsatisfied due to scarce access to the labor market and basic social services, and their failed on communicating with their representatives or their local governments. This is the situation of inhabitants of rural areas of the Andean and Amazonia of Peru who have been living in an historical dimension of poverty and has been strongly influenced by isolation and marginalization to the modernity. These three categories are not delimited with precision, but are approximated to understand the importance of the determinants of their situation of poverty in bias of finding an accurate solution (Sagasti and Bazan 2008).

Furthermore, the category of extreme poverty matches with the characteristics of endemic poverty, but also with the lowest group of people living in the skirts of the cities without proper access to basic services, fair paid and stable jobs or access to any source of income in the category of chronic poverty. There is no difference as all these groups are still excluded of the growth from urban areas, the benefits of public services and the inequity on redistribution of wealth.

The condition of isolation is the condition of a minority of people living geographically away from the reach of the centers of administration of their regions⁶⁸. Complementarily, exclusion is the condition caused by the social phenomenon of discriminating, privileging or segment access to services or goods of public access. There are diverse forms of exclusion such as cognitive-cultural, social, political, economic and environmental constrictions that affect Peruvians every day.

Five Dimensions of Exclusion

Also, according to Sagasti and Bazan (2008) there are five main dimensions of exclusion in Peru which make a close attempt for classifying the main reasons of fragmentation of certain groups of the

access to be heard by the governments which explains the reasons why they had received more support from social programs.

⁶⁸ The condition of isolation exposes rural populations to a number of risks and attempts against the principle of justice and equity by limiting access to basic services in the minimal of conditions for living submitting them to the condition of segmented access due to difficulties imposed by the incapability of the government to provide the means for communication and transportation all across the national levels of their jurisdiction.

Peruvian society. These dimensions are: economic, social, political, cognitive-cultural⁶⁹ and environmental exclusion⁷⁰.

Social exclusion is related to the inequality of opportunities to have access to basic needs that are essential for human development to ensure a minimum level of living such as health, education, dwelling, hygiene, nutrition, children and maternal care⁷¹. Political exclusion refers to the limitation of a person for the plain fulfilling of their citizen's rights including the right of security and the right to be part of the decision making of a democratic government⁷² as indicated in the Political Constitution (1993). Still, the main determinant on economic exclusion in Peru is related to the conditions of employment (Table 3.1).

Table 3.1. Conditions of employment in Peru (2004-2008)

Indicators	Urban 2004(%)	Urban 2008(%)	Rural 2004 (%)	Rural 2008 (%)
Rate of participation	66.9	70	82.1	81.8
Rate of occupation	92.7	94	99.2	99.1
Rate of unemployment	7.3	6	0.8	0.9
Public sector	9.8	10.2	3	3.5
Private sector	41.9	44.8	19.1	21.8
Independent sector	32.9	33.1	40.7	43.2
Professional and technical employment	2.2	1.9	0.2	0.1
Not Professional or technical	30.7	31.1	40.5	43.1
Familiar worker not paid	9.5	6.4	35.6	29.7
Others	6	5.6	1.6	1.8

Source: elaborated by author with data from MTPE 2012, pp. 21-22.

Its main significance is the high levels of occupation and participation from the rural areas compared to the urban areas. Though, the participation in the private sectors in urban areas doubles the rates in

⁶⁹ Cognitive-cultural exclusion is related to the phenomenon of alienation of the individuals and the cultural exclusion of groups. Economic exclusion is primarily liaised with the incapacity of a person or a group to participate of productive activities fairly paid, having access to a job position or creating it in favorable conditions having also access to the goods and services for a positive personal outcome.

⁷⁰ Environmental exclusion is associated with the vulnerability of people, their homes and their means of living to the impact of natural conditions of the geography and weather, natural disasters, exposition to contamination, degradation of the environmental conditions of the ecosystems where they live and the deterioration of the natural resources from where they make a living.

⁷¹ Social exclusion is intimately liaised with the persistence of extreme inequalities generating a divide between the urban and the rural capacity of inclusion to the society. These inequalities can be perceived in the distribution of income, racism in public services, centralization, gender discrimination, children discrimination and elder care, etc. (Sagasti and Bazan 2008).

⁷² This means that there is a group of marginalized people who are not able to participate actively of their citizenship in the decisions that affect into their future, and are not having the opportunity of every citizen in the country to make their voices to be heard through a diversity of institutional channels available for that purpose in the local, regional and national agenda. (Sagasti and Bazan 2008).

rural areas, explained by higher rates of participation of the rural areas in the independent sector and the unpaid work for the family, close to 30% in 2008 (MTPE 2012: 22).

In consequence, the inhabitants of rural and isolated areas in the Andean and Amazonia of Peru belong to the groups of chronic and extreme poverty, and are object of each of the five categories of exclusion. They are vulnerable to the effects of nature, exposed to the risk of unpredictable weather conditions and geographical isolation out of the reach of the public services such as health centers, health posts and schools. These populations are expecting the support of the government for balancing environmental exclusion such as actions for prevention and policies for reducing the impact of natural effects and solutions for improving accessibility to basic services.

3.3. The Political System in Peru

This section aims to explain the basics of the organization of the Peruvian state and a brief historical review of the governments and their politics. The idea is to explain the events that preceded the current ICTs policies in the light of the significant changes in politics that marked the policy making processes in Peru. These events reflect the changes in the framework of the policies such as the privatization of the state enterprises of public services and breaking of the monopoly for the institution of market principles, the opening for new politic initiatives and the progress on the implementation of processes of modernization of the state (Garcia and Eiguren 2008:390-394).

3.3.1. Organization of the Peruvian State

As mentioned before in this Chapter Peru is a democratic republic with a multi-party system. According to the Constitution, the elected President is the head of the State elected for five years and entitled to nominate the Prime Minister. The State counts with a unicameral congress with 130 members democratically elected for a five year term. The State comprehends three powers: executive, legislative and judicial. The executive power is composed by the Ministries of the State, controlling

the mass of the government's budget organized by portfolios. The portfolio of ministries is part of the executive power and is accounted with a long list of committees and mechanisms to describe the interaction between the executive, regional and local governments and the citizens represented by their community members.

The Political Parties

Formally, the President and the Congress are elected by and accounted by voters through the process of electoral competition. Peru historically did not have a strong and cohesive party system. Partisan identification is low and parties are highly unpopular. According to Moron and Sanborn comparative analyses ranks Peru as having the weakest party system in the region (Moron and Sanborn 2005).

The classical schools of politicians in Peru in the 1980s were mainly from the Popular Revolutionary American Alliance APRA (stands for *Alianza Popular Revolucionaria Americana*), AP (Popular Action), the Cristian Popular Party PPC (stands for *Partido Popular Cristiano*) and the minorities represented by the Left Union IU (*Izquierda Unida*) and the independent parties. Toward the 2000s to promote the inclusion of minorities and to break the traditional blocks of preferences, the electoral system implemented a strategy of flexibilization of the electorate rules for promoting citizens participation, which enhanced the registration of small parties with low level of representativeness increased with the purpose. In consequence, Peru has a fragmented multi-party system which in virtue of pluralism is hiding the weaknesses of the actors.

The Executive

The Executive branch is the right hand of the President of the Republic, representing the will and action of the presidential authority. The President has the formal authority to create, modify and eliminate tariffs including the budgeting process⁷³. The President is entitled to dictate decrees of urgency in economic matters. President also has a veto

⁷³ From 1980, the Executive branch has been largely responsible for setting the national policy agenda and initiating major reforms. Presidents with their personal boards of advisors have made most major policy decisions in macroeconomic policy, social policy, national security and state reform in general (Moron and Sanborn 2005).

power over actions of Congress and may surpass the approval of Congress in case of disapproval and according to the Constitution.

The Congress

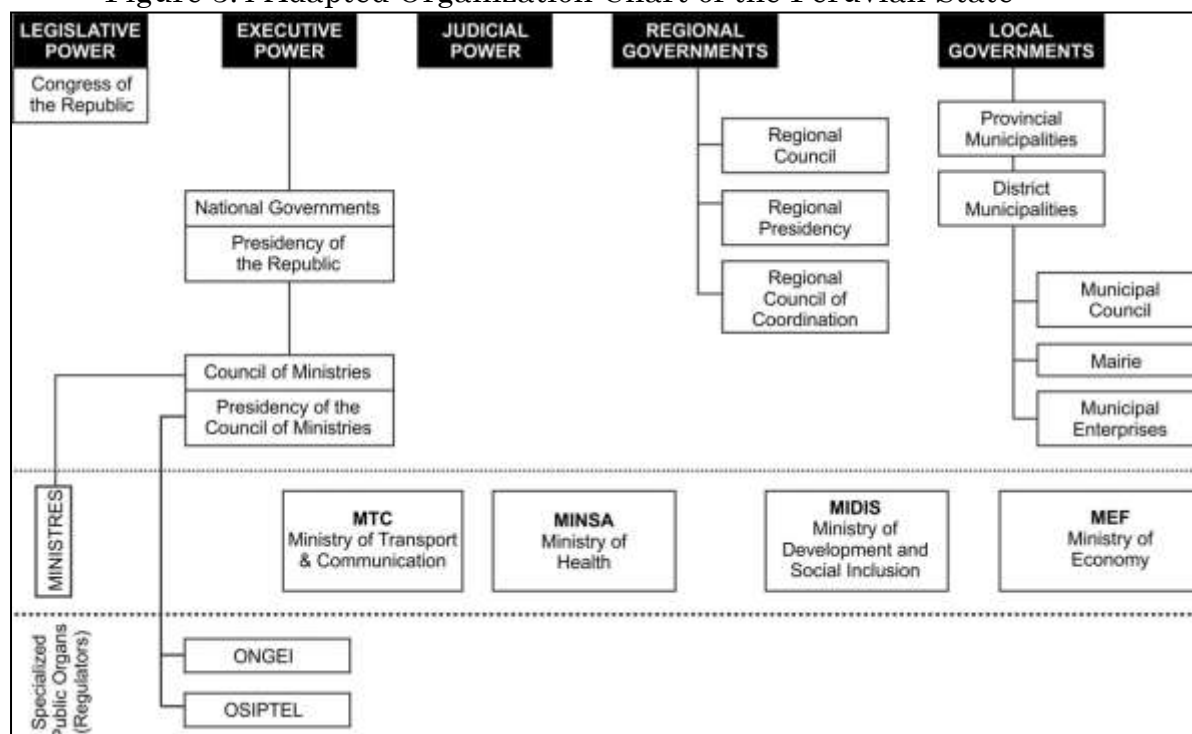
The Peruvian Congress had traditionally two houses and 240 members from 1980 to 1992, and was downsized to a single chamber with 120 members with the approval of the Political Constitution of 1993. In both cases, members were voted at the same time with the presidential votes. The Congress is in charge of approving the national budget, create investigative commissions, censure and impeach cabinet members, impeach the president or declare a presidency vacant. However the exercise of these rights is limited by other political facts.

During the past decade, the performance of Congress members was poorly evaluated by the analysts and also by the opinion of people on the private and public surveys in different provinces and in Lima (RPP noticias⁷⁴). The reason can be attributed to the fact that during the decade of the 2000s the cases of corruption and unlawful acts performed by Congress members became of high incidence, decreasing the levels of credibility and trust from the citizens to the Congress members, but also to the parties.

Figure 3.4 shows the organizational structure of the Peruvian State, and the position of the Executive, the Congress of the Republic and the Ministries (Figure 3.4). In this Figure is important to highlight that the three powers of the state appear at the same level than the regional governments and the local governments, due to the decentralization process.

⁷⁴ This information has been obtained from the website of the RPP (Radio Programas del Peru) in reference to the information collected from public and private surveys from IPSOS and APOYO, both enterprises of market and opinion in Peru. To the question about the approval or disapproval of the President Alan Garcia in July 2006, in average 45.5% of people disapproved in Lima and 50.5% disapproved his administration in the rural areas of Peru. Here the full note: http://www.rpp.com.pe/2011-07-26-cpi-presidente-alan-garcia-deja-el-cargo-con-46-2-de-aprobacion-noticia_388238.html (Last accessed March 2, 2015).

Figure 3.4 Adapted Organization Chart of the Peruvian State



Source: adapted by the author (Original version from the Portal of the Peruvian Government, last visited July 10, 2014)

Figure 3.4 shows two Specialized Organs depending of the Presidency of the Council of Ministries: there is the supervisor organism OSIPTEL and the technical specialized office for e-government ONGEI.

OSIPTEL is a regulator specialized organ in charge of supervising the activities of the private telecommunication companies such as quality of service, complain of contracts, provision of service in isolated areas pricing and so forth. It was created in July 1991 according to the Legislative Decree no. 702, and started activities in January 1994.

ONGEI is a technical specialized organ of the national system of information for the promotion of e-government activities. It was created in 2003 according to the Supreme Decree no. 604 starting activities in August 2004. It is in charge of the formulation of regulation and implementation of the national policy of e-government, ruling information security, development of ICTs and offering technical advice to public entities. It also offers IT training to contribute towards the modernization and decentralization of the State ⁷⁵. This office is in charge of the

⁷⁵ ONGEI <http://www.ongei.gob.pe/> last visited July 1st, 2014.

administration of several websites of the State, including the website of the Peruvian State (PEP)⁷⁶; the website for services to the citizens and enterprises (PSCE), website of the Commission for development of the Society of Information (CODECI), and others.

The Ministries

In the organization of the state, the authority over ICTs for health related issues lies on two important institutions of the executive power that are under the Presidency of the Council of Ministries in equal of hierarchy: The Ministry of Health (MINSA) and the Ministry of Transport and Communications (MTC). These ministries operate independently, but connected by issues of common interest and liaised by ad-hoc commissions nominated by coordination or superior call. (Figure 3.4).

The MINSA has the mission to protect the personal dignity promoting health, preventing sicknesses and offering guaranteeing comprehensive health attention for all inhabitants of the country; proposing and conducting the alignment of sanitary politics in agreement with all the public sectors and social actors ⁷⁷(MINSA website).

The General Direction of Health (DIRESA) is the entity created for the regional administration of the health services as part of the processes of decentralization and regionalization of the country. It has one representative office per every of the 25 regional counties that subdivide the country. The DIRESA of every region has the character of a deconcentrated authority, with rights on formulation, execution and deployment of regional plans in coordination with the allocated offices and under approval of the Ministry office. Each DIRESA communicates with their networks (hospitals, health centers) and micro-networks (health posts) in the region and establishes their Executive Offices for the

⁷⁶ PEP is constituted as the interactive system of information for citizens through the internet (ibid).

⁷⁷ MINSA is composed of an Organ of Institutional Control; a Public Procurement department; a General Secretary; eight general offices (communications, statistics, administration, human resources, planning, legal advice, international cooperation and national defense); seven general directions (individual health, environmental health, drugs and materials, epidemiology, health promotion, infrastructure and hygiene, development of human resources); and three deconcentrated organs (supply of strategic resources, specialized institutes and General Direction of Health).

purposes of promotion and expansion on access for their jurisdictions and coordination of actions with the local governments.

The Ministry of Transport and Communications has an executive and technical secretariat organ named Fund for Investment in Telecommunications (FITEL). FITEL is the organ in charge of the monitoring and supervision of the public investment made through open public notice for providing infrastructure of telecommunications services in rural areas, but they are not accounted with funds for the purpose, just provide technical and legal advice over issues concerning territory access for broadcasting and provision of connectivity⁷⁸.

The Regional and Local Governments

Regarding the regional and local governments, it is important to clarify that in Peru a province is the unit of administrative subdivision below the regional division. According to the Law no. 27867 of the Republic of Peru, Organic Law of the Regional Governments (2002)⁷⁹ the Regional Governments are legal persons of public law with politic, economic and administrative autonomy in matters of their natural competence, and there is one in every of the 24 regions as decentralized jurisdictions of the state. A region is divided in provinces and they are subdivided in municipalities. A municipality is the unit of administrative subdivision of the provinces. Thus, the system works as follows: each Regional Government has associated a representative of the Ministry of Health through the correspondent DIRESA which main functions are related to the government, regulation, monitoring and evaluation of the Health System in the region and its provinces. For example, there is the DIRESA Loreto for the region Loreto, and the DIRESA Cuzco for the region Cusco.

The Municipality is the administrative division correspondent to the local authority. According to the Organic Law of Municipalities of the Republic of Peru, these are “legal persons of public law with politic, economic and administrative autonomy in the majors of its competence

⁷⁸ FITEL <http://www.fitel.gob.pe/> last visit July 2, 2014

⁷⁹ Organic Law of Regional Governments no. 27867 published on November 18th, 2002.

related to the provision of services in the local jurisdiction”. Every Municipality is headed by the Mayor in the Mairie and their Aldermen, democratically elected by universal suffrage every five years.

The Civil Society

With the loss of power of the unions on the 1980s, and the strengthening of business and government elites, civil society had become in the 2000s as essential for the development of a society in general. Civil society represents the interests of the major groups and minorities associated by political views towards the development of the country and capable of orienting the tendencies of preference of voters. Given the decline on credibility on the 2000s of most governmental institutions, there is a high expectation that civil society will assume responsibility for expansion of participation and articulation of public interests.

In Peru, organized labor and civil associations of many kinds played an important role in the definition of power of the state, especially in the transition of democracies and the forming campaigns of the electorate commissions.

The Public Bureaucracy

It includes the line of ministries (Economy, Education, Health, etc.) and the autonomous agencies established in the past decades. In Peru, there is a direct role of the ministries in the process of policy making⁸⁰ as institutions representative of the state, the public servants on the executive, legislative and judicial powers, and the participation of the members of the regional and local governments.

Peru had inherited an inflated public sector from the military government in 1980 and the administrations of Fernando Belaunde (1980-1985) and Alan Garcia (1985-1990). During this decade the bureaucracy of the public services tripled the number and growth the state in proportion. In the 1990s, Fujimori’s administration changed the perspective by creating autonomous supervisor agencies for monitoring reforms and

⁸⁰ In the Peruvian health system due to the fact that there is a lack of a qualified professional civil service such as physicians and dentists, the government included regular periods of service of last year students of medicine and odontology in programs of public services in rural areas and are considered as temporary personnel in the programs SERUM (*Servicio Rural y Urbano Marginal de Salud*).

indirectly the function of the ministries and the changes were maintained and supported during the 2000s with the recent creations of the state (Sanborn 1991) such as the People's Defender Institution (*Defensoría del Pueblo*) and in the last decade the expansion of the portfolios of the executive with the creation of new ministries such as Ministry of the Women, Ministry of Environment and Ministry of Social Inclusion.

3.3.2. Historical Legacy of Governments

Peru has been always a profoundly unequal society. There are historical evidences of the legacy of a social divide in the organization system as old as the period of conquest from Spain (Pajuelo 2006). Different from Chile and Argentina, the post-independence of Peru has not found a governing class capable to unifying the nation. Instead, military caudillos disputed the control of the country and were concern about the economic development leaving aside these social differences.

Social exclusion and political instability were the main characteristics of economic development. The economic booms of private sectors and elites privileged the distribution of the bonanzas and survived the crisis with more resources, living room for the formation of dominant elites. In the 1960's, when most of the region was pursuing developmental and democratic alternatives, Peruvian elites led exportation models and survived the crisis of the land reform, inflexible to contribute toward social welfare or broader political participation. As a result, Peru had one of the most unequal patterns of income distribution in Latin America and large sectors were denied even the basic rights of suffrage (Moron and Sanborn 2005: 12-25, Pajuelo 2006: 21-24).

According to Moron and Sanborn, prior to 1968 Peru had a reformist party APRA⁸¹, which represents an important sector of the population with ideas from the central left and social proposals (Moron and Sanborn 2005)⁸². The APRA had a long history of organization and ideology and had their first elected president Alan Garcia (Garcia and

⁸¹ APRA stands for *Alianza Popular Revolucionaria Americana*

⁸² In a review about Policy Making in Peru, Moron and Sanborn made a succinct summary of the contemporary political and economic history of Peru through the governments and parties that were leading the country from 1968.

Egiguren 2008: 382). The APRA was not able to lead a reform due to structural factors such as persistent power of land owners after the land reform, and confrontations with military power.

When the moderate party *Acción Popular* (Popular Action) was also unable to achieve the reform, there was a generalized sensation that civilian elites were incapable of forging genuine national integration and transforming unfair structures. Instead, the Revolutionary Government of the Armed Forces led by the General Juan Velazco Alvarado proposed structural changes to eradicate the social class conflict and overcome external dependency. For achieving such proposal, the military government acted in radical labor reforms, nationalized a large share of primary export and financial sectors, confiscated the mass media and prohibited all political parties and electoral competitions, privileging the military elites and reinforcing the positions of difference in power.

Military power failed to achieve their objectives and after twelve years of military rule, the Peru of 1980 had still a burden of submission, authoritarianism and inequality. According to Moron and Sanborn, until the 1980s the governments made important strides towards expanding social inclusion and reducing various historical barriers to democracy. The challenge was to design a set of effective, representative institutions capable of reflecting these changes (Moron and Sanborn 2005).

In 1978, after the elections for a Constituent Assembly, for the first time parties of the three most important parties of the country (Left, Right and Center) had representation as a result of the free support from the electorate, and each participated in definition of the new institutions and distribution of power (Sanborn 1991). Thus, the alliance between AP and PPC supported the candidature of Fernando Belaunde and the return to an institutional democracy (Garcia and Egiguren 2008: 383). The administration of Belaunde in this period applied the just approved Political Constitution of Peru of 1979, which established the bases of the presidential regimes until 1992, replaced by the subsequent Constitution of 1993 which retained many of its core elements. It established an

Executive branch with a President who is also Chief of the State, and a legislature that contemplates two chambers (instead of 3 and reduced to 1 in 1993), as well as giving municipal governments and regional authorities support for being popularly elected, and establishing that the President and the entire legislature would be elected simultaneously every five years through direct popular election.

In the 1980s, new rules lowered the barriers for electoral participation⁸³. The period from 1980 to 1992 was an opportunity for strengthening the democratic institutionalism (Garcia and Egiguren 2008: 383). The Constitution of 1979 has given right to vote for illiterates and lowered the voting age from 21 to 18, measures which increased the electorate promoting inclusion on public decisions of major character⁸⁴.

Fernando Belaunde Terry (1980/7-1985/7)

In 1980s Fernando Belaunde Terry (*Acción Popular* AP) faced international crisis, armed insurgency and the terrible consequences of an El Niño weather event. Unfortunately, the Belaunde's administration made policy choices that exacerbated the persistent tension in the country without achieving greater stability. The administration of Belaunde were generating deterioration of the political regime due to the lack of relevant political, social or economic measurements of relevance to face the social changes and challenges left by the military regime (Garcia and Egiguren 2008). This government ended in economic crisis and social discontent as well as increasing political violence which may motivated the opposition as an answer, being Alan Garcia Perez (APRA) elected democratically in 1985 (Moron and Sanborn 2005:8-10).

⁸³ Lowering the barriers for participation means allowing any group of citizens to form a party with the signatures of 1% of registered voters in a given jurisdiction. Other rules also varied considerably, including those establishing the type of circumscription, the number of elected representatives, the number of chambers, rules for electing, and so forth.

⁸⁴ According to the literature, the new regimes after 1980 expanded opportunities for participation and promoted parties competition. Also, they reinforced weaknesses on the individual structure of the parties, and increased fragmentation and instability of the party system (Sanborn 1991). Along with the enforcement of the power of the Executive, the following years were characterized by the President having majority of votes in Congress, engrossing its power and having significant effect over the policy making processes, centralizing decision making and becoming accountable for all the economic and social policies.

Alan Garcia Perez (1985/7-1990/7)

Alan Garcia Perez led a populist government of arbitrary style and impetuous policy decisions (Sanborn 1991) that would lead Peru to the edge of economic and political collapse. Garcia's policies were supported by a congress whose representatives were elected by the middle working class that has given legitimacy to his election. He took personal interest in all policy areas from agriculture to anti-terrorism based on the reserves generated by the suspension of the payment of the external debt, and other economic measurements that jeopardized the reserves of the country.

By 1987, the inflation began to rise and the crisis became predictable. A controversial decision of nationalize the private banking system in July 1987 generated major economic and political disruption as well as polarization of the political forces of the country (Moron and Sanborn 2005:11, Garcia and Egiguren 2008: 384) leading into a policy paralysis and spiral of economic crisis as terrorism was increasing power in the Andean with the presence of MRTA and Shining Path. The political insecurity and physical unsafe in provinces marked rural areas motivating migration from the country to the cities that will become massive by the end of his period (Pajuelo 2006: 32).

Alberto Fujimori Fujimori (1990/7-2000/11)

In 1990, the popular novelist Mario Vargas Llosa leading a democratic movement with a neo-liberal agenda and supported by prominent members of business, political and ecclesiastical groups and proposed by an alliance of parties and independents name FREDEMO, were defeated in the election by Alberto Fujimori, mathematician and university rector who had no clear program but was a new representative of the minorities promising "honesty, technology and hard work". Fujimori's campaigns was based on a rejection toward the entire and political social elites, and lead a congress with little experience and accompanied by inexperienced legislators, but legitimate in power. He worked for the first two years studying structural adjustments to overcome the crisis. With support in the executive, his broad authority passed legislative decrees in

areas of economic policy such as resume the payment of foreign debt, restore international credit, reform the tax authority, sign of anti-drug agreements, and empowering the military in the fight against terrorism.

Legislators demanded fiscal support for the agricultural sector declared in emergency, and disagreements over tax policy and other measurements proposed by the Economy Minister reached peak in 1992, when the Tribunal of Constitutional Guarantees ruled against Fujimori on the use of certain emergency powers. On April 5th of 1992, President Fujimori announced the closure of the Congress, the reorganization of the Judicial Power and the Tribunal of Constitutional Guarantees (Garcia and Egiguren 2008: 387). With support of the military hierarchy, the “auto-golpe” was rejected by the major parties that boycotted later the election of the Constituent Democratic Congress (CCD), which he took as an opportunity and nominated 49 top voted candidates giving him a firm majority and control. The CCD appointed a commission to draft the New Political Constitution which was approved in 1993. According to Garcia and Egiguren, the main objectives of the Political Constitution of 1993 were two: at political level to consolidate the presidential power and the continuity of the authoritarian regime; and at the economic level to promote the privatization of the state enterprises leaving to the markets the economic activity of the country (Garcia and Egiguren 2008: 388).

Fujimori worked toward efficiency in the public administration promoting the centralization of the administration in a model where the Prefectures as Regional Governments assumed the functions of control of the state postponing the processes of decentralization and modifying the institutional functions of the local representatives from development agents into agents of control of the local jurisdictions, especially in the rural areas (ibid: 388-389). Reform in the education and health sector promoted the massive construction of infrastructure of schools and hospitals during his period. Massive privatization of basic services has taken place following the neo-liberal tendencies of the period.

Utilities such as Telephony Service, Electricity, Retirement funds

were privatized and massive concessions in the extractive industry were given. The Service of Pension for retirement was privatized and taken by big foreign capitals in the business of Administration of Pension Funds (AFP), the promulgation of the General Law of Health and the transformation of the Peruvian Institute of Social Security (IPSS) into the new administration Social Health Insurance (ESSALUD). Also, to guard the interest of the citizens, entities supervision organs were created such as OSIPTEL⁸⁵, and OSINERG⁸⁶. The GDP grew by 4.8 percent in 1993 and 12.5% in 1994 and inflation fell to 15%, moving toward 10% in 1995 (Moron and Sanborn 2005:12-15). By late 1994 political violence had declined 20% (from 1990 levels). Meanwhile, political opposition remind divided.

In 1995, Fujimori was re-elected. Steady rising of economy and progression of the policy changes made in the past years characterized this period of apparent stability. The second term of Fujimori was polemic due to human right concerns and military scandals. In 2000 he campaigned to be re-elected when rumors about electoral fraud, press constriction, press corruption, intimidation and bribery were confirmed by a videotaped copy of one bribery transaction that leaked to the media (ibid:13-14). He went into exile in Japan and resigned by a fax note. The network of corruption was then openly exposed.

Valentin Paniagua Corazao (2000/11-2001/7)

Valentin Paniagua was elected by consensus of the Congress becoming the President of the Congress and instituting a government of transition to the democracy (Garcia and Eiguren 2008: 395). He governed for a brief period of eight months starting on the 22nd of November of 2000 and finished with the following elections which were convened by his Congress. The administration of Paniagua initiated reforms to restore democracy and the rule of law, investigating human right abuses and prosecuting corruption.

The period was characterized by the spirit of concertation and

⁸⁵ OSIPTEL: Organism for Supervision of Private Investment in Telecommunications.

⁸⁶ OSINERG: Organism for Supervision of Investment in Energy, recently reformed to supervise the investments in mining.

striving for the alternatives for comforting the families of the disappearance of students and political representatives during the years of the military fight against terrorism. This government had the advocacy of assuming responsibility over the mistakes and abuses found in all over the country, mainly in provinces and isolated areas and the corruption at the highest levels of society. With support from civil society, instituted the Commission of Truth (*Comisión de la Verdad*) with the mission of clarifying the situation of the victims of political violence of the last decade.

This short period was dedicated to the reconstruction of the institutions that were affected by the corruption and autocratic regime. Shortly, the President called for elections as the main proof of restoration of the democracy in the country.

Alejandro Toledo Manrique (2001/7-2006/7)

In 2001 Alejandro Toledo, a leader from the democratic opposition against Fujimori, won the elections leading a socialist-populist central right party named Peru Posible. Toledo enforced democracy and proposed reforms initiated by the interim government, promoting decentralization and an orthodox liberal economic policy that held a steady growth of 4% per year. His Executive work toward the enforcement of the processes of decentralization shutdown by Fujimori and used the strategy of regionalization for improving the delivery of services and public administration.

In 2003, Toledo instituted the use of ICTs for the public administration as a measurement of integration of Peru into the development of the world, by implementing the systems of e-government. He promoted the creation of the National Office of Electronic Government (ONGEI) for supervising the activities of implementation of ICTs in the municipalities and regional governments nationwide. His government created the Fund for Investment in Telecommunications FITEL, subscribed to the Ministry of Transport and Communications for supporting the development of infrastructure in telecommunications with emphasis in the rural areas. In 2003, he also implemented the Comprehensive Health

Insurance System (SIS) and the Intangible Fund for Health FISSAL, for supporting the health system for poor people. In late 2004, speculations about corruption and weaknesses in leading his party were exposed and remained in doubt until the end of his period. In the same year, his administration corresponded with a declaration of enforcement of the Law of Transparency and Access to Public Information encouraging the use the e-government platforms.

In the last decade Peru has been one of Latin America's most impressive success stories, achieving sustained economic growth under political democracy, cutting poverty in half and producing an expanding new middle class. The country's recent boom has been driven in large part by global demand for the minerals and other primary commodities that Peru exports, as well as by sound macroeconomic policymaking and a strong commitment to international trade. Copper, iron, gold and other minerals have accounted for around 60% of total Peruvian exports, 25% of total FDI and 15% of total tax revenues (Sanborn and Young 2014:61-64). Although Western multinationals have accounted for most mineral investment and development in Peru since the 1990s, China is the main destination for Peruvian minerals and Chinese investment in this sector has increased significantly. Investors from Japan, South Korea and other Asian countries are also present in Peru'sⁱ expanding portfolio of mineral, gas and oil concessions (ibid).

Alan Garcia Perez (2006/7-2011/7)

In 2006, Alan Garcia Perez assumes the government of Peru for the second time after a slow cooked campaign promoting new proposals to renovate his unpopular reputation after the economic crisis and violence that he had left his last government in 1995. According to some authors, this government enjoyed the profits from the past administration ⁸⁷ (Sanborn and Young 2014, Jimenez 2009: 158-159). The basis of the economic growth of the three first years of the government of Garcia were

⁸⁷ During the second government of Alan Garcia, the economy had increased its GDP in 9% by 2008 facing the effects of the world's crisis, registering an average of steady increasing of GDP of 7.2% (Sanborn and Young 2014: 23-28).

the result of macroeconomic policies implemented by the administration of Toledo, incorporating measurements such as developing a market of public debt in current exchange and de-dollarization for reducing the cost of credits, controlled inflation and interventions in the exchange rates for balancing the flow of foreign currency, increasing of non-traditional exports increasing internal demand (Jimenez 2009:158).

His interest on supporting free trade treaties signified the expansion of the international market and interest for the penetration of technologies in the education and health sectors. However, his government has been highly criticized by privileging the elites and the private sector. Guarded closely by the press and international press, corruption seems to be a minor effect of his government.

The Law 29344 of Universal Insurance constitutes one of the most important accomplishments of the administration of Garcia and includes the increasing of the Intangible Solidarity Fund (FISSAL) for extending coverage to the most disadvantaged populations. Later in this dissertation, there is a section dedicated to depth into the content of this law (section 3.4.3.5.).

Ollanta Humala Tasso (2011/7-up to date)

In 2011, Ollanta Humala as a representative of the Nationalist Party (*Partido Nacionalista Peruano*) won the elections in the most fragmented electoral selection of the democratic history of Peru as there were eight candidates from different parties. Proposing a reformist model of authority (Melendez and Sosa 2013: 325), his administration is characterized by the promotion of social inclusion and international participation as means for development. The government of Humala promotes the growing of urban areas and increasing rates of employment and economy but still his level of popularity is low due to the disenchantment of the entire political system by suspicions of corruption from his party representatives and other circumstances that obliged his Prime Minister and Cabinet to be changed several times.

Related by the press to the departed Hugo Chavez (ex-president of

Venezuela), Humala proposed a strong will for promoting equity and redistribution through the implementation of social programs. His populist inclination claimed votes from the Andean and the forest area of the Amazonia which his government had corresponded by implementing a strong social inclusion policy. Thus, as a response for inclusion, his administration created the Ministry of Development and Social Inclusion (MIDIS) and implemented a series of actions to promote social participation and empowerment in the most depressed and abandoned localities. The administration of Humala supports and encourages the empowerment of women and vulnerable populations by enforcing the implementation of systems of e-government and promoting the use of ICTs for the public administration, retaking the proposals of Toledo.

3.3.3. ICTs in the Public Administration of Peru

The use of ICTs is spreading all around the world to modernize the processes of governance and offer a platform for the interaction of citizens and their representatives to promote the participative decision making and improve their access to governmental services at the local levels. It is precisely to overcome the political and natural barriers of access to medical services, e-health systems and Telehealth models of attention using ICTs to facilitate access are offering a set of tools to improve health delivery services for rural populations in Peru (Martinez et al. 2005; Sanoni 2012).

3.3.3.1. Strategy of E-Government in Peru

The Multisectoral Commission for Development of the Society of Information (CODESI) was created in 2003, following the initiative of the President Toledo, with the main objective of elaborating a development plan for the society of information in Peru. Also to align the interests of the government sectors such as economy, education, health, transport, communication, welfare, interior and dwellings. The document produced was named the Peruvian Digital Agenda, which is a fundamental document for the functions and operative strategy of the National Office of Electronic Government ONGEI.

CODESI is now an active part of ONGEI, but speaks as a multi-sectorial commission as it integrates members from the government, enterprises and citizen representatives. CODESI has a role as a facilitator for concentrating opinion and willingness from the strategic partners on breaking the digital divide in Peru, and it groups private enterprises, telephony operators, institutions of international support and community representatives for creating mechanisms to articulate ICTs to the strategies of national development.

As mentioned before, from 2004 the ONGEI operates as a technical specialized organ in charge of regulation and implementation of the national policy of e-government. This office is currently working in the creation and supervision of contents, transparency, use and promotion of the Portal of the Peruvian State with the main objective to facilitate governmental services to any Peruvian citizen. Also, ONGEI had established a list of indicators for assessment of effectiveness of ICTs⁸⁸. This office is in charge of the administration of several websites of the State, including the website of the Peruvian State (PEP)⁸⁹, the website for Services to the Citizens and Enterprises (PSCE), the website of the Commission for development of the Society of Information (CODESI), and so forth.

3.3.3.2. Social Inclusion Policy (MIDIS)

In October 2011, President Ollanta Humala approved the creation of the Ministry of Development and Social Inclusion (MIDIS) with the objective to professionalize the action of the state toward the achievement of social inclusion. The goal for MIDIS is to achieve that all citizens have access to the same opportunities of integration to the Peruvian society without meaning of the places of birth or residence, their language, their culture or the culture of their parents and their social or educational background.

⁸⁸ ICTs indicators: http://www.ongei.gob.pe/entidad/ongei_tematicos.asp?cod_tema=4550 (last visited July 1, 2014).

⁸⁹ The PEP is the representative of the Peruvian State, constituted as an interactive platform for systematization of information for citizens through the internet.

The National Strategy for Development and Social Inclusion had received the official name of “Inclusion for growth” and had become an important tool to organize the social strategy of the state. The MIDIS intends to integrate the institutional efforts of the state and to address the national policy toward social inclusion for development in Peru. This Ministry elaborates strategies for tackling poverty and including the isolated sectors of society in the economy, health and education systems of the country. The strategy of MIDIS is to balance development in the urban and the rural living to promote equal opportunities (MIDIS website).

MIDIS implemented five social programs: “Cuna mas” for day childcare; “Pension 65” for giving a cash pension to elders in extreme poverty, “Pronaa” as alimentary support for children through schools; “Foncodes” for articulating international cooperation towards development programs and “Juntos” which provides cash transfers for families in extreme poverty⁹⁰.

There is a high expectation toward the implementation of these programs, especially in the most depressed areas of the Amazonia, but at the time of writing this dissertation, results was not assessed yet.

3.3.3.3. Law of Regional Governments

In Peru, a province is the unit of administrative subdivision below a region. A district is a unit of administrative subdivision. The Regional Government is represented by the President of the Region and acts as a deconcentrated organism of the central government with executive power.

⁹⁰Although, these social programs are mean to make the presence of the government to be felt in rural depressed areas, no evidence has been found about the inference of these social programs into an objective increasing or decreasing of the conditions of access of vulnerable populations to health services. There is also a special program called “Fund for the Economic Inclusion in Rural Areas” (FONIE). This fund implemented in 2013 has the final objective of financing the elaboration of studies of public pre-investment, investment and maintenance of public services presented by the local and regional governments, the portfolio (sector) or the private sector for the fulfilling of projects to build or improve infrastructures in water, sanitation, electrification, telecommunications and roads, giving priority to simultaneous actions with the object to generate impact in welfare and improvement of quality of living in rural households. To complete the list of the projects of MIDIS for promoting social inclusion, the latest project is the Quipu Commission and The National Committee of Supervision and Transparency. In June 2011, the Quipu Commission reunited academics, national and international experts, functionaries from MIDIS and the Ministry of Economy (MEF) to develop their ideas and prepare innovative proposals in public policy for improving the efficiency of the social programs. The multidisciplinary character of the commission enhances the proposals to be considered in their technical and logistic viability for formulation of policies.

According to the Law no. 27867 of the Republic of Peru, Organic Law of the Regional Governments (2002)⁹¹, the Regional Governments are legal persons of public law with politic, economic and administrative autonomy in matters of their natural competence. The article 5 of this Law established their mission to organize and conduct the public regional management, according to the national and sectoral policy to contribute towards the comprehensive and sustainable development of the region.

In the field of ICTs, the Law of Regional Governments establishes to use the technologies as a tool for communication and development of the activities of the region, as well as for enforcing the transparency of their actions by publishing the results of the exercise of their management. In these matters, the Law establishes that Regional Governments are in charge of the promotion of development and regional economy, supporting the investment, activities and public services of their responsibility, and they are competent to administrate the regional goods and rents, including the use of the resources of the state such as ICTs.

3.3.3.4. Law of Transparency and Access to Public Information

The Law of Transparency and Access to Public Information (Law no. 27806) was subscribed in 2002 taking effect from 2003 during the government of Toledo as part of the strategy of modernization of the state. The Executive decided to give five months for all public entities toward adaptation of the new dispositions. ICTs play an essential role in the application of this Law, due to the nature of its utility. ICTs are tools for promoting the exchange of information between the entities of the government for the service of the citizens.

This Law is considered a law of constitutional development because it regulates the exercise considered in the Political Constitution of Peru 1979, which indicates in article no. 2 the right to demand and receive information of public entities in a period established by law and assuming the cost of such demands for the destination of interest of the citizen, which become low cost activities due to the application of ICTs.

⁹¹ Organic Law of Regional Governments no. 27867 published on November 18th, 2002.

3.3.3.5. Law of Telecommunications and Universal Access

The Law of Telecommunications in Peru (supreme decree N° 06-94-TCC, 1991) has been modified several times and proposes a policy of Universal Access creating in 1993 the Technical Secretariat of The Ministry of Transport and Communications and its Fund for Investment FITELE⁹². As mentioned before, the role of FITELE is to advise and to promote the extension of the telecommunications' network as strategy of compliance for the policy of universal access. The fund has budgeted for directing activities toward assurance of infrastructure of telecommunications, but not for maintenance of the networks or the service of transmission of voice and data.

The Law of Telecommunications regulates the policy for installation and use of the telecommunications' infrastructure of the state, the use of air and the bands allowed in the jurisdiction of the country. The application of this Law is essential for Telemedicine because is the only policy that promotes the installation of ICTs and the extension of the optical fiber in rural areas to provide connectivity to the regional hospitals and the health centers.

3.4. The Health System in Peru

As mentioned in Chapter III and according to Reid (2009), the Peruvian system is a National Model mixed with an Out-of-Pocket model, and according to the typology of health systems proposed by Blank and Burau (2010), the Peruvian health system oscillates between the National Health Insurance system and the free market system offering alternatives of private insurance. Thus, the health system in Peru has two sectors: private and public. The private sector has a variety of payment and co-payment agreements regulated by the Superintendence of Bank and

⁹² The objectives of FITELE can be defined as follows are related to develop programs and projects for the provision of telecommunications services in rural areas or in areas of social interest, as well as studies on infrastructure and telecommunications services to ensure access by financing programs and coordinating strategic alliances with companies in the private sector, public institutions, national and international, as well as universities, research centers, etc., to obtain their commitment for designing or implementing activities toward sustainability of the initiatives of FITELE, with special interest in rural areas. Their vision is to be an organization which aims to achieving the country's connectivity by integrating quality telecommunications services and articulating their sustainability (FITELE website).

Insurance, and some of them offer private pension systems for retirement, aging or incapacity.

In between the private system and the public system, there is the EPS⁹³ (Entity Provider of Health) model which has been created in 1997 for supporting the public system in most urban areas. The EPS creation is important because it's a landmark of penetration of the private sector in the public delivery of healthcare services.

3.4.1. Health Insurance Systems

The public sector is divided in two regimes: the contributive system which corresponds to contributions of workers discounted from the payroll (ESSALUD⁹⁴ and special system for members of the Armed Forces⁹⁵); and the subsidized system named Comprehensive Health Insurance System (SIS)⁹⁶ for citizens that are not in condition to offer any contribution for the health services in Peru (MINSA 2013:31-32).

The Comprehensive Health Insurance System (SIS) offers no mediation for the simple and complex layers of attention. In the rural areas, most of people is in situation of poverty and extreme poverty and enrolled in the SIS. The SIS aims to deliver health coverage for vulnerable populations without affiliation to any other insurance program, mostly rural and indigenous population who cannot afford to contribute to the National Social Security System such as taxpayers in the urban areas. Thus, SIS emulates the mission of the government to protect the health of

⁹³ The Law of Social Security in Health (law 26790) has the objective to create the EPS system as a complement to the health attention offered by the national system but insufficient to cover the national wide demand. The deal is to transfer the treatment of diseases of the simple layer (primary health care attention) to the EPS (private establishments such as clinics), and through the system of reference of patients, transfer only the complex layers to the specialized services of the national hospitals.

⁹⁴ ESSALUD is a program held by the Ministry of Work and supported by direct contributions of workers and enterprises obliged and jointly insured. ESSALUD is a system in constant process of renewal from 1998 up until now, firstly because they can (budget), secondly by need as population and contributors grow as the working population grows, and also for obvious political reasons. ESSALUD has a well settled set of hospitals in urban areas with services of running water, electricity and connectivity.

⁹⁵ The Health Services from the Armed Forces and National Police Department only attend their workers and their direct family members (Public Sanitary Institutions). This insurance is promoted and supported with funds of the public treasure.

⁹⁶ As reviewed, most of populations living in rural areas of Peru are in situation of unemployment or informal employment, therefore do not afford a contribution system and have access only to SIS.

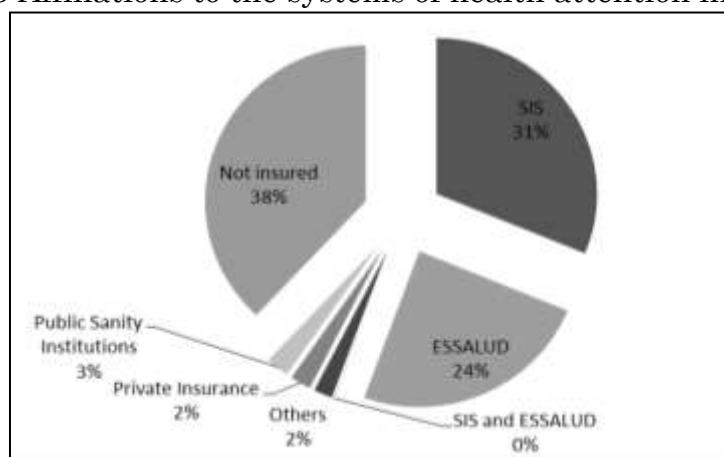
citizens in situation of need, prioritizing the ones in situation of poverty and extreme poverty.

The private sector works as a pre-paid account which includes the private services (hospitals and clinics) which attend patients based on their payments or enrolment into social programs or individual agreements with different scales of payment according to their particular agreements. This subsector is financed by voluntary contributions of the employers and in a minor scale from the families with a medium high to high level of income. The percentage with double affiliation is about 2.5% of the population (Alcalde-Rabanal 2011). This system is more popular in urban areas. At the same time, there are intermediate organisms that offer services of medical attention such as Health Service Companies (*Entidades Prestadoras de Salud*) which are public or private entities different than Social Security. These companies provide vouchers of attention and establish private agreements with their customers (patients) and health attention centers (hospitals or clinics).

According to the study of health situation done by Alcalde-Rabanal in 2011, between 10 and 20% of Peruvian population are excluded of the health system despite of the attempts of the central government of registry, probably due to the lack of personnel available and infrastructure of health services in isolated areas (Alcalde-Rabanal et al. 2011:245). Also, sectors linked to the informal economy or not paid by the regular channels of income due to informality may not be register in any kind of insurance, but are also not accounted in these percentages⁹⁷. Their anonymity is considered as a high risk, especially coming from the rural isolated sectors where delays on epidemiologic surveillance are significant.

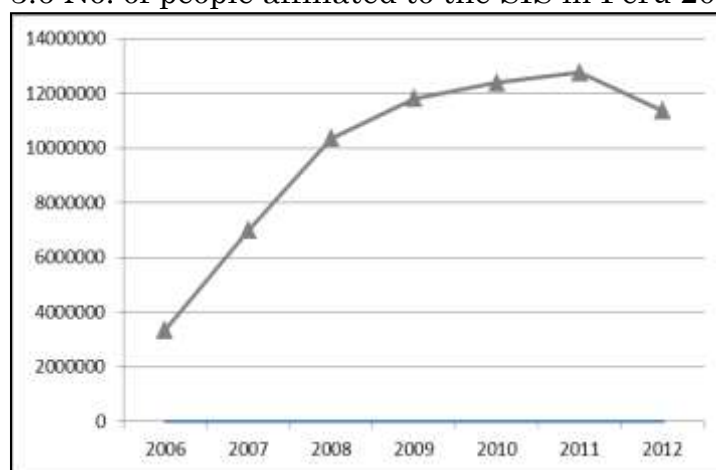
⁹⁷ Also, there are segments of population that are not able to have access to the services offered by ESSALUD yet not able to afford private services, but have a level of income that do not let them to get benefit of the public subsidy of SIS and are also not included on this statistics.

Figure 3.5 Affiliations to the systems of health attention in Peru 2012



Source: elaborated by author with data from MINSA 2013, p.33.

Figure 3.6 No. of people affiliated to the SIS in Peru 2006-2012



Source: elaborated by author with data from MINSA 2013b, p.22.

As indicated in Figure 3.5 and Table 3.2 more than one third of population is not affiliated to any kind of health insurance in Peru (38%). Figure 3.6 explains the increasing of the number of affiliations to the SIS from 2006 until 2012. According to these figures and the information provided in Table 3.2, approximately 10% of population is completely excluded of the health system. 36.3% of people who is subscribed to any kind of insurance are affiliated to SIS, 21.6% are affiliated to ESSALUD and only 5.5% have any other kind of insurance including private services (MINSA 2013).

Table 3.2 Percentage of Affiliation to the Health Insurance 2005-2010

Insurance	2005	2006	2007	2008	2009	2010
TOTAL	36.2	38.3	42.1	53.7	60.5	63.5
ESSALUD	17.3	18.6	19.6	20.1	21.2	21.6
SIS	14.1	15.4	17.0	28.1	33.8	36.3
Others	4.8	4.4	5.5	5.5	5.6	5.5

Source: MINSA 2013, p.45

There are some disadvantages of the SIS in comparison with the ESSALUD ⁹⁸. The SIS is working in rural environments attending indigenous and isolated populations exposed constantly to material scarcity such as adequate conditions of housing, sanity, water and electricity, and extreme climate and epidemics related to this condition and their situation of chronic and extreme poverty.

Decentralized Character of the Health System in Peru

As mentioned in a previous section, the Health System in Peru is decentralized having representatives of the MINSA on every regional government: each regional government has a DIRESA which main functions are related to the government of the health services such as regulation, monitoring and evaluation of the health system.

3.4.2. Categories of the Health Attention Establishments

The health establishments correspond to different categories of health attention based on the functions, characteristics and levels of medical complexity which they are able to solve. Each of these health facilities responds to the services that organizationally they are aim to solve, but eventually, in the most isolated areas are not able to provide due to significant difficulties in the supply chain (administrative, weather conditions, lack of transportation, etc.). There are three differential levels of attention as indicated in Table 3.3.

Table 3.3 Categories of the Health Attention Establishments in Peru

Level of attention	Category	Name
First level	I-1	Health Post
	I-2	Health Post with GP ⁹⁹
	I-3	Health Center without internment
	I-4	Health Center with internment
Second level	II-1	Hospital I
	II-2	Hospital II
Third level	III-1	Hospital III
	III-2	Specialized Institute

Source: Website of the Ministry of Health MINSA.

⁹⁸ Other disadvantages of the SIS compared to ESSALUD are related to the income of the system. The SIS of MINSA does not receive direct contributions but from the Ministry and attends a massive population in poverty and extreme poverty in isolated facilities. In the lack of roads and communication means the SIS faces high expenses of transference, huge lacks in infrastructure, obsolete equipment and limited access to communication technologies.

⁹⁹ GP Stands for General Practitioner (ref. Medical doctor)

The first level of attention receives and refers between 70 to 80% of the cases that arrives to their establishments demanding health services. It means that from the 100% of cases that it welcomes, can only solve up to 20% (MINSA 2013). Health posts (HP) and health centers (HC) are basic health emergency assistance facilities with scarcity of specialized medical equipment. Personnel in charge are usually technical and nursing, or a doctor who also attends other centers and who is oriented to provide first aid, first diagnosis and referral, assigned treatments and preventive care. For example: centers and health posts where healthy life style is promoted and minor procedures are offered to attend emergencies that does not compromise the life of the patient.

The second level attends 12-22% of the patients that arrives to their establishments, referring most of the patients to a hospital with facilities prepared to solve a higher level of complexity (ibid). This level focuses in the promotion, prevention and diagnosis of health condition, offering actions and services of ambulatory attention and hospitalization for patients derived from first level establishments or the ones that comes spontaneously with urgencies. These establishments are able to attend patients who require treatment of intermediate complexity. This level emphasizes its services on the recovery of the patient. Personnel from the following specialties are often but not always found: general medicine, internal medicine, gynecology, general surgery and pediatric attention.

The third level attends 5-10% of the general demand. This level is usually located into the cities and is the center of reference of higher complexity at the regional and national level (MINSA 2013). At this level it is possible to find specialist in most of specialties. The resolution capability of these centers and specialized institutes reaches high level, such as pathological diagnosis which requires equipment and specific treatment requirements and technical availability. Some of these facilities are also in charge of research and education.

The Micro-network of Health

Health Posts (HPs) are the establishments of lower level of hierarchy in the public system of primary attention and are the door of access to health care services for rural inhabitants. Those are usually in small populations of up to 1000 people and are not provided of many services or facilities. The HPs may not have access to land lines of telephone service and only few of them are in reachable distance by pavement roads: health posts are usually in isolated locations. Many HPs depend on their correspondent Health Center (HCs) or center of reference. The HPs referred to one HC constitute the Micro-Network of Health¹⁰⁰.

The Micro-Network of Health is the basic unit of primary attention recognized by the DIRESA in each region. The Micro-Networks are directed by a doctor (GP) who is responsible for the HC and who coordinates the actions of the HPs. Most of the HPs are directed by technical personnel, nurses or a recent graduate GPs. These new graduated doctors are usually personnel with a short period on training and who requires constant communication with their GP of reference in the HCs to do consultations, send reports of epidemiological surveillance, restock of medication and medical supplies and report about the existence of acute disease outbreaks, epidemiological events, medical emergencies and natural disasters.

3.4.3. Regulation, Health Policy and Health Reform

In order to respond to the problems of the health sector in Peru¹⁰¹, policies and regulation are the tools for the public administration to communicate their strategies and plans. As mentioned before, the MINSA is the institution in charge of the regulation of health in Peru, but is also

¹⁰⁰ The HCs are establishments of higher hierarchy than HS's and are usually located in the capital of the provinces or districts where at least one land line of telephony is usually available. A HC is a reference center of several HPs. It is always directed by a GP and has infrastructure and equipment for diagnostic testing and support for internment when required. Most of activities of the HPs are coordinated on their HCs of reference. Also, these facilities are equipped with at least one personal computer to digitalize the reports to be sent to the DIRESA and usually have at least one person who is in charge of those administrative matters besides of the medical personnel.

¹⁰¹ Problems such as for example: the financial component of Health shows that the total expenditure of health in Peru as a percentage of GDP in 2008 reaches 4.4% which is significantly lower than the 6.6% as average in Latin America (PAHO 2012: 1).

constricted by internal factors such as budget and availability of personnel in rural areas, and external factors such as epidemics or natural disasters.

The last document of strategy released by MINSA in July 2002 is the most recent document of health strategy, proposing strategic lines of action and also had approved officially the document “General Alignment to Guide the Health Policy in the Period 2002-2012”¹⁰² (Table 3.4).

Table 3.4 General Alignment for the Health Policy in Peru 2002-2012

General Alignment of the policy 2002-2012	Main problems to be solved
Promotion of health and prevention of diseases	Deficient environmental health, high level prevalence of transmissible diseases and increasing on the non-transmissible ones. High level infant and maternal malnutrition High level infant and maternal mortality
Comprehensive attention and universalization of health insurance (SIS, ESSALUD, etc.)	Reduced the coverage and increasing of exclusion
Policy of supplies and rational use of medication	Limited access to medication
Policy of management and development of human resources	Absent of human resources policy
Creation of the Coordinated and Decentralized National Health System	Segmentation and irrationality in the health sector
Impulse the Comprehensive National Insurance (SIS)	
Modernization of the MINSA and strengthening of its role of conduction of the health sector	Administrative disorganization and lack of a rectory in the Ministry of Health
External and Internal finances oriented to the poorest sectors of society	Insufficient and inequity financial resources
Democratization of Health	Limited citizenship's participation and low level of involvement of the beneficiaries of the services.

Source: elaborated by author from the document General Alignment for Health Policy in Peru 2002-2012, MINSA 2002, p. 33.

The national budget of Peru for the health sector appears as having deficiencies in the administration of funds to face the challenges and needs of its population due to the inequality on the financial resources assigned for the portfolio. The lack of resources for the national system pushes people to take private contracts restricting the access to health services to

¹⁰² Translation from “*Lineamientos Generales que orienten las políticas de salud en el periodo 2002-2012 y Principios Fundamentales para el Plan Estratégico Sectorial del Quinquenio Agosto 2001-Julio 2006*”. Document edited by MINSA and the National Federal Council of Health in May 2002 and Second Edition in June 2002. This document is the most updated version of General Alignment offered by the Ministry of Health in Peru. At the moment, documents related to the new alignment have been proposed for reform 2013 without an official promulgation of changes.

the citizens who can afford out-of-pocket expenses. This condition constricts the capacity of having access to health services of the disadvantaged groups of society, being emphasized in rural and isolated areas where the level of poverty is higher than in the urban cities. Also, this qualifies as inefficient since it rests on resources derived directly from the households' denominated "pocket money" (MINSA 2012: 2-5).

3.4.3.1. General Law of Health and Law of Universal Health Insurance

The General Law of Health (Law no. 26842, 1997) establishes the protection of health as an issue of public interest, therefore a responsibility of the state to be provided, regulated, and promoted and subject of surveillance. The main objective of this law is to establish the principles and financial resources for the attention of affiliated citizens with the regime of subsidized and semi-contributors to ensure sustainability of universal insurance and the progressive implementation of the program¹⁰³.

The Law of Universal Health Insurance (Law no. 29344) in Peru aims to enforce the right to quality healthcare attention in opportunity from birth until death. This right was not ensured in Peru until 2009, becoming a historical landmark toward social reform and a fairer and equal society. This Law establishes the health service as a right of all citizens nationwide in the Republic of Peru. The Law also creates the National Superintendence of Universal Insurance with the objective to supervise the Administrators of Funds for Insurance (AFA), establishing methods of control, financing and the plans for insurance for the public.

The coverage is supported by the contributions of the SIS, funds of the regional and local governments and the contributions coming from international cooperation agencies and other donations. It promotes the mandatory affiliation of any citizen to any of the health systems in Peru,

¹⁰³ Other important objectives of the Law of Universal Insurance are eight as follows: (1) to define universal insurance, (2) diffuse and spread the meaning of the law no. 29344, (3) describe the basic elements for the reform of universal insurance, (4) recognize the importance of the contributions of the private system to the universal insurance, (5) establish the mechanisms of the main plans for universal insurance in Peru, (6) define the limitations of the Peruvian health systems, (7) understand the national context of universal insurance, and (8) identify strategies for the achievement of universal insurance.

and is oriented for every citizen to have partial or complete coverage of basic health insurance (public or private).

3.4.3.2. Health Reform 2013 includes Telemedicine

For the purpose of this thesis, it is important to highlight the inclusion of Telemedicine in the changes proposed by the Health Reform 2013. These changes as proposals consider ICTs as an institutional tool for the delivery of remote health care services for the first time in the history of the Health System in Peru¹⁰⁴. This document of politics was presented to the public opinion in July 2013 and it is still in process of negotiation for achieving its proposals¹⁰⁵.

The following table shows explicitly the strategy proposed for incorporating the use of Telemedicine in a proposal of policy (Table 3.5) as the complete table can be found in Annex 2.

Table 3.5 Strategy 3 of the General Alignment for the Health Reform Policy in Peru 2013

Alignment no. 3 Improvement of efficiency, quality and access to specialized health services	
Strategies	Proposal of policy
Articulation of public services and regional governments	Enforcing the inter-institutional agreements for exchange of services(targeted groups) Regulation of medical and drug supplies Establishment of a Telemedicine network with emphasis in maternal and infant health and cancer treatment especially for isolated populations in need of specialized services.

Source: adapted by author from MINSA, 2013, pp. 12-65.

The document emphasizes the need for construction of a health system that is universal, equal and supportive in a solidarity spirit. Also, it highlights the challenges of improvements organizing them in four areas of action: (i) extending the improvements in health nationwide, (ii) promoting a culture of prevention and protection of health in society, (iii)

¹⁰⁴ During the first three months of 2013 there was an announcement of collapse of the medical and health services, originating a massive nationwide strike. The strike affected mostly the rural areas where specialist and doctors were working on rotational shifts and part time hours under extreme political pressure of the unions. The MINSA led the process of concertation, and reunited in a commission along with the representatives of the unions of doctors and nurses trying to find agreements that could be elevated to the Congress and to the Executive for consideration, producing the document Alignment and Measurements of the Reform in the Health Sector (MINSA 2013a).

¹⁰⁵ The document summarizes the proposal of measurements formulated by the National Council of Health and the special guests from the President of the Republic who participated in the negotiations. The measurements proposed assurance in the delivery of health services and the prioritization of an inclusive and universal recognizing health as a fundamental right and incorporating the use of Telemedicine as a structural change giving priority to the attention of remote populations.

working toward a system of health focused on service; and (iv) relieving the financial burden of citizens enrolled in the system (out-of-pocket).

The reform includes proposals of financial packages directed to the Ministry of Economy toward the widening of the financial constrictions of the system in infrastructure, personnel, training and other important areas of expenditure, based on the principle of redistribution of the Peruvian growing economy. Also, it proposes the establishment of alignment principles with its correspondent strategies and policy implementation proposals for establishing the bases of the negotiations.

3.4.4. Main Problems of the Health System in Peru

Peruvian's health state is a reflection of their complex social inequalities. There have been improvements in the past years but most of the data examined masks the real situation and hides such as inequalities. The highest or lowest probability of death and illness are in function of factors such as socio-economic status, condition of rural placement, gender and educational level of peoples and their communities.

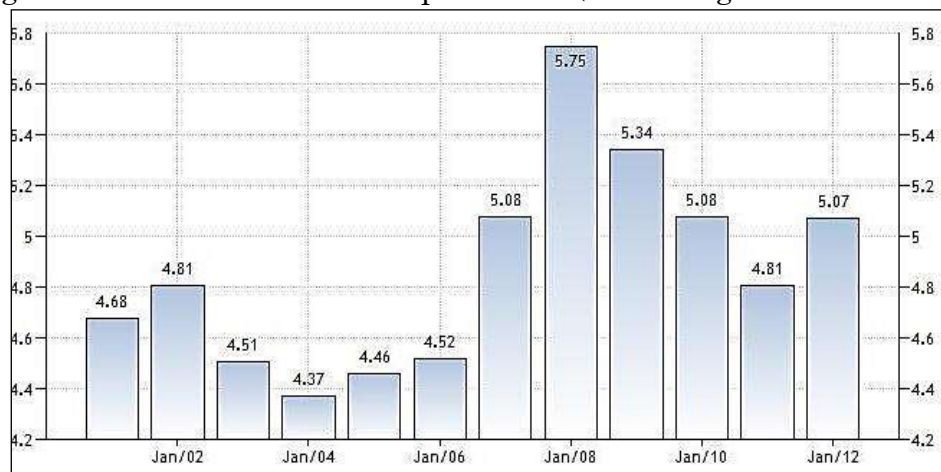
After an extensive literature review, it is possible to associate the main problems in the Health System in Peru with the following four groups: (i) Economy, (ii) Administration, (iii) Infrastructure, and (iv) Human resources.

(i) Economy

Health expenditure as a percentage of the total GDP in Peru was last measured at 5.08% in 2010 (PAHO 2012:2). Total health expenditure is the sum of public and private health expenditure. It covers the provision of health services (preventive and curative), family planning activities, nutrition activities, and emergency aid designated for health but does not include provision of water and sanitation (Figure 3.7, p.100).

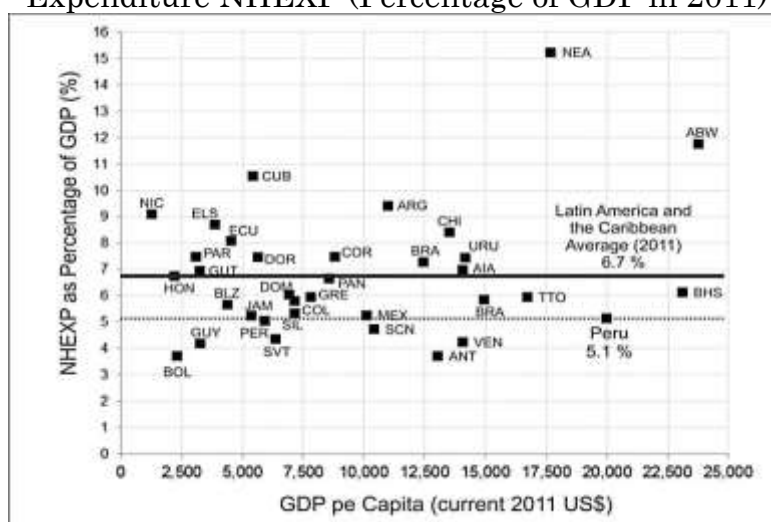
According to the last report on Health Care Expenditure of the Pan American Health Organization (PAHO 2012), Peru registers the lowest level of expenditure of GDP in health of the region in comparison with the income per capita (Figure 3.8, p.100).

Figure 3.7 National Health Expenditure (Percentage of GDP in Peru)



Source: elaborated by author with data from World Bank.
The World Bank Website- Profile Peru 2012 (last visited August 10, 2014)

Figure 3.8 Latin American Income Per capita and National Health Expenditure NHEXP (Percentage of GDP in 2011)



Source: elaborated by author with data from PAHO 2012, p. 2.

(ii) Administration

The administration of resources has been for a long time one of the main problems of the public systems in Peru. These are the key for determining the costs of operation of the public services. About this issue, the International Labor Organization (ILO) from their mission for the Andean Community on their study named “the Health System in Peru: current situation and strategies to support the extension of a contributive coverage” identifies 15 characteristics referring to the style of management of the health system in Peru and identifying them as vices. These characteristics can be listed and summarized as follows: reduced

level of expenditure in public health; excessive out-of pocket-payments; insufficient human resources and infrastructure of the health sector; institutional dispersion in isolated areas; increasing in health coverage but major deficiencies in the medium income sectors; and the last but most relevant, referred to the high degree of institutional fragmentation qualified as a source of un-equity and inefficiency all along the system(ILO 2013: 161-176).

In rural areas, the administration of health services assumes the difficulties for the delivery of health care such as geographic isolation and weather conditions. The DIRESA has the challenge of the bureaucracy of the system for the administration of the resources, and the difficulties on the distribution of medical supplies, lack of incentives for medical personnel and coordination without communication means. Thus, Telemedicine appears as an alternative for improving the health systems.

(iii) Infrastructure

In Peru, according to the database of the Ministry of Health there is a total of 10,241 health establishment distributed in the following levels of attention (Table 3.6):

- Primary attention: 6,632 health posts attended by technicians of at least 2 years of education and training.
- Secondary attention: 2,981 health centers offering ambulatory services and attention to low-risk deliveries (births).
- Tertiary attention: 628 hospitals which cover services of hospitalization (internment), surgeries and other medical specialized medical treatments depending on availability of the resources per specialty (MINSA 2013b:53):.

According to the World Bank latest statistic report, hospital beds (per 1000 people) in Peru was last measured at 1.50 in 2010. Hospital beds include inpatient beds available in public, private, general, and specialized hospitals and rehabilitation centers. In most cases beds for both acute and chronic care are included (WB 2011). This average can be lower in the rural environments and isolated populations.

Table 3.6. Quantification and distribution of Health Services in Peru

Health Facilities	No.	For 10,000 inhabitants
Health Posts	6632	2,2
Health Centers	2981	1,0
Hospitals: Ambulatory services, hospitalization, surgery, specific services	628	0,2
Total Health Services	10241	3,4

Source: elaborated by author with information from MINSA, 2013b p. 53.

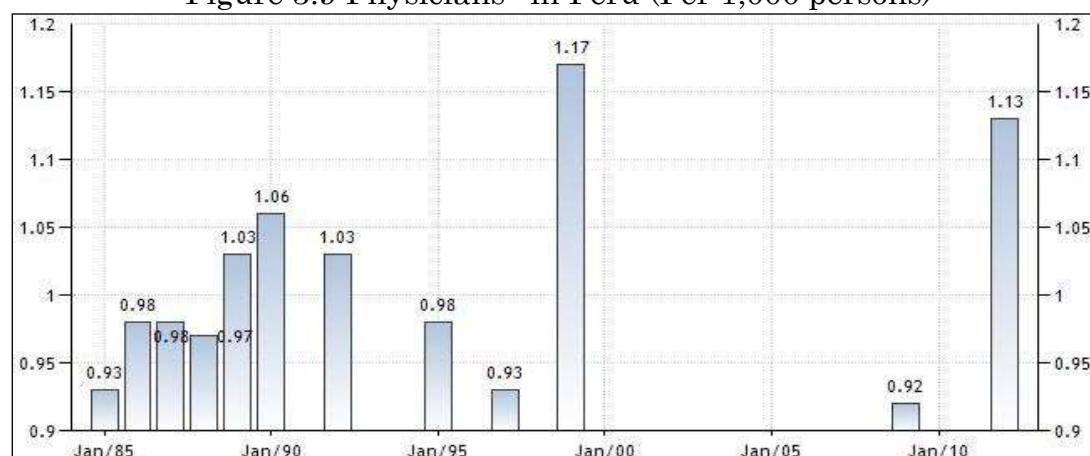
The challenges of the health sector in Peru at the level of infrastructures can be summarized as follows: (i) age of the infrastructure where at least 42% is older than 20 years (MINSA 2013b); (ii) scarcity of relief resources especially in the Amazonia; (iii) instability of the regional governments; (iv) insufficient incorporation of quality criteria to the delivery of the services such as lack of protocols, certification of hospitals and ensure of quality procedures in general.

From the side of ICTs there is insufficient infrastructure of telecommunications making difficult the access to communication tools for coordination between the regional hospitals and the health centers from the periphery. Therefore, Telemedicine appears as a potential solution.

(iv) Human resources

In Peru there is an average of 11.7 General Medical Practitioners (GP), 8 nurses and 1.1 Dentists per every 10.000 people. Compared with neighbor countries, it evidences a lack of health professionals (Fundacion 2008). Figure 3.9 shows the evolution of the reality in Peru, last measured at 0.92 doctors per every 1,000 persons in 2009 (WB website).

Figure 3.9 Physicians* in Peru (Per 1,000 persons)



Source: elaborated by author with data from World Bank
The World Bank Website- Profile Peru 2012 (last visited August 10, 2014).
(*)Physicians include generalist and specialist medical practitioners

Nurses and midwives were last measured at 1.27 in 2009, including professional nurses, professional midwives, auxiliary nurses, auxiliary midwives, enrolled nurses, enrolled midwives and other associated personnel, such as dental nurses and primary care nurses (Figure 3.10). Evidently, these numbers vary according to the location of the health workers, tending to reduce significantly in rural areas.

Figure 3.10 Nurses and Midwives in Peru (Per 1,000 persons)



Source: World Bank Website- Profile Peru 2012 (last visited August 10, 2014).

The lack of medical personnel and health professionals is especially significant in the rural areas of the country. With the intention to improve the attention to health in the isolated areas, in 1997 the government launched the Marginal Urban and Rural Health Service (*Servicio Rural y Urbano Marginal de Salud* SERUM) which is a program oriented to develop preventive activities in the health posts and health centers, mainly in the urban-marginal and rural areas. According to the data 2007, more than 3000 professionals in health science were sent on SERUM program on 2008.

3.4.5. Main Health Problems in Rural areas of Peru

In the past decade there were significant improvements on health situation of Peruvian population due to the process of urbanization, increasing of the level of instruction and access to services of basic sanitation, change of life style of peoples, demographic changes and development of services on the first level of attention. This latter had entitled the access of marginalized populations to certain services of health and improves some indicators such as infant mortality in urban areas through the control of diarrheic diseases and control of

transmissible diseases. Still, in rural areas, the high level of child mortality, perinatal and maternal death is high.

In order to guide public policies to address the problem of budget administration to improve access and quality of culturally relevant services, the United Nations Children's Fund (UNICEF) and the National Institute of Statistic and Informatics (INEI) with support of the Canadian government had elaborated a report named "The Status of indigenous children in Peru" (*Estado de la niñez en el Perú*) on February 2011¹⁰⁶ (Benavides et al. 2011). The results evidenced in the report are an analytical compilation of official statistics collected from 2007 and 2010 from the INEI, the Ministry of Education, Ministry of Health and local-private sources of data such as ENDES (National Demographic and Familiar Survey), and ENAHO (National Survey of Households) and the numbers are representative of more than four million indigenous residents, of which about one quarter are indigenous children, children living in urban areas and adolescents¹⁰⁷.

The report highlighted that although there is an increase in health coverage by indigenous populations regarding to the data collected from 2007, there are still difficulties to cover the need of health personnel and medical practitioners into the medical facilities located in rural areas¹⁰⁸. Also, the report affirms that for indigenous children is more difficult to have access to running and drinking water services and drainage. Only 60% of this group of people has access to clean water and no more than 20% of them have access to the draining system.

¹⁰⁶ There is no register of further studies as wide of this nature performed after this.

¹⁰⁷ About levels of poverty, the document resembles that 78% of the population indigenous children (3 to 17 years) live in poverty compared with 40% who have Spanish as a mother tongue. "This inequality is higher in ethnic groups in the jungle, where almost half of children (49%) live in extreme poverty" (Benavides et al. 2011: 34). Children, adolescents, indigenous, those who learned to speak Quechua, Aymara or other Amazonian languages, live in worse conditions and less access to development opportunities as those with Spanish language. An important fact is that only non-indigenous children 3-5 years, 60% are enrolled in health insurance, a figure that rises to 79% in indigenous children of this age. Still there is a big number unregistered, therefore, unreachable by the health system.

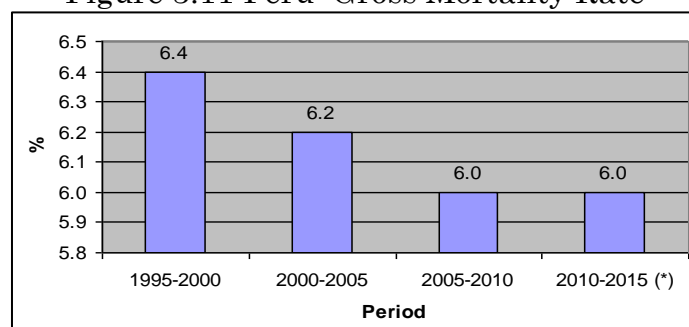
¹⁰⁸ Anticona and San Sebastian (2014) from the University Cayetano Heredia, one of the most prestigious universities in the discipline and practice of medical sciences in Peru, had recently developed a study about health of indigenous populations, concretely from the Amazonian region. Main conclusions refer to the incidence of anemia in people from 0-17 years old is of 51%, and highly prevalent on children from 0-5 years old. Also 20% of children are underweight, and from 12-17 years old, have 50% probability of anemia and stunting (Anticona 2014: 4-5).

Mortality and diseases

During the past years, the health of Peruvian population showed improvements as there were changes in its international profile of mortality as it had happened in most of Latin American countries and from the Caribbean area. Following it is an explanation of the most remarkable changes.

The concept of Gross Mortality Rate¹⁰⁹ is the demographic indicator which shows the number of deaths of a population per every 1000 inhabitants during a determinate period of time (generally a year). Peru has a low mortality rate and its evolution during the past years can be appreciated in the following feature (Figure 3.11).

Figure 3.11 Peru: Gross Mortality Rate



Source: elaborated by author with data from MINSA 2013, p.45.

Transmissible diseases are still a problem for the Peruvians such as Malaria¹¹⁰, Leishmaniasis¹¹¹ and Chagas¹¹²(MINSA 2013). Tuberculosis is still an important problem in the country. In 1992 the worst number was registered and 20 years later in 2012, about 1,800 patients were diagnosed reducing the number but persisting as a transmissible disease (ibid:101).

¹⁰⁹ Gross Mortality Rate (GMR) is calculable with the following formula:

$$\text{GMR} = \frac{\text{No. deceses (in a period)} \times \text{Total Population}}{1000}$$

¹¹⁰ In 2003 the register of cases of malaria in Loreto was of 35,518 cases of *P. vivax* and 7,658 of *P. falciparum*, rising by 2004 to 68,617 and 13,658 respectively. In 2005 the tendency kept on growing and by June the register indicated 41,768 cases of *P. vivax* and 8,091 of *P. falciparum*¹¹⁰. In 2012 there were 31,704 cases of Malaria and 27,702 corresponded to Malaria for *P. vivax* and 4,002 for Malaria for *P. falciparum* (MINSA 2013:94).

¹¹¹ The Leishmaniasis is caused by parasitic protozoa of the genus *Leishmania*. Humans are infected via the bite of phlebotomine sandflies, which breed in forest areas, caves, or the burrows of small rodents (WHO 2011). The estimated incidence between 2003 and 2012 is about 77,977 cases. In 2012 there were 6,212 cases (MINSA 2013:96).

¹¹² The Chagas is a transmissible disease. The early stage of infection (acute Chagas disease) usually is not severe, but sometimes it can cause death, particularly in infants. For these persons who develop chronic symptoms, the average life expectancy decreases by an average of 9 years. In Peru between 2000 and 2012 there were 686 cases and 643 confirmed cases of the disease (ibid:100).

Peru also holds a rate of global malnutrition of 81%. Chronic malnutrition affects more than 20% of children between 0 and 5 years of age and 30.9% of population is considered with caloric deficit in their diet (MINSA 2013:105). In 2011 there was a registry of 76,419 cases of cancer. 16,6% stomach cancer, 11,7% of lungs and organs of the respiratory system and 11,6% of liver and the biliary system (ibid: 105-107).

3.4.6. ICTs and Rural Health in Peru

The link between ICTs and health is defined by the use and application of ICTs designed to attend the specific needs delivery of health services in remote areas. This section aims to provide an explanation about the relation between the health system and the ICTs regulatory members in Peru. Also, this section presents the government bodies in concerned by the issue of ICTs and rural health.

3.4.6.1. Problematic of ICTs Projects in Peru

In Peru during the 2000s, most of the ICTs projects for development were financed by International Cooperation Agencies as supporters of NGOs in alliance with technological partners such as universities and local organizations (Sanoni 2008). These projects emerge to overcome the barriers of access of rural populations to health services¹¹³ such as geographical isolation, scarcity of communication resources, high costs of transportation, unavailability of paved roads and long distances between the centers of reference, lack of qualified and specialized medical personnel, among other difficulties (Martinez et al. 2001).

Most of projects of ICTs in the Peruvian health system¹¹⁴ are able to

¹¹³ ICTs projects in Peru have high barriers to penetrate in the rural environment. At the level of infrastructure, in the rural areas only 28.9% of households are supplied with electricity (92.5% in urban areas), and 35% has access to the potable running water service inside their household (77.7% in urban areas). 51.4% does not have any service of sewage (8.2% in urban areas). Thus, between the social and politic factors that conditions the situation of health of Peru there is the lack of integration, population disperse, multi ethnical background, cultures and poverty as a relevant factors in Amazonian and Andean communities (Telefonica 2006). There are also significant barriers (economic, geographic, cultural, etc.) which limits the access of Peruvians to the health services. Approximately 24.42% of the population have the possibility to access to the Social Services (individual payment system-ESSALUD), about 4-5% is attended by private insurance or Health Services of the Armed Forces (individual payment and co-payment systems) and 31% depends of the public services (SIS) as 38.19% of the entire population has no possibility to reach any health service at all (MINSA 2013: 33-34).

¹¹⁴ Also, most of these projects are strong on building management and technical capabilities in local actors such as the municipalities and health centers, but weak on robustness of the technologies

provide the following services: support for administrative systems and facilitating logistic coordination in remote bases; communication services between the regional hospitals and the local health attention establishments; support for coordination between the peripheral establishments and the hospitals for reference of emergency patients; support for breaking the isolation of medical personnel; facilitates on-line consultation and promotes exchange of medical information such as second consultation, patient referral and counter referral, epidemiologic incidents, casualties and deceased (Rey-Moreno et al. 2010, Bebea et al. 2011, Martinez et al. 2005).

After reading many reports and studies about ICTs and health¹¹⁵, the problems of telemedicine in rural areas can be summarized as follows:

- Lack of infrastructure of telecommunications, scarcity of electrification and limited resources for transportation for mobilizing people and resources to the isolated areas. There is no access to electricity in most of the rural populations, or it is available for limited hours every end of the day. There is a need to provide the systems of telecommunication with self-provision of electricity such as generators or diesel systems making the solutions more expensive and raising technical barriers for maintenance.
- Scarcity of qualified technical personnel for maintenance and operations of technologies in the rural areas. They usually live and work within the cities, making expensive to try to bring them every time when their services are required. Also, for one up to two days a week, the rural health establishments are unattended due to coordination trips that require the presence of assistance personnel.
- Low population density, low level of income and consequently reduced acquisitive power of rural inhabitants. Therefore, incapacity to assume the costs of expensive infrastructures from external private providers or the expensive costs of maintenance. The average time required for

(capabilities and performance of the networks) due to the high cost of purchase, installation and high cost of long term training for forming technicians in maintenance of the systems (Sanoni 2008).

¹¹⁵ Several studies such as Bebea et al. 2011, Martinez et al. 2005, Rey-Moreno et al. 2010, Sanoni 2012

one member of the technical personnel to travel to their reference centers¹¹⁶ is long. In the province of Alto Amazonas, Loreto, Peru it is 20 hours round trip to the center (Iquitos).

- Low population density makes rural areas a non-profitable market for private operators. Thus, developing countries to promote global coverage of their territory since they are not in the position to meet the costs to extend the installation of infrastructure for the networks. Basically, the State is not able to assume the expense due to the high proportion of non-contributors in rural populations and the costs to the national budget.
- Lack of normative framework that aligns the accountability of the state on public health and welfare, the exigency of regulatory bodies of the state to demand from private enterprises for compliance of the law for extending the telephony networks acquired after privatization; and the urgent needs of access to health services from the rural inhabitants.
- Institutional sensitization process is essential for supporting the actors involved in the change from using ordinary processes to processes involving ICTs for health care¹¹⁷. In Universities as a research partners, the heads of the departments may hesitate to grant permission for receiving and administrating funds from international cooperation to rural areas. In the organization of projects, usually this process of sensitization is the role of Universities and NGOs for persuading the local participants and promotes their active support for the implementation of ICTs and to proof they are useful tools, pertinent and accurate to solve the needs of rural populations.

Furthermore, in Peru the presence of NGOs, international cooperation agencies, private organizations and public brigades has taken great importance in the decade of the 1990s, due to their power for mobilizing resources from overseas in the shape of international donations and addressing those funds to concrete projects to be distributed straight

¹¹⁶ Reference center is the place where the medical doctor is located.

¹¹⁷ Even when NGOs have got a long road working within the rural populations, more often than expected, local authorities are not aware of the potential solutions, or they tend to think that are economically or technically unaffordable (Bebea 2010, Martinez et al. 2007)

into the hands of the beneficiaries in the most depressed areas of the country ¹¹⁸. Thus, NGOs became a link between the international organizations and the local communities and representing the voice of the beneficiaries and leading the management of the resources assuming responsibility for the results of the initiatives. These organizations provided funds and actions to contribute to the implementation of services for connectivity for local solutions avoiding the bureaucracy of the state. They also supported local actors empowering people in the use of technologies and adapting those technologies to solve the urgent and important needs in the rural context.

Summarizing, the importance of this Chapter for the analysis of the regulation of ICTs lies in the transcendental influence of the background of Peru in the effects of policy implementation. Thus, depending of the demographic, geographic, economic and political situation of the country, the effect of ICTs policies varies in urban and rural contexts. Also, the problems and needs of the rural areas are different than the urban areas, requiring more attention and resources from the government due to disadvantages in their access to public services.

Following, three cases of study are presented reflecting the reality of the rural areas and the impact of ICTs in the delivery of health care services. These cases of study are projects of implementation of ICTs inserted in the context presented in this Chapter, therefore it is an important reference to explain the effects of changes in policy during the development and assessment of these three cases of study.

¹¹⁸ According to the Economic Commission for Latin America and the Caribbean from United Nations 2011 e-health Report (ECLAC 2011), in Peru “Most information and communication technology (ICTs) health projects have been developed by universities and non-governmental organizations (Curioso et al. 2007:1). Although a National Telehealth Plan has been drawn up (INICTEL 2004), Peru’s Ministry of Health does not at present use ICTs systematically” (ECLAC 2011:110). The partnership between Universities and NGOs appears first as a strategic alliance between research and social application of the matter, and later became an ideal synergy for the development of low cost technological solutions at the service of the empowerment of rural populations (Sanoni 2012).

Chapter IV: Cases of Study

This chapter aims to present the three projects of Telemedicine in rural areas of Peru as cases of study of this dissertation: the project EHAS-ALIS, the project EHAS-Napo and the project Putumayo. These cases are used in this research to illustrate the effects of politics and the processes of policy making in Peru for the specifics of ICTs in healthcare¹¹⁹.

The content is dense and essential for understanding the details of the projects for an accurate interpretation of the results. The author of this dissertation was a member of the assessment team of the project EHAS-ALIS in 2007 and EHAS-Napo in 2010, and supported the formulation and study of feasibility from the project Putumayo, from January to March 2009.

The formulation, finances, administration, technologies and implementation of these projects as well as the assessment methods were similar as it is shown later in this Chapter. However, these projects had different outcomes, making the results interesting to identify the aspects that were the cause of such as differences.

1. Organization of the Telemedicine Projects

In the three cases of study, three were the main partners in action: university, contributing to the technologies and management of change in rural areas; the NGO supporting with the administration of resources; and the international financial donors. Thus, organization and management has been in charge of the alliance between the NGO *Fundacion EHAS* (Hispano-American Health Link Foundation), the Pontificia Universidad Catolica del Peru through their Research Institute in Communication Technologies (the Group of Rural Telecommunications GTR-PUCP) and the international development organization which supported the initiatives such as European Union (EU), Andean Community of Nations

¹¹⁹ At the closing of collection of information for this dissertation, the three cases of study were given to their beneficiaries represented by the health services in the regional governments DIRESA, and the infrastructure of telecommunications, given as donations to the local governments (municipalities). Thus, the projects as their name indicates do not exist anymore, as they were completely transferred to the property of the state.

(CAN), and few others.

The Group of Rural Telecommunications at the Pontifical Catholic University of Peru (GTR-PUCP), the *Fundacion EHAS*, and their partners of the civil society are working together since 1999 in developing countries of Africa and Central America, had implemented systems of ICT4D¹²⁰ to support the delivery of health care services and health management. All these years of work had been supported by several sources of international cooperation that renew their votes of confidence and trust by the results obtained from the organizational model formed by the alliance among university, civil society and local governments.

The EHAS Foundation

The EHAS Foundation¹²¹ was created from the efforts of the NGO EHAS in 2004 after the consolidation of a commission of patronage supported by their institutional partners: Polytechnic University of Madrid, King Juan Carlos University, Pontifical Catholic University of Peru, University of Cauca and the NGO Engineering without borders. *Fundacion EHAS*, as its name in Spanish, is a non-profit organization, whose purpose is to promote the appropriate use of new ICTs to improve the processes of health in remote rural areas of developing countries.

EHAS started in 1997 as a joint research group between the Polytechnic University of Madrid (UPM) and the NGO Engineering Without Borders¹²². In this year, a group of students of this NGO and the Group of Bioengineering and Telemedicine of the Polytechnic University of Madrid (GBT-UPM) started their joint research oriented to the design of systems and services of communication tailored to the needs of health workers in rural areas of Latin American countries. The results of this research and the need of executive partners in the areas of application of such as technologies originated the creation of a working program which the NGO named the Program EHAS as an agenda to guide the

¹²⁰ ICT4D stands for Information and Communication Technologies for Development.

¹²¹ History and organization of EHAS Foundation can be found in the website <http://www.ehas.org/quienes-somos-3/historia/>

¹²² The NGO Engineering without Borders became in 2006 to the name Ongawa, and started working with projects of improvement of water and sanitation in rural areas of developing countries.

formulation and achievements of projects of ICTs for improvement of public health systems in developing countries.

In this scenario and with the objective of implementing the first pilot project in Peru, two local institutions in Lima became collaborators of the objectives of the Program EHAS: the Pontifical Catholic University of Peru and the Peruvian University Cayetano Heredia. The former through the Faculty of Telecommunications and their Group of Rural Telecommunications (GTR-PUCP) acting as a technological partner, and the latter through the Faculty of Medicine acting as a medical counterpart. This multidisciplinary team started working in the development of two main lines of action: appropriate technologies of telecommunications and telemedicine services, and the processes of distance learning for training purposes. Then, two projects took place in the Peruvian Amazonia and Andean area with support from the Spanish Agency of International Cooperation for Development (AECID). In the following years, the NGO EHAS found partners in other developing countries of Latin America such as the project EHAS-ALIS including Colombia and Cuba¹²³.

The trajectory of the EHAS Foundation in Peru started in 1999 working together with the Section of Electronic Engineering from the Pontifical Catholic University of Peru (PUCP) through the Group of Rural Telecommunications (GTR-PUCP) as a technological counterpart for research studies conducted from Spain. Between 2000 and 2002, the first part of the Telecommunication network spreading started in Peru, in the province of Alto Amazonas (Loreto) with the objective to implement a low cost solution of communications and assess its impact.

This project provided connectivity to the Provincial Hospital of Iquitos (capital city of Loreto), Yurimaguas and other 40 health

¹²³ The implementation of the Program EHAS in each country was organized to follow five stages as follows: (i) identification, constitution and enforcement of the counterparts (technological, medical and administrative) within the country, (ii) study of concrete needs of information and communication of the rural health workers of the country, (iii) development of a pilot experience in an isolated region of the country, (iv) achievement of the assessment study of impact of the project in population and into the health system in general, and (v) deployment of the technologies and services of the Program EHAS through all the country. At the moment, the EHAS Foundation holds active projects in Peru, Guatemala, Colombia, Ecuador and Cuba.

establishments in Loreto in two categories: health centers (HCs) and health posts (HPs)¹²⁴. There were three criteria for the selection of Alto Amazonas as a field of intervention: geographical condition to try with radio applications, extended territory without pavement roads (95% of health centers were only accessible by fluvial transportation), and it has important lacks of infrastructure of telecommunications as only two establishments had land lines installed as a basic service of telephony to connect with the Regional Hospitals into the city (EHAS-ALIS 2002: 1-5). In 2000, EHAS started projects in common with the Telematic Department at The University of Cauca (Colombia); and in 2003 with Cuba through the Center for Informatics Development in Public Health CEDISAP¹²⁵ and the National Center in Information and Medical Sciences INFOMED¹²⁶.

After these experiences, in 2004, the partners of the NGO EHAS decided to constitute the EHAS Foundation based in a participative trustee fund (with contribution of the patrons of the foundation) constituting a board with the representatives of the partner institutions to promote its legitimate integration to the scientific community. The EHAS Foundation focuses on the diffusion of the results of the achieved projects and the spreading of knowledge and experience in ICTs for health¹²⁷. The aims of the EHAS Foundation are two as follows: (i) to route the support of international cooperation in ICTs applied to the health; and (ii) to link research, training and development of the information society to provide the means for improvement of the health sector in Hispano-American and other developing countries¹²⁸.

¹²⁴ Categories of health establishments in Peru from lower level of attention to regional attention: health posts, health centers and regional hospitals.

¹²⁵ CEDISAP: Centro para el Desarrollo de la Informática en la Salud Pública- Cuba (Center for Informatic Development in Public Health).

¹²⁶ INFOMED :Centro Nacional de Información en Ciencias Médicas- Cuba (National Center in Information and Medical Sciences).

¹²⁷ The foundation also promotes international participation in the discussion of ICTs for health and education for development and dedicates efforts to guide students of engineering to achieve their theses projects in topics related to development of appropriate technologies for delivery of health care services and distance learning education.

¹²⁸ After many years of committed work with the development of the most disadvantaged areas of Latin America, the EHAS Foundation was awarded with the Ashden Award 2003, the first prize in the

The Group of Rural Telecommunications (GTR-PUCP)

GTR-PUCP was founded in 1998 and it is a research group with facilities located at the campus of the University. Its organization has been formed and supported by the Faculty of Sciences and Engineering of the Pontifical Catholic University of Peru through the Section of Engineering of Telecommunications. GTR-PUCP is a group of professors, professionals, current and graduated students and researchers dedicated to the development and promotion of the rural telecommunications in Latin America, as a way of facilitating sustainable human development in rural environments.

GTR-PUCP is a multidisciplinary team committed to the research, development, application, analysis, evaluation of impact and promotion of ICTs and contribution to the improvement of the standard of living of marginal communities which have none or limited access to communication media, with emphasis in those located in the rural environment¹²⁹. Their goal is to become one of the leaders in development of appropriate and innovative low-cost technological solutions in the field of rural telecommunications and to be recognized as a national and international reference in the area of ICTs for human development¹³⁰.

One of the strategies of GTR-PUCP to spread the use of ICTs for social inclusion and improvement of delivery of public services is through the enforcement of research groups within the country and overseas and empower them within the knowledge to spread the technologies in their own local environments and promote their self-development. Their purpose is to develop technical expertise in different zones of intervention

Stockholm Challenge in 2004, the first prize from the Abbot Foundation to the Cooperation for Health in Iberoamerica in 2005, and the prize to the Solidarity from the Social Council of the Polytechnic University of Madrid in 2006. Up until now, EHAS keeps working on the improvement of communication systems and in the possibilities to install wireless systems of tele-diagnosis and other services of telemedicine. Work related to research and development of new applications are always done in collaboration with partners around the world which are the experts in their fields and always doing efforts for putting academic research at the service of humanity.

¹²⁹ Their objectives are as follows: to contribute to the reduction of the digital gap in rural and isolated areas; to act as facilitators of several social actors which aim to contribute to the improvement of standard of living for isolated populations; to contribute towards human development through implementation of accurate and appropriate ICTs; and to identify, formulate, plan, accomplish, spread and promote opportunities and projects towards social inclusion.

¹³⁰ Website of the Group of Rural Telecommunications <http://gtr.telecom.pucp.edu.pe/>

at different levels and explore the results towards improvement of their services offered for rural areas¹³¹. Thus, the experience of research groups liaised with projects of development has been transferred little by little by working together and also by delivering funds for joint research projects with the National University San Antonio Abad of Cusco (UNSAAC), National University of Ica (UNICA), Private Technical University of Loja, Ecuador (UTPL) and the NGO Intermediate Technologies for Development Group (ITDG) through their Centre of Demonstration and Qualification in Appropriate Technologies (CEDECAP) in Cajamarca.

1.1. Tree of Problems of Telemedicine Projects

This tree of problems (Figure 4.1) was designed in a participative workshop back in 2002 prepared by the team of GTR-PUCP and the EHAS Foundation for the study of diagnostic of needs of the population for the formulation of the EHAS-ALIS project. The tree of problems is a tool to understand the reasons of pertinence, priority and accuracy on the implementation of a communication network.

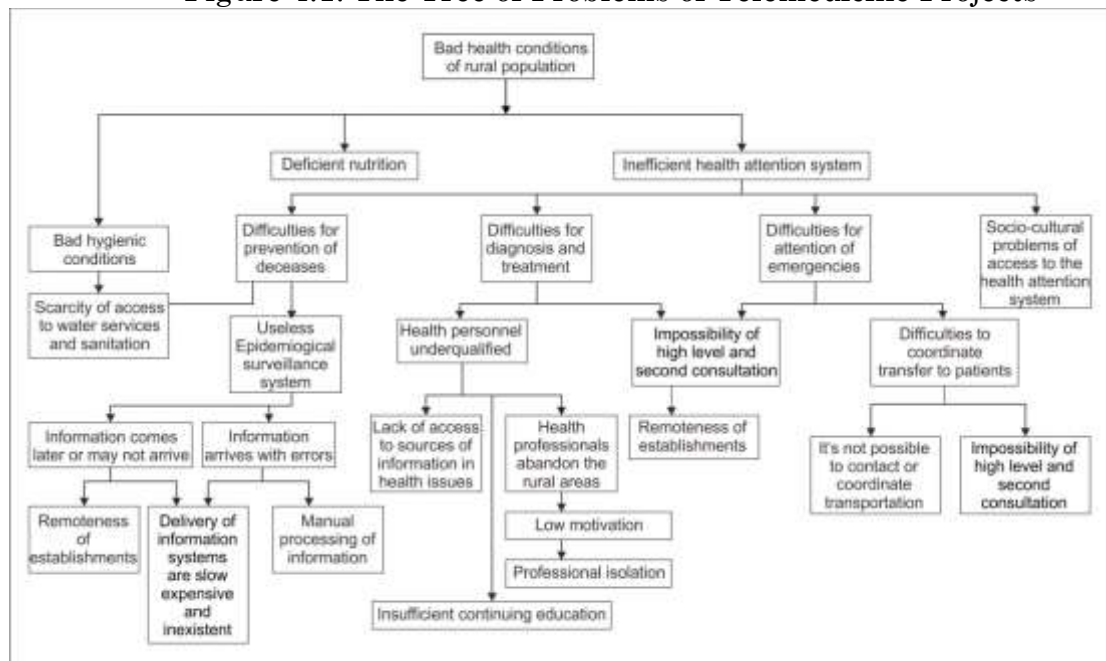
This tree informs about the health conditions of population and the environmental conditions that affected them. In a second level of analysis its shows how users recognized the limitations of the system towards prevention and capacity of diagnosis, and also the capability of resolution of the health workers.

Since this tree was composed with the participation of the technicians and medical personnel, it also evidences their self-perception of the system. They also agreed on considering socio-cultural differences in a separate place, due to the special believe of Amazonian population regarding the concept of health especially about reproductive health, prevention on cervical cancer, believe in medical care and needs during pregnancy, puerperium and health of the just born children. Also

¹³¹ GTR-PUCP works on four main lines of research: (i) development and innovation of telecommunication technology to serve the necessities of the rural sectors of developing countries, (ii) strategies of change management which ensure the technological transfer and appropriation to the communities of the rural sector, (iii) study the impact evaluation of the appropriate technological projects developed and sustainability strategies that support the extended networks, and (iv) energy solutions as in most of places there is no electricity and systems should be designed as self- sufficient.

considering their particular beliefs about vaccination, immunization and usage of chemical medicine instead of natural products.

Figure 4.1. The Tree of Problems of Telemedicine Projects



Source: Formulation of the project EHAS-ALIS GTR- PUCP 2002, p.17.

1.2. The Project EHAS- ALIS (2003-2006)

The EHAS-ALIS Project started in October 2003 and continued until December 2006 as a product of the initiative of the partners of the NGO EHAS¹³² with their partners in Peru, Colombia and Cuba as a consolidation of previous successful experiences in ICTs for health in these countries. The satisfying results promoted further development in research and activities to extend the networks and trying to find technological solutions for improvement of quality of the services and improvement of the living of health workers in the health centers and health posts as well as users of the health services in rural areas.

The main objective of the project EHAS-ALIS was to contribute to the improvement of health care systems in rural areas of Latin American Countries through the implementation of telecommunication systems in 12 health establishments in Cusco (Peru), 12 locations in the Pacific Coast of Colombia and 16 stations in health centers in Guantanamo (Cuba).

¹³² The NGO EHAS became the EHAS Foundation in 2004, and their main objective was to follow the strategies of the Program EHAS.

Since results in the three countries differ, for the purpose of this dissertation, the data used for the analysis corresponds to the installations of the project EHAS-ALIS in Peru (12 health establishments).

1.2.1. Facts about the Region Cuzco

The Region Cuzco represents the origin and history of the Inca's Emporium and has been recognized in the world for having a majestic architecture and archaeological heritage. Cuzco is the fourth biggest region of Peru due to its extension and is located in the frontier between the Andean geography and the Amazonia. The Region Cuzco has Cuzco as a capital city and is located in the south-east area of Peru (Figure 4.2).

Figure 4.2. Map of the Department of Cuzco-Peru



Source: adapted by author

Location of the Project EHAS-ALIS: Acomayo and Quispicanchi

The project EHAS-ALIS took place between 2003 and 2006 in the localities of Acomayo and Quispicanchi as peripheral areas from the department of Cuzco (Figure 4.2). These localities are between the Andean and Amazonian region with difficulties for access due to the geography of the terrain and unpredictable weather. These regions were chosen for the project EHAS-ALIS as a pilot program to demonstrate the power of the wireless networking and to test the capacity of replica in the Andean area

to continue the expansion of the networks toward the Amazonian side with documented experience.

Population in the Region Cuzco

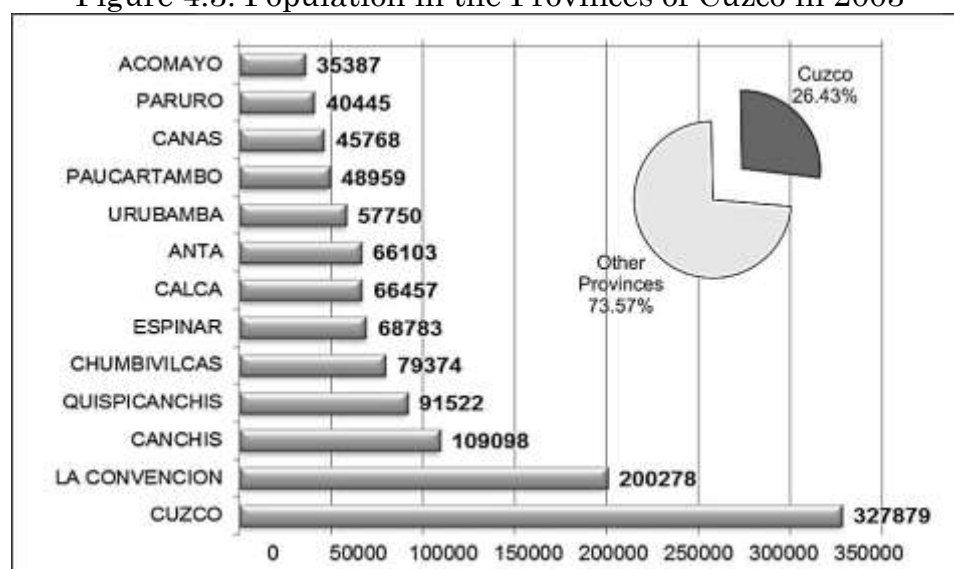
According to the National Census of population in Peru, in 2002 in the locality of Acomayo from the total of 35387 inhabitants 47.4% were living in urban areas and 52.6% were living in rural towns with an average of 28.85 inhabitants per square km. The locality of Quispicanchi had only 29.9% of urban population from a total of 91522 inhabitants, and more than 70% were living in rural areas representing about 63,000 people (Table 4.1, and Figure 4.3).

Table 4.1 Density of Population in the Provinces of Acomayo and Quispicanchi in Cuzco-Peru in 2003

Province	Capital	Surface (km2)	Population Density
Cuzco	Cuzco	72104.41	16.25
Acomayo	Acomayo	948.22	28.85
Quispicanchi	Urcos	7862.6	10.45

Source: adapted by author using data from ASIS 2005, pp. 14-19.

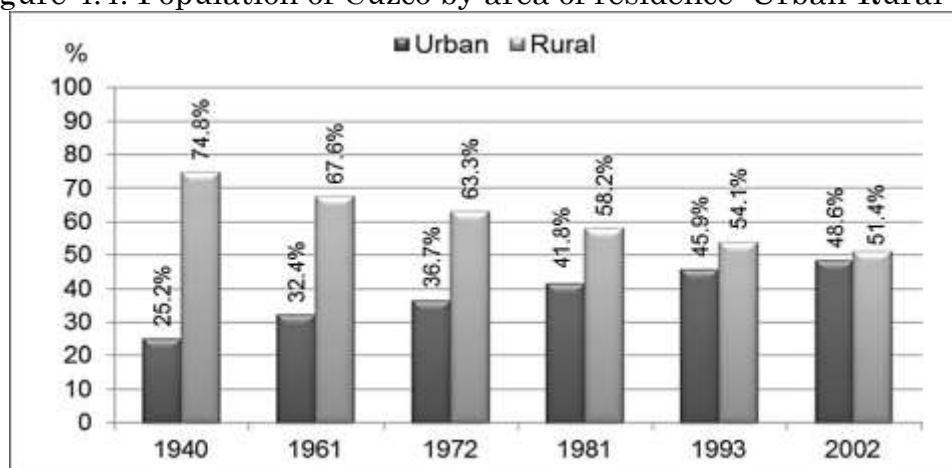
Figure 4.3. Population in the Provinces of Cuzco in 2003



Source: elaborated by author with data from ASIS 2005, p.19.

By 2003, Cuzco had 50% of its population living in rural areas, probably as an effect of the massive migration from rural to urban areas that occurred during the decade of terrorism in Peru in the 1980s (Figure 4.4).

Figure 4.4. Population of Cuzco by area of residence: Urban-Rural 2003.



Source: elaborated by author with data from ASIS 2003, p.80.

Poverty in the Region Cuzco

In Peru, during the decade of the 2000s, about 42% of the households were poor. The situation of poverty in Cuzco was at 63.6% of the households and 24.4% are in extreme poverty (EHAS-ALIS 2002: 5). The Fund of Cooperation for Development of Peru (FONCODES) had developed a list of levels of poverty according to the districts of Peru. In 2002 Acomayo appears as poor on three districts: Acos, Mosoc Llacta and Sangarara, and extreme poor in four districts: Acomayo, Acopia, Pomacanchi and Rondocan. Quispicanchis appears as poor on six districts: Urcos, Andahuaylillas, Camanti, Huarro, Oropesa and Quiquijana, and extreme poor in the other six districts that conform their jurisdiction: Ccarhuayo, Ccatca, Cusipata, Marcapata and Ocongate.

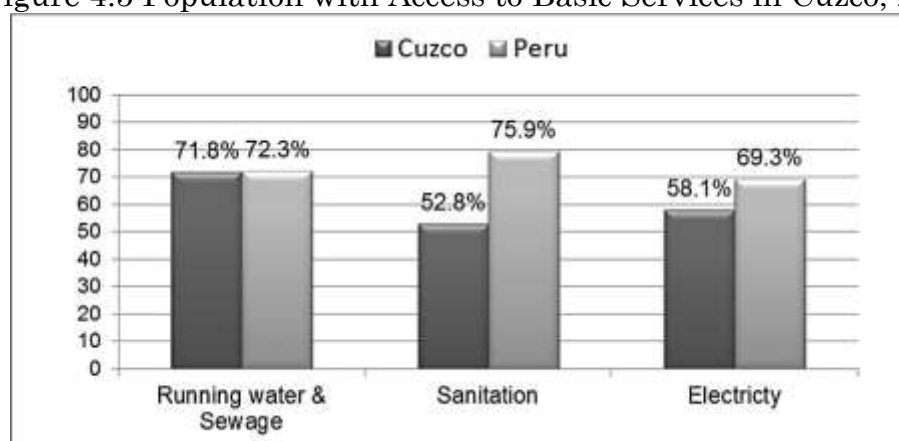
In Peru, EHAS-ALIS had installations in the health centers and health posts of the districts of Acomayo in poverty (Acos and Sangarara) and extreme poverty (Acomayo, Acopia and Pomacanchi); and the districts of Quispicanchis in poverty (Urcos and Andahuaylillas) and extreme poverty (Cusipata, and Ocongate).

Access to basic services in the Region Cuzco

In 2002, almost 72% of dwellings had access to running water (53% from inside of the houses). From that 53% only 47% had access in rural areas and 23% of population consumed water from natural fountains or rivers, becoming 34% in rural areas (Figure 4.5). According to the INEI,

during the period 1993-2007 there was an increasing number of dwellings with access to water inside (4.3%) and outside (7.3%).

Figure 4.5 Population with Access to Basic Services in Cuzco, 2002



Source: elaborated by author with data from ASIS 2003, p.92.

About access to electricity, in 2002 only 58.1% of population had access to electrification and electric services attended by a private company as national services were sold to private enterprises back in 1993. In the same year, the national access to electrification services rose from 58.1% to 63.9%, but the access for rural areas remained in 42% as in 2003 (ASIS 2008: 110.).

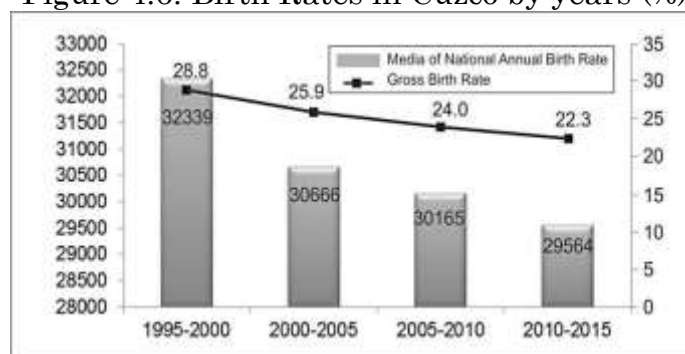
1.2.2. Situation of Health in the Region Cuzco

The administration of health in the Region Cuzco is in charge of the National Direction of Health of Cuzco (DIRESA-Cuzco). It is divided in four networks or health services: North Cuzco, South Cuzco, *Canas-Canchis-Espinar* and *La Convencion*. It accounts with two departmental hospitals: the Hospital of Support to the Department of Cuzco (Regional Hospital) and the Hospital Antonio Lorena, both in Cuzco City.

Birth rate

The gross rate of birth in Cuzco had been decreasing significantly compared to the births until the year 2000. The INEI projects a decreasing tendency for the future years as a consequence of the spreading of contraceptive methods for birth control. Also, the increasing literacy for women and the age of getting a couple is starting at younger age than past generations. At the provincial level, most of provinces in Cuzco are under the national media of birth rates (20.7%) (ASIS 2008: 99) (Figure 4.6).

Figure 4.6. Birth Rates in Cuzco by years (%)

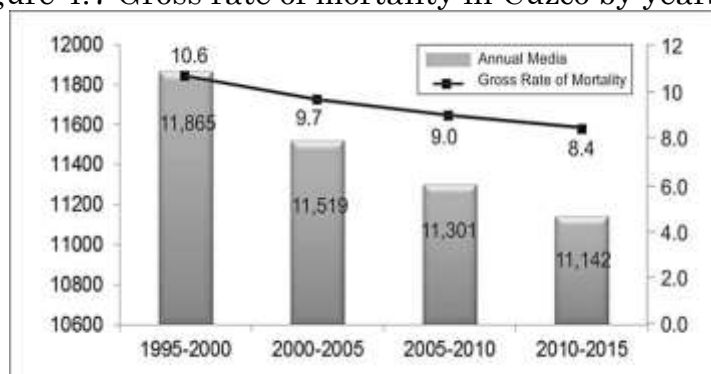


Source: elaborated by author with data from ASIS 2003, p.83.

Mortality rate

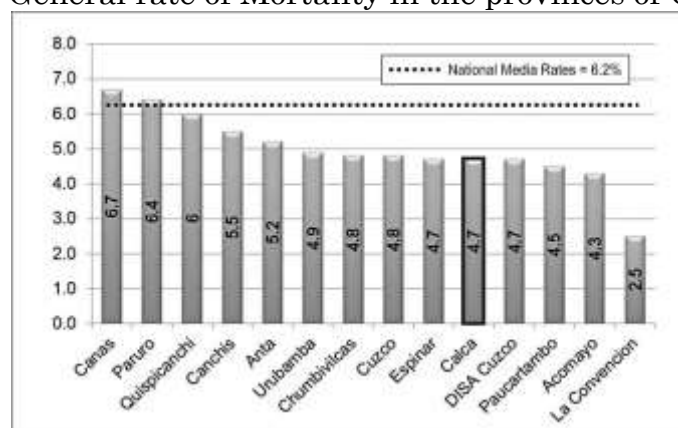
The gross rate of mortality in Cuzco evidences that the media of deceased people a year is about 9.7 per every 1000 inhabitants in the past 10-15 years, with a decreasing pattern far from the national media of 6.2 for every 1000 inhabitants (Figures 4.7 and 4.8).

Figure 4.7 Gross rate of mortality in Cuzco by years (%)



Source: elaborated by author with data from ASIS 2003, p.85.

Figure 4.8 General rate of Mortality in the provinces of Cuzco, 2002.



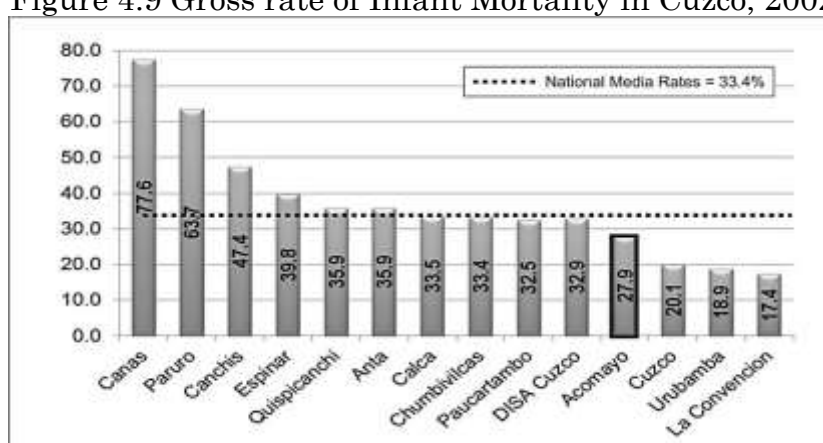
Source: elaborated by author with data from ASIS 2003, p.86.

Figure 4.8 shows the General rate of Mortality in the provinces of Cuzco, where Acomayo appears below the media with 4.3 per every 1,000

inhabitants, and Quispicanchi with a lower level of density in population and a higher level of extreme poverty, reflects with 6 per every 1,000 inhabitants, getting close to the national media.

In 2003, the gross rate of Infant Mortality in Cuzco was of 33.4 per every 1,000 birth alive, locating Cuzco as a population in high risk. In 2002, 62% of the provinces of Cuzco were over the national media, and in 2006 the media of the national gross rate was 20 per every 1,000 inhabitants which evidences an improvement in the national levels, but keeps rural populations at high risk.

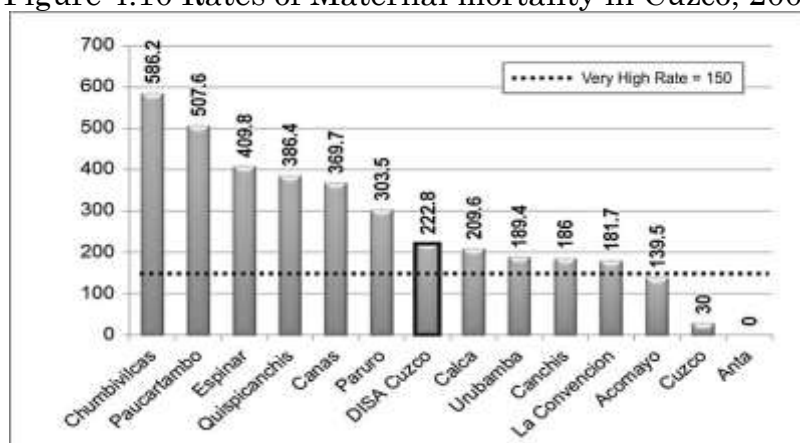
Figure 4.9 Gross rate of Infant Mortality in Cuzco, 2002



Source: elaborated by author with data from ASIS 2003, p.87.

Maternal Mortality rates in Cusco are considered at high risk due to the highest rank on the provinces of most population. Quispicanchi is considered between the provinces of a higher risk.

Figure 4.10 Rates of Maternal mortality in Cuzco, 2002



Source: elaborated by author with data from ASIS 2003, p.89.

Diseases under epidemiological surveillance

In Peru, since 1995 the National Plan for elimination of Measles

and Rubella promotes periodical campaigns for prevention with the purpose to maintain the level of distribution of the vaccination and maintaining active the processes of epidemiological surveillance of fever, infectious and eruptive diseases.

Poliomyelitis and Acute Flaccid Paralysis have been watched by the authorities maintaining levels under the risk established by the WHO and the indicated numbers by the National Direction of Health. Still, there is a high level of prevalence in the provinces in Cuzco, being the most sensitive and the poorest districts under high risk in 2002. Malaria¹³³, Yellow fever¹³⁴ and other epidemics such as Hepatitis B, Pertussis (*Tos Ferina*) and Neonatal Tetanus, Bartonellosis, Leishmaniasis, Tuberculosis, HIV/AIDS¹³⁵, Diarrhea, and Acute Respiratory Diseases which also represent high risk for the rural inhabitants.

1.2.3. History of the Project EHAS-ALIS

In June 1999, there was the celebration of the Summit of Rio de Janeiro between the Presidents of the States of Latin America and the Government Authorities of European Union giving a start to the Program Alliance for the Society of Information (ALIS for its initials in Spanish) with the objective to extend the benefits of the Society of Information to all citizens in Latin America and reduce the digital divide by promoting dialogue and cooperation between both regions. The Program ALIS provided support to hundreds of projects of development from 1999 until 2008 in topics of e-Government, e-education, e-Inclusion and e-Health as well as cultural diversity.

¹³³ In Cuzco in 1997, there were 23,950 cases of Malaria. There were a series of climatic changes and unusual weather conditions, increasing of the migratory flow from the rural to the urban due to a complication of the economic moment of the region and a terrible neglect for watching after the distribution and conservation of vaccines in the most isolated areas. By January 1998 the crisis seemed to be controlled down to 500 cases, but reaching peak in October with more than 1600 cases. From 2000 until 2002 the levels varied but under 50 cases a year.

¹³⁴ Yellow Fever has two patterns of transmission: urban yellow fever and the forest yellow fever with two different viruses to be attacked. Cuzco belongs to the basin of the Urubamba River, and is in the area of high risk. In 1999 there were two cases in Echarati and Pichari. In 2000 one case in Paucartambo, in 2001 there was no case, and in 2002 there were eight cases in Echarati (La Convencion). There are vaccination plans, but not yet eradication.

¹³⁵ AIDS stands for Acquired Immunodeficiency Syndrome, and HIV for human immunodeficiency virus

ALIS- Alliance for the Society of Information

The Program ALIS started from the political dialogue promoted by the Summit of Rio de Janeiro in 1999 between the Presidents of the Latin American States and the Governors from European Union with intention to include these developing countries and extend them the advantages of the participation in the Society of Information toward cohesion of both regions. This program is an initiative of International Cooperation from European Union that aims to enforce the relations with Latin America in the issues related to the Society of Information. ALIS was created by a decision of the European Commission in December 2001 with a budget of 77.5 million Euros with an initial donation of EU of 63.5 million Euros and the rest from associates to the program¹³⁶.

The Program ALIS intended to integrate the maximum number of actors and users of the Society of Information from EU members and the 18 countries of Latin America in order to respond to the local collective needs, promote dialogue about policy and regulation and increase the capacity of interconnection between the community of academics and non-governmental organizations from both regions.

The Program ALIS and the Project EHAS-ALIS

In the context of the Program ALIS from EU, the proposal of the Project EHAS-ALIS was presented by 12 institutional partners from 12 countries from Europe and Latin America which acted as medical, technological and executive counterparts for the fulfillment of three telemedicine networks in the rural areas of Peru, Colombia and Cuba.

The project EHAS-ALIS was led by the Group of Biotechnology of the Polytechnic University of Madrid (GBT-UPM) and received financial aid from the program ALIS of European Union for 3.5 million euros for 3 years of implementation and it had installed telecommunication systems

¹³⁶ The Program ALIS pursued five objectives: (i) to incentive international cooperation between European and Latin American members; (ii) to facilitate the integration of Latin American countries to the Society of Information, (iii) to promote dialogue between all the actors and users of the Society of Information, (iv) to improve the interconnection between communities of researchers in both regions, and (v) to respond to the needs of citizens and local communities (EHAS Foundation website).

in 36 establishments of three health care networks in Cauca (Colombia), Guantanamo (Cuba) and Cuzco (Peru). The project was fulfilled between October 2003 and December 2006, and data for the assessment of the project has been collected by December 2007¹³⁷.

1.2.4. Partners of the Project EHAS-ALIS

The partners of the Project EHAS-ALIS were associated in three big groups according to the counterparts that they had represented for their activities and responsibilities in the project: executive partners, technical counterparts and medical counterparts. The organization of partners by the nature of their activities facilitated the coordination of activities related to a specific objective.

The Polytechnic University of Madrid (UPM) and the NGO Engineering Without Borders were the executive partners and were in charge of the administration and report to the donors as experts on implementation of technologies in rural areas of Latin America. International organizations acted as advisers and executive partners such as the Andean Organism of Health (ORAS), the London School of Hygiene and Tropical Medicine from England, the University Carlos III of Madrid (UCIIM) and the Foundation for Health Cooperation in International Health from the Institute of Health Carlos III (ISCIII) from Spain.

Additionally, there were teams of executive, technological and medical counterparts in each country. In Peru there were the Pontifical Catholic University of Peru represented by the Group of Rural Telecommunications (GTR-PUCP) as an executive and technological partner, and the Peruvian University Cayetano Heredia (UPCH) as a medical partner. In Colombia there was the Cauca University (UC) from Colombia as an executive and technological partner. In Cuba there was the Center for Development of Public Health Informatics (CEDISAP) as an executive and technological partner, and the Telematic Network of Health of Cuba (INFOMED) as a medical partner.

¹³⁷ One year after the end of the implementation process and the end of technological transfer processes

1.2.5. Geographic Location of the Project EHAS-ALIS

The project EHAS-ALIS took place in the localities of Acomayo and Quispicanchi as peripheral areas from the Region Cuzco (Figure 4.11).

Figure 4.11 Province of Acomayo and Quispicanchi in Cuzco



Source: adapted by author

The difficulties for penetrating in the area of intervention were the scarcity of paved roads and the geographic situation of hills and mountains in the basin of the Urubamba River, with concaves and convexes on the breaks of the inter Andean-Amazonian horizon of the area known as the valley of Urubamba. Also, the situation of scarcity of electricity obliged the health centers to rely on temporary lamps and expensive generators, depending of combustible which was costly and scarcity of transportation.

1.2.6. Services offered by the Project EHAS-ALIS

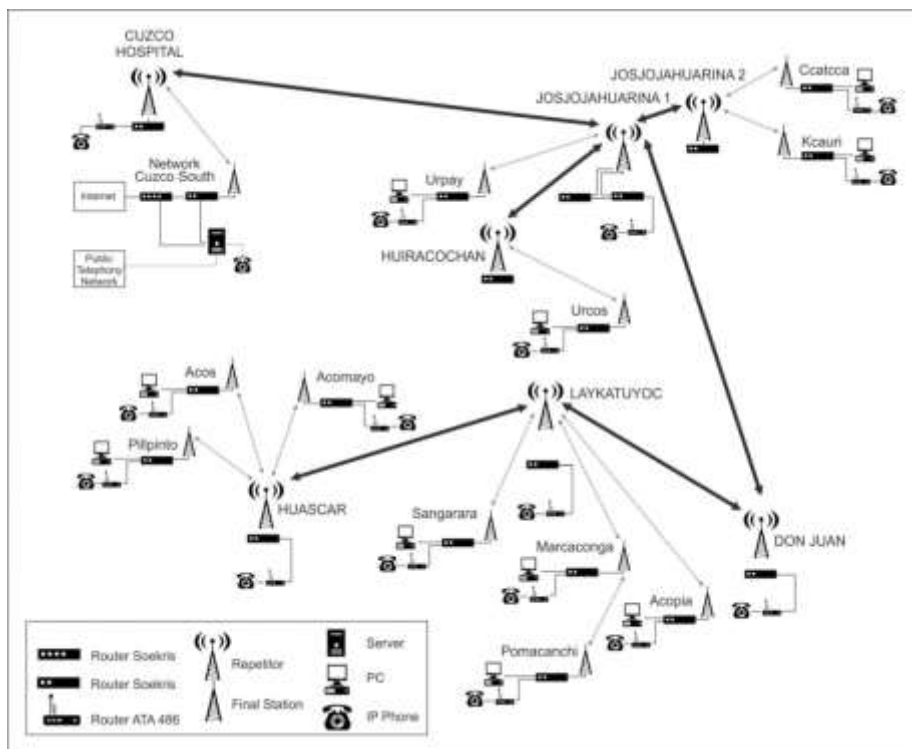
The Network of the Project EHAS-ALIS (Figure 4.12) was installed in several districts of Acomayo and Quispicanchi to provide communication means for the health workers for the coordination of the transfer of patients for emergencies, births and diseases and to increase the capacity of resolution of the health centers and health workers.

Table 4.2. List of establishments and donation of EHAS-ALIS

Establishments of the EHAS-ALIS network	Equipment/ Functions
1. Cuzco- South Network	Router, client station, server
2. Urcos	Router, client station
3. Urcay	Router, client station
4. Ccatcca	Router, client station
5. Kcauri	Router, client station
6. Acopia	Router, client station
7. Pomacanchi	Router, client station
8. Marcaconga	Router, client station
9. Sangarara	Router, client station
10. Acomayo	Router, client station
11. Acos	Router, client station
12. Pillpinto	Router, client station
Cusco Regional Hospital	Repetitor (router+antenna), client station
Josjohuarina 1	Repetitor (router+antenna), client station
Josjohuarina 2	Repetitor (router+antenna)
Huiracochan	Repetitor (router+antenna)
Don Juan	Repetitor (router+antenna), client station
Laykatuyoc	Repetitor (router+antenna), client station
Huascar	Repetitor (router+antenna), client station

Source: Study of Assessment of the Project EHAS-ALIS 2007, p.20.

Figure 4.12 Wireless Network Design for the Project EHAS-ALIS in Peru



Source: adapted by author using data from EHAS-ALIS 2003-2006, p.7.

Technologies

The project EHAS-ALIS was implemented in a different moment of technologies than today. At that time, wireless technologies were costly and hardly developed in a challenging environment where geography, weather, and resources of infrastructure such as access to electricity were significant barriers to overcome. Thus, the challenge was adapting low cost wireless connections for long distances. These technologies were not experimented for rural areas before, justifying the need of associating with technological partners capable of researching and producing their own hardware and software for wireless connections.

Wireless technologies have been implemented to offer services of communication by voice (IP phones for doing calls into their private network using IP numbers, similar to a regular local phone extension number) and Internet connection. Wireless technologies provide access to connectivity without using cables of optical fiber in every terminal (but partially) instead, saving the number of terminals and replacing them for antennas to transmit the connection and signal. In this environment, users of the communication systems are named “clients”, and they have equipment such as radio or IP phone, personal computer, office software (text processor, spreadsheets, etc.), e-mail software and Internet navigator. The operative system installed is based in Linux technology (free software licenses), and printer.

1.2.7. Objectives, Strategies and Activities of the Project EHAS-ALIS

To understand the strategies and objectives of this project is important to locate the formulation and execution to the context in Latin America where the access to internet and ICTs for public administration and for the public in general was scarce and restricted in rural areas due to limitations in availability of optical fiber and electricity.

The Objectives of the project EHAS-ALIS

The main objective of the Project EHAS-ALIS was addressed to demonstrate the capacity of improvement of the public health system of primary attention in the rural areas of Latin America through use and application of appropriate technologies of communication and access to

information to streamline the processes of health management and the technical capability of health workers¹³⁸.

The Strategy EHAS-ALIS: three components and four subprojects

The strategy of the Project EHAS-ALIS was designed to address the objectives and activities in three countries by sub-projects with specific results designed according to the diagnostic of needs accomplished on each region. Trusting their local partners and providing adequate and standardized training from the institutional teams to the local health centers, the administration of EHAS-ALIS conveys the intention of ensuring technological transfer toward the sustainability of the project.

The project provided the following components as a complement to the existing public health systems: (i) donation of infrastructure of telecommunications for voice and internet navigation services, (ii) implementation of services of information and formation such as platforms for distance learning and training, and (iii) improvement of the processes of health management for the coordination of emergencies, supplies and management, second opinion and the system of reference and de-reference of patients.

The four sub-projects EHAS-ALIS

The Project EHAS-ALIS was oriented to accomplish four sub-projects to be accomplished in Peru, Colombia and Cuba in different timing but within the three year framework programmed by EU for the execution. These sub-projects had specific objectives, activities, results and indicators to measure the accomplishments and predict overcoming difficulties and bottle necks.

As indicated in Table 4.3, there were four sub-projects for the accomplishment of the project EHAS-ALIS (Table 4.3). The sub-project no. 1 was “EHAS Communication Networks” aimed to group the technological activities for installation of the communication network.

¹³⁸ This objective came from the conception of the project as a pilot experience and oriented toward the demonstration that using ICTs of low cost is possible to improve the quality of health attention of isolated populations, keeping a cost-benefit relation positive for the health system. The specific objective of the project was to improve the processes of health management and technical capacities of the health workers in the rural areas of Cuzco (Peru), Cauca (Colombia) and Guantanamo (Cuba).

Table 4.3. Activities of the Project EHAS-ALIS

Expected Results(as in 2003)	Activities
Sub-project 1: EHAS Communication Networks	
R1.1 Adaptation of the systems of communication for their deployment in rural areas	Adaptation of the VHF and HF radio system to the wireless communication Adaptation of the system of Telemedicine Wi-Fi
R1.2 Installing of 3 networks of communication	Design of the networks Logistic deployment Installation of networks Testing and certification Presentation of the project to the communities
R1.3 Training of users of the EHAS systems	Design of the training courses Remote monitoring of users
R1.4 Implementation of maintenance systems and repair of the communication networks	Selection of technicians and training for maintenance on each locality Integration and run of the maintenance systems
Sub-project 2: EHAS Services of information	
R2.1 Adaptation of the tools for remote training	Study, design and adjustment of the model of information and contents Design of online tools for remote monitoring Design of online tools for information management for epidemiologic surveillance Testing and failure record
R2.2 Created the contents of the training courses for health workers & technicians	Design of the training courses and documents of frequent asked questions (FAQ's) Design and spread of bulletins of health
R2.3 Giving the courses of remote training to the health personnel	Design of the procedures of management for services of training and exchange of info. Spreading of the training courses by e-mail Design of the processes of remote access for scientific information
Sub-project 3: Management of health services using the EHAS Networks	
R3.1 Improvement of the system of evacuation of acute case patients	Study of weaknesses and strengths of the system of evacuation of patients, design and implementation of the improvement proposal Design and implementation of remote monitoring
R3.2 Improvement of the capacity of resolution of the health centers in isolation	Coordination and monitoring of organization change Testing and situational training
R3.3 Improvement of the system of reference and de-reference of patients	Identification of current problems Design, implementation and monitoring of a model of specialized attention for the system of reference
R3.4 Changes to improve the system of transmission of reports and information	Study of the systems of epidemiologic information of each region and proposal/testing of changes
R3.5 Improvement of the system of medication supplies	Study, correction and monitoring of the current systems of delivery and supplies using ICTs
R3.6 Creating a system of informal communication for the rural health care personnel	Design a voice system using radio and IP telephone to promote communication between health workers to overcome the sensation of professional isolation
Sub-project 4: Assessment of impact and diffusion of results	
R4.1 Scientific monitoring of the activities of each subproject	Technical auditory Design, implementation and monitoring of a portal
R4.2 Assessment of the results of the project and the technical, economical and institutional viability	Trace of a baseline previous to the intervention Design and implementation of an assessment of results and assessment of impact of the project
R4.3 Spreading of the results in the community of the telecom sector in Latin American countries	Writing of a memorial document Organization of international online meetings and forum for discussion Promotion of use of the remote services between health workers

Source: adapted by author from the Formulation of the Project EHAS-ALIS 2002, pp. 59-77.

The sub-project no. 2 was “EHAS Services of information”, and it associated activities related to use of telematic tools for remote training and distance learning of the health personnel. The sub-project no. 3 was “Management of health services using the EHAS Networks” and it associated activities related to the progressive and controlled introduction of the use of tools developed in the sub-project no, 1 and 2. The sub-project no. 4 was “Assessment of impact and diffusion of results” which grouped the assessment activities and the scientific, technical and medical monitoring of the use and impact of these technologies.

1.2.8. Beneficiaries of the Project EHAS- ALIS

The beneficiaries of the project were considered in two groups of influence: the first group constituted by the population attended by the rural health establishments, and the second group constituted by the health personnel in charge of management and maintenance of the equipment and use of the systems for the public service. This second group included all health workers such as nurses, technical and medical personnel from the health establishments.

The beneficiaries of the project EHAS-ALIS in each country were estimated as follows: in Peru, in the Province of Acomayo and Quispicanchi there were 20 health establishments to be connected, five doctors, three obstetricians, five nurses, and 18 nurse technicians (Population attended: 55,546 inhabitants). In Colombia, the network connected the municipalities of *Silvia* and *Jambaló* with 20 health establishments, five doctors, two obstetricians, four nurses, twelve midwives, four odontologists, three odontology technicians, and 18 nurse technicians (Population attended: 53,433 inhabitants). In Cuba, the Province of Guantanamo was connected with 20 health establishments, 20 doctors, one obstetrician, 17 nurses and four nurse technicians (Population attended: 20,000 inhabitants) (EHAS-ALIS 2002: 1-10).

1.2.9. Assessment of the Project EHAS-ALIS

The project was assessed in 2007, and had contributed with the installation of three components: the installation of infrastructure of

telecommunication, the development of services of information and formation of personnel, and the improvement of the processes of health management. The assessment of this project consists of an analysis of the impact of the installation of these services in the processes of health attention.

Methodology of the Assessment of the Project EHAS-ALIS

The methodology of evaluation was a standardized model for the three countries but individual assessments as results per country (Peru, Colombia and Cuba). For the purpose of this particular research, only the results correspondent to the case of Peru was considered.

The Team of Evaluation

The team of evaluators headed by Valentin Villarroel Ortega, Chief coordinator of the project EHAS-ALIS¹³⁹, had prepared a list of materials for addressing the needs of information of this study:

- Questionnaire for 96 users (control groups and final assessment);
- Semi-structured interviews and in-depth interviews for 65 persons (users, local and regional managers, health managers and team members of the project);
- Preparation of focus groups per country to be assessed;
- Direction of six workshops using Quick Participative Diagnostic technique, for users (health workers) and technicians; and
- Observation.

1.2.9.1. Impact of the Project EHAS-ALIS

This analysis of impact studied the effects of the project EHAS-ALIS in the micro-network of health of Cuzco and the health system. The results of this project are reflected in the document Report of Assessment of the Project EHAS-ALIS (EHAS-ALIS 2007). This assessment was

¹³⁹ The assessment was coordinated by the NGO Engineering Without Borders. The commission of assessment was accounted with at least two members of the executive teams from each country: Valentin Villarroel Ortega and Maria Camino Villacorta. From Peru, the representatives were Jamine Pozu from the medical counterpart of the University Cayetano Heredia (UPCH), and from the technical counterpart it was Jaime Vera (Coordinator of GTR-PUCP) and Paola Sanoni, author of this dissertation. The collection of samples in-situ, focus groups and workshops has been done in September 2006 in the three countries. Peru was the first country on collecting data and interviews. All data was collected in-situ due to the requirements of the methodology to accomplish the objectives of the donor (EU).

conducted in every country between February and April 2007 in Peru, Colombia and Cuba.

As a general result, the specific objective of the program was achieved: improvement of the processes of health management and technical quality of the health workers of rural areas in the department of Cuzco in Peru, the department of Cauca in Colombia and in Guantanamo, Cuba. Also, the impact of the project was positive as the result of the implementation of the networks had good results in health attention, but limited in intensity and extension due to the limitations of time and coverage of the demonstrative nature of the initiative (EHAS-ALIS 2007). Thus, the overall of the project had accomplished the general objective: it has demonstrated the capacity of improvement of the public health system of primary attention in rural areas of Latin American countries through the use of appropriate technologies. Still, there were differences on the degrees of accomplishment per country.

The assessment of impact in health management processes of the project EHAS-ALIS (2007) considered five main areas of impact: (i) impact in health attention and the capacity of resolution, (ii) impact in health personnel, (iii) economic impact, (iv) institutional impact, and (v) impact over policy. The selection of health establishments was limited to 12 stations in Peru which in 2003 represented about 40% of the established network of health centers (EHAS-ALIS 2007).

(i) Impact in health attention and the capacity of resolution

The specific objective of the project was to achieve the improvement in health management and capacity of resolution of the peripheral health establishments. The project had selected the most critical processes and focused on improved them. These processes are as follows: the process of reference and dereference of patients, the process of second opinion for the resolution of doubts about diagnostic and treatment, the process of exchange of administrative, epidemiological and clinical reports, and the management of information about medical supplies. In all cases there was

evidence of improvements and areas of opportunity for further work as indicated lines below.

(i-1) Impact in the processes of reference and dereference of patients

The reference of a patient is the transfer of his attention files from one health establishment to another with higher capacity of resolution. The process of dereference of patients corresponds to the return of the file case to the establishment of origin. The core of these processes is that the medical records of a patient are handy at all times in the establishment where attention is expected to be offered according to the diagnostic and treatment assigned by the health professionals. Therefore, to ensure this processes take place, the coordination and continuity on the exchange of information is important between the establishment of origin and destiny.

In the case of an external consultation, regularly the patient is in charge of transporting him/herself to the destiny of the consultation and the health system is in charge of transporting the medical records to the center of attention. In the case of an emergency, the health system is in charge to coordinate both transfers, giving priority to the patients under any circumstance.

In the project EHAS-ALIS, the improvement of the system of reference and dereference of patients was identified as a priority. According to the study of assessment, the project EHAS-ALIS promoted the improvement of reference and dereference of patients in the following three main aspects. The first aspect is by promoting the use of ICTs for second opinion in the flow of expedients and using electronic instead of physical transmission of data. This aspect gained time in processing and facilitated the participation of health personnel of higher experience in the diagnostic and treatment of patients. The second aspect is using ICTs for facilitating the coordination of the transfer of patients. This aspect reduced time required for the transportation of files instead of waiting for the piles to be grouped before sending as it was in the previous system. The third aspect for improving the process of reference of patients is by sharing vehicles for the remission of patients and documents, and

coordinating the transfers by the phone or e-mail, so the health destination is ready for welcoming the patient with accurate supplies.

Table 4.4. Main indicators of the reference and dereference system to the end of the Project EHAS-ALIS in Cuzco

Indicator	Value
Average of remissions (month)	6.5
Average of urgent remissions (month)	2.3
Average of required time for coordination of a single transfer	31'48"
Average of required time for doing a single transfer	3h54'
Average of costs of a single transfer	21,8€ (~3050¥)
Remissions coordinated using the EHAS-ALIS network	86.8%
Remissions with previous appointment	66.9%
Average of avoided remissions due to the use of ICTs (month)	2.5

Source: Study of Assessment of the Project EHAS-ALIS, 2007, p. 45.

The most common communication means for coordination of remissions in Cuzco was the radio which presents frequent failures. The introduction of the IP phone using ICTs facilitates immediate connection, and had become slowly the most used resource, increasing rates of use toward the end of the project.

Table 4.5. Communication means for coordination of remissions in Cuzco

Indicator	Beginning	End
Radio	88%	50%
Public phone	18%	0
IP Telephone (EHAS)	0	50%

Source: Study of Assessment of the Project EHAS-ALIS, 2007, p. 46.

(i-2) Impact in the processes of second opinion and inter-consultation

The process of second opinion is the consultation and confirmation about patient condition, diagnostic or treatment from a health worker or a professional of health with a specialist or professional of superior capacity of resolution. This process has legal concerns but operates according to the organization of the administrative systems of health in each country.

In the rural areas of Peru, the administrative system protects the right of privacy of a patient precisely by promoting the use of second opinion in the treatment of emergencies instead of sharing the medical records. Thus, in the area of intervention of the project EHAS-ALIS, the second consultation provided solution to the needs of diagnostic and treatment to health workers mainly in the peripheral establishments using the IP phones or radio. The ICTs provided by the project incentives

the use of second consultation more often than before because this system provided immediate response. Thus, administrative consultation gain speed due to the increasing capability of the personnel to address their questionings to the precise areas, without increasing the number of average calls for consultation. This effect is considered as an increasing in the capacity of resolution of the health personnel.

In the case of Cuzco there was a duplication of the number of clinical consultations from an average of 1.3 to 3 per day. The processes of consultation for administrative doubts had also increased by a factor of 3.5 (from 1.2 to 4.2 consultations a month). The favorite communication means for all these consultations was the IP phone system provided by the project EHAS-ALIS (EHAS-ALIS 2007).

Table 4.6. Average of second consultation in Cuzco (per day)

Indicator	Beginning	End	Increase (%)
Number of clinical consultations	1.3	3	131
Number of administrative consultations	1.2	4.2	250

Source: Study of Assessment of the Project EHAS-ALIS, 2007, p. 48.

Table 4.7 Frequency of clinical and administrative consultation in Cuzco (%)

Indicator/Frequency	Clinical consultation		Administrative consultation	
	Beginning	End	Beginning	End
Never	9.1	10.5	9.1	6.3
Sporadically	63.6	68.4	72.7	62.5
Often	18.2	21.1	9.1	31.3
Very often	9.1	0	9.1	0

Source: Study of Assessment of the Project EHAS-ALIS, 2007, p. 48.

Table 4.8 Destination of second consultation in Cuzco
(non-exclusionary answers)

Indicator/Frequency	Clinical consultation (%)		Administrative consultation (%)	
	Beginning	End	Beginning	End
Health Center	50	38.9	60	40
Micro- network (health posts)	0	22.2	60	66.7
Regional Hospital	37.5	33.3	10	0
Other destinations	25	11.1	10	0

Source: Study of Assessment of the Project EHAS-ALIS, 2007, p. 49.

Table 4.9 Communication means for second consultation in Cuzco
(non-exclusionary answers)

Indicator	Clinical consultation (%)	Administrative consultation (%)
In person	10	6.3
Radio	20	25
IP Telephone (EHAS)	65	81.3
E-mail	35	31.3
Mobile phone	0.5	0.6

Source: Study of Assessment of the Project EHAS-ALIS, 2007, p. 49.

(i-3) Impact in the processes of exchange of reports and medical supplies

At the moment of assessment for the collection of data of this report (2007), the e-mail was not considered by any technical manual as an institutional form of delivering information from the health care system in Peru. Therefore, all communications through e-mail means were considered as informal transmissions. Even in practice they were highly used, still they were not considered as formal for administrative, epidemiological and clinical reports. Also, there are some reports that required a signature when officially digital signature was not considered as a formal approval according to the technical norm. Still, from all levels of the health system, the personnel considered the benefits of sending reports using electronic mailing systems provided by the EHAS-ALIS networks.

The users from the health establishments and personnel in charge of transmission of data and reports recognized the reduction in the number of trips and costs saved. For example, from the Ccatcca Health Center to the Regional Hospital, the doctor had to make two trips a month but now only one, and the cost of that trip alone was about 350 soles in average (~15,000¥ in 2005), which is about half of the monthly direct collection of the health center.

Table 4.10 Comparison of the systems for the exchange of reports in Cuzco

Location	Radio/phone (%)	Internet (%)	CD's (%)	Printed(%)
Cauca (Colombia)	15.4	7.7	7.7	100
Guantanamo (Cuba)	40	0	20	80
Cuzco (Peru)	80	0	33.3	85.7

Source: Study of Assessment of the Project EHAS-ALIS, 2007, p. 52.

From another perspective, by the time of the assessment of this project, there was not enough statistical evidence collected to make a fair analysis, but changes were implemented to transform the mentality of health workers from the pharmacies towards the supplies in the health centers¹⁴⁰. By the end of the project EHAS-ALIS, the IP systems were deployed, and the attitude of the health workers certainly improved the flow of supplies toward the peripheral centers. The evidence of these increasing was not possible to be measured due to the scarcity of certain data.

(ii) Impact in health personnel

This impact can be considered in two dimensions: the use of ICTs for overcoming the sensation of isolation of the health personnel, and the change in their general conditions of work. These variables introduced an element of perception of the health workers towards their personal accommodation and acculturation to the use of communication technologies and their levels of satisfaction with the use of these communication systems at work.

Directives and health workers from the peripheral establishments had recognized in the interviews the reduction of the sensation of personal and professional isolation by the implementation of ICTs in their working stations. They feel more “connected” (as mentioned on the interviews) with the world by the use of navigators on the internet, finding information that they never had access before, and having the capacity to call and be called on the certain on receiving an immediate response from the centers

¹⁴⁰ Usually pharmacies are located within the regional hospital (central warehouse) and somebody from the health centers became responsible for the task. The idea was to show the health workers in pharmacy how important information was, and how it can alleviate their work in the long term. The first essay of the project was in paper. The hospitals asked the local pharmacies to submit their reports of stocks three times a week (it was weekly before) and they engaged to send feedback of projected needs in the same frequency. They used postal addresses, as the post was the only means available for such as exchange at the moment. Then, pharmacies discovered that using the radio and dictating the lists was faster for transmission three times a week, and that the load of work became more dynamic when frequency of reporting increased. From this experiment, one important conclusion was made: the use of platforms of ICTs for the improvement of administrative and managerial processes in the health establishments cannot be separated from the need of a redesign of processes. The implementation of ICTs requires the managers to think of conventional methods that introduce a mindset of personnel using incentives for motivating the change from the traditional methods toward the use of technologies just to demonstrate the convenience of the systems.

of reference, particularly in the cases of coordination of emergencies (Table 4.11).

Table 4.11. Sensation of isolation in the three areas of EHAS-ALIS

Location	Professional isolation (%)	Personal isolation(%)
Cauca (Colombia)	38.5	23.1
Guantanamo (Cuba)	16.7	10,5
Cuzco (Peru)	80	0

Source: Study of Assessment of the Project EHAS-ALIS, 2007, p. 53.

About changes in working conditions, in Cuzco 80% of users considered that the use of ICTs at work had improved their working conditions and nobody declared that it had worsened with variation about the perception of improvement. It is important to highlight that most of professional doctors, technical personnel and nurses, who work in the most isolated areas, did not live in those areas but relatively closer than the personnel who work in the regional hospitals. This closeness favors to overcome the feeling of professional and personal isolation as they could use the phone for communicating to each other from one to another end of the line for coordination and immediate response. After using ICTs they felt incorporated to the team, and not working alone in the isolated locations as declared in the interviews.

Table 4.12 Perception about changes at work motivated by using ICT provided by the project EHAS-ALIS

Perception	Cauca- (Colombia) (%)	Guantanamo (Cuba) (%)	Cuzco (Peru) (%)
It had worsened very much	0	0	0
It had worsened some	0	0	5.3
It's the same	18.2	12.5	10.5
It had improved some	36.4	18.8	52.3
It had improved very much	45.5	68.8	31.6

Source: Study of Assessment of the Project EHAS-ALIS, 2007, p. 54.

(iii) Economic impact

The economic improvement generated by using ICTs in the health system in Peru is related to the reduction of costs for the administrative and managerial system of the health centers¹⁴¹. Savings were found on the

¹⁴¹ To put in perspective the magnitude of savings, is useful to make a comparison toward the estimation of annual expense of maintenance of the equipments accounted by 380€ (~53,000¥) per establishment (about 32€ or ~4.500¥ per month). In the example posted below (Table 4.13), the locality of CCatcca saves more than the double of their regularly maintenance expenses with a

number of trips and transportation use and diets, the use of physical printings and magnetic devices (CD's, USB ports, etc.), the use of private phones or public phones that was not covered by the health system, and the uses of the posting system.

Table 4.13 Examples of monthly savings by using ICTs in Cuzco

Item of savings/Location	Ccatcca		Urpay	
	Soles	Yen	Soles	Yen
Printed copies/photocopies	S/. 180	¥6,840	S/. 27	¥1,026
Phone	S/. 63	¥2,394	S/. 0	¥0
Post service	S/. 180	¥6,840	S/. 180	¥6,840
Trips/diets/transportation	S/. 50	¥1,915	S/. 108	¥4,104
Magnetic devices	S/. 9	¥342	S/. 0	¥0
Total	S/. 540	¥20,520	S/. 297	¥11,286

Source: Study of Assessment of the Project EHAS-ALIS, 2007, p. 55 (data indexed 2.9USD-2014).

(iv) Institutional impact

This section presents the analysis of changes that the project had printed in the organizations involved (health establishments, municipality, DIRESA, etc.) such as increasing their capacities of management, administration, transfer of resources, etc.

The main institutional impact of the project was at the level of the regional hospital and health establishments, by providing them a system of monitoring of the peripheral establishments from the management. Often, the health managers use the IP phone or the alternatives of the system for controlling the attendance of personnel in the establishments of the periphery, coordination of transfers and also to check on the distribution of medical supplies.

The experience of workshops and focus groups with the health personnel from all the stations, supported the sensitization toward the need and flow of information and supplies from the lower to the upper levels of the administration of the health centers, making clear their situation and opening a window for dialogue and understanding of the importance of every step of the processes that is not commonly observed.

significance of about 910€ a year. In the case of Urpay, before the project started they had no access to phone or computer and the annual savings equal to about 500€.

Finally, the project has been useful to make the functionaries and directors of the DIRESA to talk about the prioritization of actions and important issues in the administration of health centers with the managers of peripheral establishments.

(v) Impact in policy

The most important influence of the project EHAS-ALIS over policy was related to a possible change on the directives of the communication systems to be used from the MINSA in the jurisdiction of the DIRESA Cuzco to the peripheral health establishments. For example, the health personnel started using electronic transmissions for epidemiologic reports, using the networks for coordination of transfers, and using the networks for administrative processes in general. In particular, the results of the installation of the EHAS-ALIS network had influenced toward the modification of the strategy of communication with the peripheral establishments and the possibility of replication to other areas.

EHAS-ALIS in Peru had strong impact at the regional levels because addressed the view of the authorities toward the importance of providing communication means to the peripheral centers. Although, there were several expressions of interest and appreciation for the use and applications of ICTs in rural areas from MINSA, and open doors for proceedings toward the progress of the EHAS-ALIS activities, the determination of the central government during the time of fulfilling of the project were focused on the urban cores of the provinces to enforce regional integration and development.

1.2.9.2. Sustainability

The study of sustainability of the project EHAS-ALIS analyzed if the positive changes produced by the project were able to be maintained in the long term by the social, technical, institutional and political organization of the Telemedicine services surrounding the implementation and use of ICTs. The idea is to examine the capacity of adaptation of ICTs to support the current systems when the external resources stopped and

the equipment was transferred to the DIRESA Cuzco and the regional government.

(i) Social sustainability

Generally and according to the study of impact, the result indicates that there is a high level of acceptance¹⁴² of the project in the three areas of intervention. According to the study of impact of EHAS-ALIS (2007) from interview and surveys to health workers and users, the level of acceptance of ICTs for health in Cuzco overall is 89.5%. The positive perceptions of the systems were reflected in the impact over the processes of reference and derference of patients, second opinion, exchange of information and supplies distribution, and the opinion of users about impact on the overcoming of the sensation of isolation (EHAS-ALIS 2007).

(ii) Technological sustainability

Technological sustainability of this project was assessed based on the increase of the capacity of the local workers to perform an adequate maintenance of the systems and ensure the feedback processing from new users about solving of questions and training activities. In order to determine these capacities, four components were identified: the organization of the system of maintenance¹⁴³, the formation and training in use of software (including the capacity of the technicians to repair and solve technical issues of maintenance), the capacity of access to the technologies installed¹⁴⁴, and the financial support for maintenance.

In this circumstance, DIRESA Loreto assumed in 2007 the responsibility of maintenance of the ICTs health network in Cuzco and the

¹⁴² Acceptation of the technologies is an important component of social and institutional sustainability. Acceptability depends of the recipient groups giving a positive value to the impacts of the technologies and considering it as a pertinent tool for addressing at least a partial solution to their problems. The importance of the level of acceptance reflects on the degree of engagement and trust of the directives of health and the representatives of the regional and local governments and their attitude toward the support on the spreading and use of ICTs for the health systems. To win that political acceptance, the opinion of the health workers and users of the system brings a valuable feedback transmitted by informal and formal communication means to the heads of the system.

¹⁴³ The organization of the system of maintenance refers to the institutional capacity for management of the maintenance and having a plan to define the checking points of the systems during a period of time and in occasion that includes roles, people in charge, procedures and quality standards.

¹⁴⁴ The capacity of access to the technologies installed refers to the possibility of having access to the expertise and knowledge about transforming and repairing the system from the design and adapt it to the need of users.

organization of the processes of repair and replacements. There was also the assignation of an annual budget for the year 2007 for maintenance for about 10,000€ (~380,000¥). As for the future, the DIRESA Cuzco proposed to involve the regional government and the municipal districts.

The DIRESA Cuzco also assumed a commitment with the continuous formation and training in use of software and technologies providing spaces and resources for the development of the capacity of the technicians to repair and solve technical issues of maintenance¹⁴⁵.

(iii) Institutional Sustainability

Institutional sustainability is related to the capacity of the receiving entity to carry out the organization, management and leadership of the project with the intention to keep its autonomy and keep the services running. In Cuzco the receptor of the project EHAS-ALIS was the DIRESA Cuzco as a representative of the Ministry of Health. This institution had assumed the responsibility for the project and the commitment for providing organizational support and resources for sustainability for the future.

The DIRESA Cuzco is the highest level of regional authority in health benefiting the stability of the project. Though, their inference on modifying the system of inputs toward the region from central government and Ministry of Economy is limited in terms of the constrictions imposed to the national system of regionalization. Nevertheless, DIRESA Cuzco had shown its institutional capacity by continuing the effort of the project EHAS-ALIS and assuming the responsibility of leading the processes of organizational change by introducing the use ICTs into the daily routine of delivery of health services.

¹⁴⁵ In this regards, DIRESA Cuzco also recognized their responsibility with the problem related to the high rotation of qualified and trained health personnel in the peripheral establishments due to the extreme conditions of working in isolated rural areas with difficulty to go through the geography and without incentives. Also, in the localities of Acomayo and Quispicanchi, there were difficulties for having access to qualified personnel for IT maintenance in the rural areas, making essential the adoption of a local partner. Thus, for all technical matters, through the technological partners of PUCP in Cuzco, the engineers and students of the University San Antonio Abad from Cuzco were bringing technical support to the installations of DIRESA Cuzco from the project EHAS-ALIS through their Group of Research in Telecommunications (CEDITER).

(iv) Political Sustainability

The Project EHAS-ALIS was related to several layers of the political levels, due to the changes proposed for ICTs and the challenges implied for the public administration. The idea of the promoters of EHAS-ALIS was also to generate some political pressure on pushing toward the implementation of ICTs in the health sector in rural areas aiming the possibilities of replicability and massification. Political sustainability refers to the capacity of the implemented changes to impact over the policy making processes in a sustainable manner, by making ICTs part of the health systems supported by policies that ensure its development and maintenance in the long term.

In Cuzco from 2003 to 2006 there were not signal of political opposition, which facilitated the deployment of the networks. Instead, in a positive perspective, it is perceived the sensation of engagement and motivation from the workers of DIRESA Cuzco and their expectation of growing the network to extend the services to other health establishments of the periphery¹⁴⁶. About the capability of replicability, it is in the hands and set of the DIRESA Loreto who had shown genuine interest in the Telemedicine initiative from the beginning.

¹⁴⁶ From the interviews and workshops organized for the assessment of the project EHAS-ALIS (reference in Appendix 3, A. List of interviews project EHAS-ALIS).

1.3. The Project EHAS- Napo (2006-2009)

The Project EHAS-Napo was implemented from October 2006 until December 2009 and assessed in 2010. This project was the result of the endeavors of Foundation EHAS from Spain, its local technological partner was the Group of Rural Telecommunications from the Pontifical Catholic University of Peru (GTR-PUCP) and the synergies created by them within the field of intervention in the Napo River basin. This project was supported by foreign aid from International Cooperation agencies in partnership with a University and an NGO for funds as for the infrastructure, implementation, diffusion and technological transfer for the empowerment of its local beneficiaries.

The project EHAS-Napo had the main objective of providing infrastructure of wireless telecommunications for 16 rural health establishments covering 450 kilometers of dense vegetation in an area of difficult access where geography and weather are challenges for the deployment of technologies, and limited access to paved roads, phone or radio. This project had the purpose of promoting the use of ICTs for improving the quality of health services and delay in the primary attention for vulnerable populations living in the basin of the Napo River.

1.3.1. Facts about the Region Loreto

Loreto is a regional circumscription of Peru located in the north eastern side of the country, in the Amazon basin. This is the most extensive area of the country, and due to its 368,852 km² it represents the 28.7% of the total surface of Peru (Figure 4.13).

Figure 4.13. Map of Peru indicating Region Loreto



Source: adapted by author

The main economic activity of the region is agriculture followed by fishing. Agricultural production is led by rice, corn and bananas. Fishing is a product for daily consumption and for local markets.

Accessibility to Healthcare Establishments

There are several factors associated with the high incidence of infections and transmissible respiratory diseases, including problems of accessibility to the health services as well as social, economic and cultural. For example, the understanding of the rationality about the process of health-sickness from the communities due to their beliefs and customary beliefs regarding to pregnancy, birth and puerperal transition represent a barrier for people to choose the public health system as a first option. Also, the difficulties for having access to the health centers or the regional hospital and the scarcity of out-of-pocket resources for transportation discourage isolated populations to go to the services.

In the area there were also difficulties in achieving accurate diagnosis due to their lack on continuous formation and the under qualification of available staff on the attention centers. Most of the health posts are not attended by doctors or GPs but sanitary technical personnel.

Table 4.14 Transfer time required between remote sites in Loreto

Distance in time from origin to destination/ Transportation means		Ship	Fast boat	Road	Plane
Origin	Destination				
Lima	Iquitos (Regional Hospital)	15 days			2 hrs.
Iquitos (Regional Hospital)	Iquitos (Petro Peru)			0.5 hr.	
Iquitos (Petro Peru)	Mazan (Amazon side)	20 hrs.	2 hrs.		
Mazan (Amazon side)	Mazan (Napo side)			0.5 hr.	
Mazan (Napo side)	Huaman Urco	4 hrs.	1 hr.		
Huaman Urco	Tuta Pishco	4 hrs.	1 hr.		
Tuta Pishco	Negro Urco	4 hrs.	1 hr.		
Negro Urco	Tacsha Curaray	4 hrs.	1 hr.		
Tacsha Curaray	Santa Clotilde	7 hrs.	1.5 hrs.		
Santa Clotilde	Copal Urco	3 hrs.	0.5 hr.		
Copal Urco	San Rafael	9 hrs.	1.5 hrs.		
San Rafael	Rumi Tuni	12 hrs.	2 hrs.		
Rumi Tuni	Campo Serio	6 hrs.	1.5 hrs.		
Campo Serio	Angoteros	4 hrs.	1 hr.		
Angoteros	Tupac amaru	6 hrs.	1.5 hrs.		
Tupac amaru	Tempestad	4 hrs.	1 hr.		
Tempestad	Torres Causana	6 hrs.	1 hr.		
Torres Causana	Cabo Pantoja	6 hrs.	1 hr.		

Source: adapted by author with information from Bebea et al. 2011, p.159.

The DIRESA Loreto¹⁴⁷ had 355 establishments of health attention organized by health posts (HPs) and health centers (HCs) ¹⁴⁸ and distributed along 51 districts. Only 2.09% of the establishments are HCs, meaning that only seven stations had an average of capacity of resolution associated with the presence of physicians and equipment in an emergency. In contrast, the HCs of the category I-1 which usually have only a nurse or technician represent over 77% of all the DIRESA establishments.

Organization of the Micro-network of Napo

At the level of provinces, over 33% of the health establishments were concentrated in Maynas followed by Alto Amazonas on second place with almost 18% and Dátem del Maraón with over 14%. The center of reference for the Health Centers of the Micro-Network of Napo and Mazan is the Regional Hospital of Iquitos (MINSA 2007:1-8). Table 4.15 shows the number of establishments dedicated to health attention in the seven districts of Loreto.

Table 4.15. Organization of the micro-network Napo

Table 1.16: Organization of the Micro Network Naps									
Province/ Level of facility	Category								Total facilities
	Hospital			Center of Reference	Health Centers		Health Posts		
	III-1	II-2	II-1		I-4	I-3	I-2	I-1	
Maynas	1	1	0	1	4	15	16	75	113
Ramon Castilla	0	0	0	0	1	3	1	16	21
Loreto	0	0	0	0	2	3	3	21	29
Ucayali	0	0	0	0	1	5	1	27	34
Requena	0	0	0	0	1	5	2	28	36
Alto Amazonas	0	0	1	0	0	9	4	57	71
Datem	0	0	0	0	1	2	6	39	48
Total	1	1	1	1	10	42	33	263	352

Source: elaborated by author with data from MINSA 2010, p.24.

Maternal Mortality in Loreto

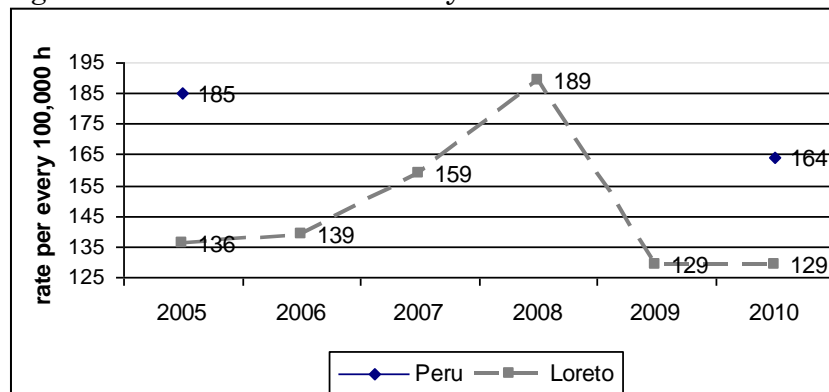
This graph shows the rates of maternal mortality in Loreto during the period 2005 and 2010. The independent spots are the numbers about

¹⁴⁷ Data taken from the Annual Report SIS 2009

¹⁴⁸ Health posts are the health establishments of lower level, usually attended by a technician in nursery or a nurse. Health centers are sometimes dotated with microscope and a nurse or a physician.

the total rate of mortality in Peru for the same years, finding in Loreto the highest numbers from the index in 2005 and also in 2010 (129 from 164 took place in Loreto).

Figure 4.14 Maternal mortality rates in Loreto 2005-2010



Source: elaborated by author with data from MINSA 2010, p. 105.

1.3.2. History of the Project EHAS-Napo

The project EHAS-Napo is the fusion of two projects: EHAS-PAMAFRO and EHAS-Madrid. This network was installed in two stages. The first stage was provided after a long time of conversations documented lines below and it has been granted by the Global Fund to fight AIDS, Tuberculosis and Malaria (GFATM) in 2007 through the project PAMAFRO: “Malaria control on the cross border areas of the Andean Region: a community based approach PAMAFRO¹⁴⁹” which on its objective no. 4 states as follows: “Design and Implementation of a communication network of voice and data in health establishments in the frontier of Peru”.

In 2005, the EHAS Foundation and GTR-PUCP started to work together in the basin of the Napo River with the installation of a network for IP telephony and access to Internet for 5 health facilities in the Micro-Network of Napo, contributing directly to the improvement of the processes of health care attention. All together plus the last mile connection to the Regional Hospital of Iquitos made a global result of 18 establishments in a wireless connection within the Amazonian deep forest.

¹⁴⁹ PAMAFRO for its initials in Spanish language: “Malaria control on the cross border areas of the Andean Region: A community based approach”.

In 2008, the EHAS Foundation and GTR-PUCP worked together again for obtaining a grant for the EHAS-Madrid project: “Improvement of the health conditions of maternal and infant population through proper application of ICTs in health centers and medical posts along the Napo river basin in Peru”¹⁵⁰. This project connected the health establishments from Santa Clotilde to the Regional Hospital of Iquitos with a wireless network of 300 km using long distance technology (WiLD ¹⁵¹) for IP telephony and Internet access, becoming the longest wireless network for delivery of health care services installed in Latin America connecting over 450 km of a telemedicine network.

First stage of EHAS-Napo: The Project EHAS-PAMAFRO

The Project EHAS-Napo reunited the efforts of two projects of development supported by agents of international cooperation. The first part of the project consisted of the installation of 11 telecommunication stations in the health establishments located along the Napo River and their systems of solar electrification. This project provided wireless services in a range of 306.30 kilometers.

The Project PAMAFRO aimed to solve the common health problems in the border areas of the Andean countries. Thus, the Ministries of Health from Ecuador, Colombia, Venezuela and Peru were having conversations in several meetings between 2002 and 2004. Then, with support of the Andean Organism of Health (ORAS), these countries formed a multi-national team and elaborated a proposal to eradicate malaria in the region. In 2005, the Global Fund granted 26 million dollars¹⁵² for accomplishing five objectives in a five year plan, and concretely 640,000 dollars for the accomplishment of the fourth objective: “Design and Implementation of a communication network of voice and data in health

¹⁵⁰ Report: Project EHAS-Madrid December 2007-December 2008 “Mejora de las condiciones de salud de la población materno infantil a través del uso apropiado de las Tecnologías de la Información y las Comunicaciones (TIC) en centros y puestos de salud del Río Napo”(Peru). Grupo de Telecomunicaciones Rurales de la Pontificia Universidad Católica del Perú y la Fundación EHAS.

¹⁵¹ WiLD stands for Wireless internet for Long Distances

¹⁵² Organismo Andino de Salud <http://www.orasconhu.org/pamafro> (Last checked 23 August 2010)

establishments in the frontier of Peru and Ecuador”¹⁵³ including the installing and training of four micro-networks in the frontiers.

The results of the installation of the wireless network included in the Project EHAS-PAMAFRO were granted permanently to its beneficiaries between October and November 2007. The assessment of the project was concluded by March 2008 and the Auditory Report of the Network¹⁵⁴ was arranged directly by the Global Fund.

Second stage of EHAS-Napo: The Project EHAS-Madrid

The second project was a proposal of an extension to the network installed in Maynas to connect the health establishments located from Santa Clotilde until the Regional Hospital of Iquitos. This project was achieved with funds from the Madrid City Council (*Ayuntamiento de Madrid*) addressed to the medical and technical personnel from the health establishments as main beneficiaries.

This project was an extension to the PAMAFRO network for connecting the gap between the health establishments located from Santa Clotilde until the Regional Hospital of Iquitos. This network provided connectivity to five stations with a wireless network of 138.72 km using WiLD and delivering services of IP telephony and Internet access.

1.3.3. Partners of the Project EHAS-Napo

The partners as receptors from the donors of EU on this initiative were the EHAS Foundation as a coordinator of the funds and main sub-receptor, and GTR-PUCP as a technological partner. The strategy of implementation implied to work together with the health authority and the regional and local governments in partnership. Thus, the Regional Government of Loreto and the DIRESA Loreto acted as partners in the activities related to training and development of their health workers as specified later in this Chapter (1.3.7 Strategies, objectives and activities).

¹⁵³ Several official reports from fulfilling partners: Technical report of subreceptors 2007- Project PAMAFRO from The Group of Rural Telecommunications- Pontifical Catholic University of Peru; Auditing report 2008 from The Global Fund Grant Number: MAA-3-5-G01-M.11.2007; Final report from EHAS to the Ayuntamiento de Madrid (funding partner) submitted in March 2009.

¹⁵⁴ The Global Fund had required an independent verification of the functioning of the systems and the authentication of the transfer credentials to the beneficiaries by the Report of Auditory Network EHAS- PAMAFRO presented on the 5th of March 2008 by a private team. (Spanish language).

1.3.4. Geographic Location and context of the Project EHAS-Napo

The areas of intervention were the province of Pastaza and Morona in Ecuador where 12 establishments were connected, the provinces of *Dátem del Marañón* with 18 establishments and the province of Maynas in Peru with 11 establishments connected to the network¹⁵⁵ (Figure 4.15 and 4.16).

Figure 4.15. Map of the Region Loreto



Source: adapted by author

Figure 4.16. Map of the Province of Maynas



Source: adapted by author

Loreto is the most diverse area in ethnic populations and indigenous languages. Figures 4.15 and 4.16 show a map of the Region

¹⁵⁵ Report: Result 4 from the Project PAMAFRO- Design of the Communication network in Peru (Pastaza, Morona y Napo) and Ecuador (Pastaza y Morona). Fundación EHAS, June 2006.

Loreto and the Province of Maynas respectively. These maps show the frontier with Ecuador, Colombia and Brasil. According to the XVI Census of Population and Housing 2010, Loreto was accounted for 891,732 inhabitants from which ones 51.24% are males (456,962) and 48.76% are females (434,770)¹⁵⁶. Also, the density of population¹⁵⁷ in Loreto reached 2.4 inhabitants per km².

Loreto region is divided politically and administratively in seven provinces. Four of these provinces are Maynas, Alto Amazonas, Requena and Loreto, concentrating more than 80% of the population. Maynas contains the capital city of Iquitos, reason why it is probably the most populated with 55.28% from the total population of the Region (492,992 inhabitants). Figure 4.17 pictures the districts of the province of Maynas, showing Mazan (13583 inh.), Napo (15067 inh.) and Torres Causana (5162 inh.) where the Project EHAS-Napo was installed.

1.3.5. Services offered by the Project EHAS-Napo

The EHAS-Napo project in Peru was designed to provide connectivity services to 11 establishments of health posts (HPs) and health centers (HCs) in the basin of the Napo River. The project had achieved to install infrastructure of telecommunications to 16 public facilities in the basin of the Napo River, from the Regional Hospital located in Iquitos capital city up until the locality of Cabo Pantoja in the north-east frontier between Peru and Ecuador. The provision of infrastructure includes the aerial network (towers and cables by air), the access to the routers and connectivity gadgets, and the implementation of client stations. This infrastructure of telecommunications was established along 450 km through the deep forest¹⁵⁸.

¹⁵⁶ XI Census of Population and VI of Dwellings INEI 2007

¹⁵⁷ Instituto Nacional de Estadística e Informática INEI- Peru
<http://www.inei.gob.pe/web/PeruCifras4.asp>

¹⁵⁸ Several official reports from fulfilling partners: Technical report of subreceptors 2007- Project PAMAFRO from The Group of Rural Telecommunications- Pontifical Catholic University of Peru; Auditing report 2008 from The Global Fund Grant Number: MAA-3-5-G01-M.11.2007; Final report from EHAS to the Ayuntamiento de Madrid (funding partner) submitted in March 2009.

Technologies

Connectivity was provided by using WiLD technology (WiFi IEEE 802.11 modified for Long Distance¹⁵⁹) and offered broad band services such as VoIP, telephony, videoconferencing, reporting, image diagnosis and real time stethoscope, chat and Internet access used for several purposes related to e-Healthcare such as tele-consultation, tele-diagnosis, tele-treatment, health information management, emergency coordination, drugs dispatch and logistics (Bebea et al. 2011). Every station was also provided by its own basic electrification system due to the scarcity of power sources in most of the establishments. These establishments connected comprehend the EHAS-Napo network (Tables 4.16, 4.17).

Table 4.16 Category of the Health Establishments in the Micro-network of EHAS-Madrid in Loreto and the distances between them.

Name of the establishment	Category	Distance from the next station (km)
1. Negro Urco	Health stall	28.49
2. Tuta Pishco	Health stall	29.59
3. Huaman Urco	Health stall	24.85
4. Mazan	Health center	24.51
5. Iquitos- Petro Peru	Vicariate of San Jose del Amazonas	30.23
6. Regional Hospital of Iquitos	Regional Hospital	1.05

Source: Formulation of the Project EHAS-Napo 2008, p.36.

Table 4.17. Category of the Health Establishments in the Micro-network of EHAS-Pamafro in Loreto and the distances between them.

Name of the establishment	Category	Distance from the next station (km)
7. Cabo Pantoja	Health center	
8. Torres Causana	Health stall	24.10
9. Tempestad	Health stall	25.00
10. Tupac Amaru	School	16.60
11. Angoteros	Health center	27.10
12. Campo Serio	Health stall	41.50
13. Rumi Tuni	Health stall	49.90
14. San Rafael	Health stall	36.10
15. Copal Urco	Health stall- emergency box	19.80
16. Santa Clotilde	Health center	39.00
17. Tacsha Curaray	Health stall	

Source: Formulation of the Project EHAS-Napo 2008, p.36.

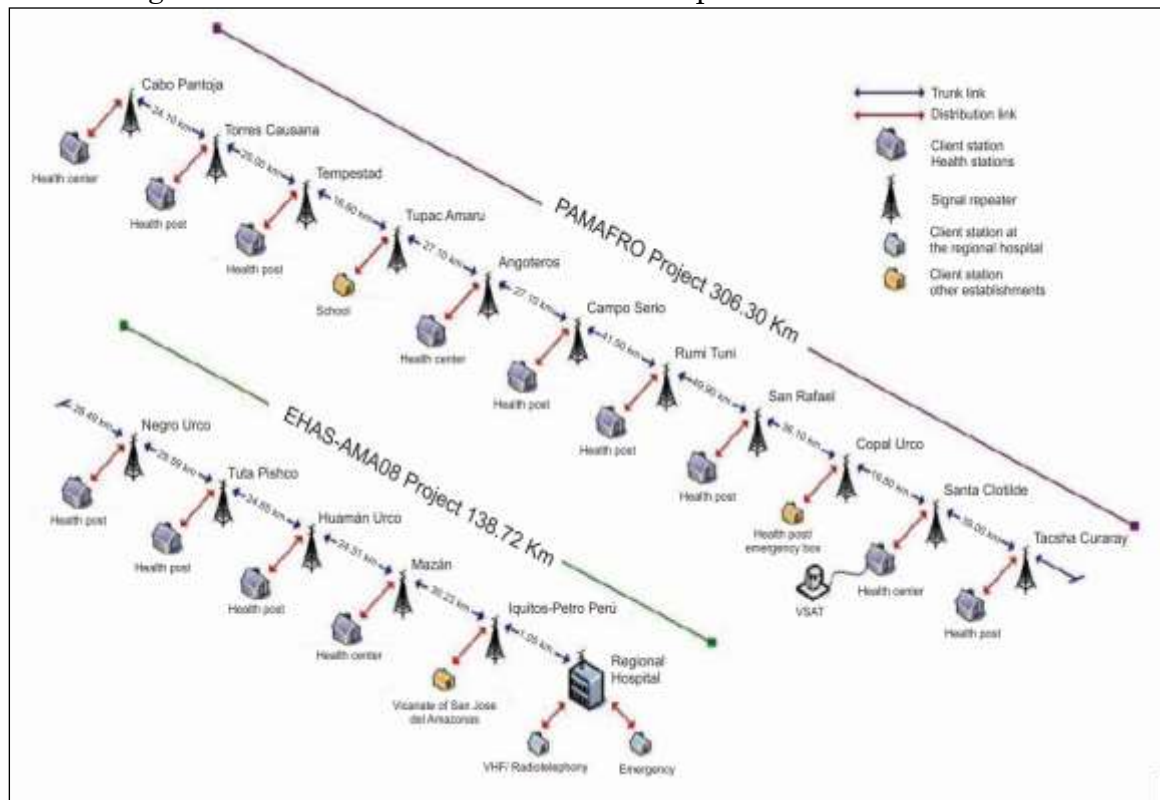
¹⁵⁹ WiFi IEEE 802.11 modified for Long Distance is the name of the international protocol for wireless connectivity

Figure 4.17 The Project EHAS-Napo in the Peruvian Amazonia



Source: Formulation of the Project EHAS-Napo 2008, p. 35.

Figure 4.18 Structure of the EHAS-Napo Wireless Network



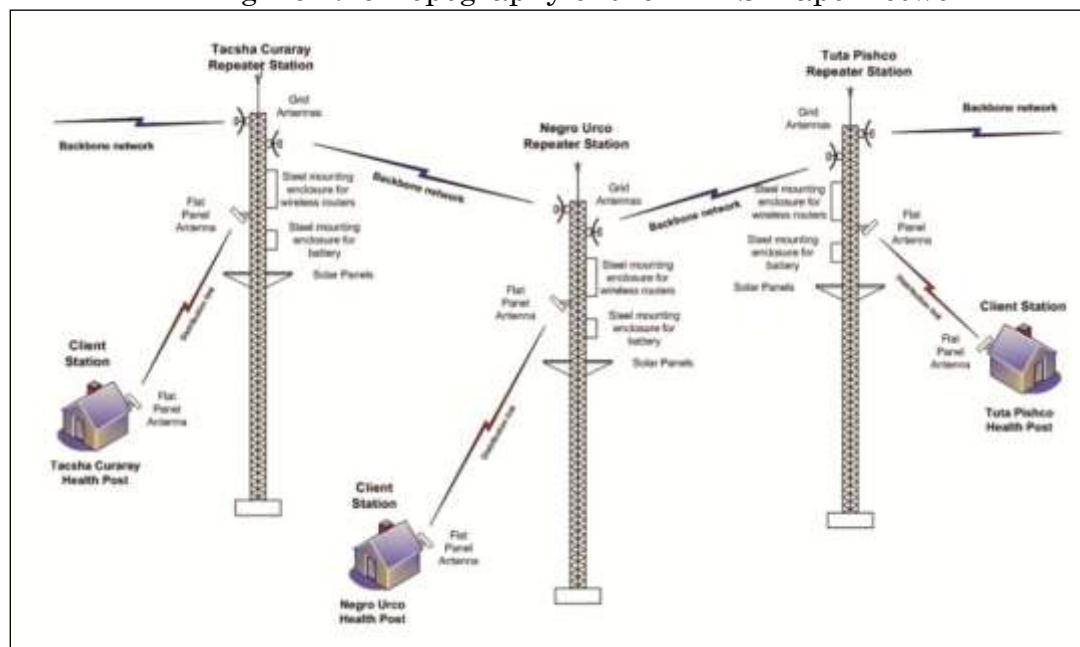
Source: Technical Report of the Project EHAS-Napo 2008, p.36.

The linkages shown in the network maps (Figure 4.17 and 4.18) have the capacity to connect distances of over 50 kms with a wireless connection. To accomplish this purpose, the technology used is called WiFi

(standard IEEE 802.11 which is the name of the international protocol for wireless connectivity) modified for long distances (known as WiLD-EDCA on the technical protocol).

The wireless technology requires a line of sight between the extremes of each link of communication which means that the antennas that transmit the waves to provide communication converge in the angle where those are directed in order to reproduce the waves and give origin to the phenomena of wireless communication. This is the logic of wireless technologies: when it is not possible to provide the line of sight naturally due to topographic conditions (a hill, a tree, a further installation or building etc.), then it is required to use repetitors which are intermediate antennas to enroute the waves towards the correct angle to ensure the flow of the connection as indicated in Figure 4.19.

Figure 4.19 Topography of the EHAS-Napo Network

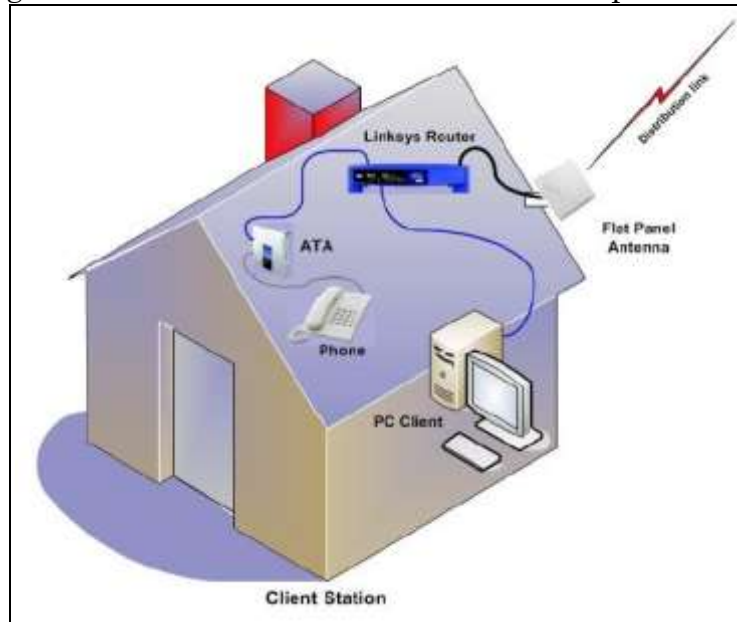


Source: Technical Report of the Project EHAS-Napo 2008, p.38.

The trunks (antennas) connect the repetitors distanced up to 50 kilometers from each other. The client stations (HSs or HCs) have usually one office station with pc and printer, and also have installed a telephone with telephony service by IP (VoIP) which allows telephonic service between units of the same network (close networking) without any further cost as a private network (Figure 4.20). This network was a platform of

communications that allowed isolated communities to have access to the local services such as telephony ¹⁶⁰, Internet service ¹⁶¹, and video-conference system¹⁶².

Figure 4.20 Client Station of the EHAS-Napo Network



Source: Technical Report of the Project EHAS-Napo 2008, p.34.

The Telemicroscopy system¹⁶³ allowed health post technicians to share microscopy images with a specialist. The health posts are provided with a microscope and the equipment needed to prepare a sample of intestinal parasites. Health post technicians were capable of analyzing malaria samples, but more complicated cases require a specialist. It is necessary to be a real time process due to the importance of choosing the right fields to evaluate. Real time diagnostic allowed technicians and

¹⁶⁰ Telephony: an Asterisk server was provided to make IP voice calls (VoIP) 24 hours free without additional cost between the health stalls, health centers and administrative offices of the Health Center of Alto Amazonas and Santa Clotilde.

¹⁶¹ Internet service: the establishments involved in this project had access to Internet through the configuration of a Gateway (client of the Health Network) which is connected to the ADSL of Telefonica and contracted by the health network. All the nodes of the network had access to the Internet.

¹⁶² The video-conference system via the software Spontania with the following characteristics: proprietary software (a license has been given to this project), only installed in the server (client hosts connect to the server by a web browser. Then, the browser downloads a plug-in and runs the application), no Internet connection is needed in both ends (it can work as a LAN service), it is possible to manual configure the application bandwidth in order to fit the available network resources, and Videoconference traffic must reach Iquitos server and then go back to the destination post. Napo network is line-shaped, so videoconference traffic increases traffic network.

¹⁶³ Microscopy image was shared by screen sharing tools provided by Spontania or Skype. Since microscopy images are quite static, the service required a low bandwidth, about 400Kbps.

specialists to analyze the same sample at the same time, becoming a good training experience.

The Telestethoscopy service¹⁶⁴ was based on the use of digital stethoscopes that send the auscultation signal from health posts to health centers or regional hospitals. This allowed the physician to lead the auscultation process and get a right diagnosis. The sound was sent directly from source host to destination host, so it was not necessary to use a server. Usually Skype videoconference was used as a complement, so the physician can see the patient while auscultation process is taking place.

The Teleultrasound system¹⁶⁵ allowed sharing ultrasound images in real time, so both health post technician and specialist can see the same images. Skype screen sharing tool was used to share ultrasound images. This tool does not allow to manually configuring the video bit rate. All equipment (out of Yurimaguas city) including computers was working with solar energy.

1.3.6. Strategies, Objectives and Activities of the Project EHAS-Napo

The objective of the Project EHAS-Napo was to contribute to the reduction of the child-mother morbid-mortality in the rural isolated areas of the Napo River basin using of ICTs. Table 4.18 shows the specific objectives per activity as presented to the financial aid agencies for the project EHAS-Madrid (2007-2008), similar to the ones indicated for the Objective 4 in the Project EHAS-PAMAFRO (2006). The objectives are expressed in terms of expected results for the purposes of the project.

Table 4.18 Expected results for the EHAS-Napo project (2007)

Expected result no. 1: System of control and prevention of deceases improved	
Objectively verifiable indicator	Source of verification
Reduction in 20% of the travel for the delivery of administrative and epidemiologic reports	Travel monitoring report
Disappearance of silent zones from the epidemiological surveillance system	Reports from the Regional Direction of Health (DIRESA)
Delay on delivery of epidemiologic reports reduced on 50%	Reports from the Statistic Department of the DIRESA
Time dedicated for administrative and epidemiologic reports reduced on 20%	Survey to the rural medical and technical personnel
Risk: Difficulties in bureaucratic procedures for the institutionalization of ICTs.	

¹⁶⁴ The application requires a bandwidth of 200Kbps and a constant delay

¹⁶⁵ 400Kbps are needed to get the minimum required quality

Expected result no.2: Systems of emergency attention improved in the rural HCs	
Objectively verifiable indicator	Source of verification
25% reduction of evacuation time for seriously ill patients	Verification and monitoring reports from the health centers
Generalized usage of sending and reception of transfer patients	Survey to the rural medical and technical personnel
Risk: Support of the health personnel and local authorities	

Expected result no.3: Diagnostic and treatment capacity in the rural health attention establishments improved	
Objectively verifiable indicator	Source of verification
Number of establishments with digital stethoscope, EGG, Doppler, microscopic remote image equipment; Number and % of personnel trained to use the facilities and deliver telemedicine services	Records of installation and delivery of equipment Training reports
Average of 6 Tele-consultations per month per each health attention establishment to solve diagnosis and treatment doubts	Monthly monitoring reports from the Program of Reproductive health from DIRESA
20% reduction of urgent evacuations 40% reduction of the no. of patients referred without an appointment	Reports from the Integral Health Insurance (SIS) from the DIRESA
40% reduction of the no. of trips to re-stock medicine supplies 25% reduction of stocks breaks in the rural health center's pharmacies	Survey to the rural medical and technical personnel
Risk: Support of the health personnel and local authorities. Difficulties for coordination of personnel training support due to lack of personnel to cover the shifts in their local posts.	

Expected result no. 4: Management and control of economic resources improved in the rural health centers	
Objectively verifiable indicator	Source of verification
20% increasing of the income for attention of insured patients	Record of income per attention per establishment
25% reduction of the number of trips from the posts to the regional centers of reference (Santa Clotilde, Mazan, Iquitos)	Survey to the rural medical and technical personnel
10% increasing of the number of patients attended with the SIS Insurance	SIS records obtained from DIRESA.
Risk: Support of the health personnel and local authorities. Difficulties for coordination of personnel training support due to lack of personnel to cover the shifts in their local posts.	

Expected result no.5: Correct monitoring system applied and achieved the results of impact of the project in the clinic process, in the health of the patients, and in the accessibility to a high quality health attention	
Objectively verifiable indicator	Source of verification
Study of viability (technical, economical, institutional) and impact	Final assessment report

Source: adapted by author from Formulation of the Project EHAS-Napo 2008, pp. 21-28.

Activities and Responsibilities of the Project EHAS-Napo

According to the formulation of the Project EHAS-Madrid (second stage of the install of the Project EHAS-Napo, the list of activities liaised with the results listed lines above and the institutions responsible for each activity were organized as follows in Table 4.19. In this list of activities it is possible to identify the role of the NGO and the University taking responsibilities over the accomplishment of activities which involves local actors and beneficiaries. At the end of the project, the DIRESA Loreto received the infrastructure of telecommunications and equipment as donations, and the local governments assumed the responsibilities over the maintenance expenses as signed in the agreements of transfer of the goods which were specifically prepared for the equipment installed in every establishment.

Table 4.19. Activities of the Project EHAS- Madrid by responsibilities

Project EHAS - Madrid		
Activity	Responsible	Participants
0. Diagnosis of needs	EHAS	EHAS, GTR-PUCP, MINSA, DIRESA, Regional and Local authorities, Beneficiaries.
Workshop with regional/local authorities	EHAS	
Workshop with health workers	EHAS	
Workshop with beneficiaries	EHAS	
Workshop with partners	EHAS	
Construction of the flow of social interaction	EHAS	
Elaboration of report	EHAS	
1. Design of the telecommunication network	GTR-PUCP	EHAS, GTR-PUCP, Beneficiaries
Network design	GTR-PUCP	
Electric protection system design	GTR-PUCP	
Energy system design	GTR-PUCP	
Radio-Telematics system design	GTR-PUCP	
Software design	GTR-PUCP	
Validation and approval of the comprehensive design	GTR-PUCP	
2. Implementation of the voice and data transmission system in 5 establishments	GTR-PUCP	EHAS, GTR-PUCP, Beneficiaries
Elaboration of purchase list	GTR-PUCP	
Local purchases	GTR-PUCP	
Imported purchases- Import	GTR-PUCP	
Installation of the systems	GTR-PUCP	
Equipment testing	GTR-PUCP	
Transport of equipment	GTR-PUCP	
Construction of the towers base	GTR-PUCP	

Installation of towers and equipment	GTR-PUCP	
Test of functioning of the network	GTR-PUCP	
Assessment of the network systems	GTR-PUCP	
Starting of the operation of the systems	GTR-PUCP	
3. Training of the personnel in the usage and maintenance of the systems	EHAS	EHAS, GTR-PUCP, Beneficiaries
Elaboration of the training plan	EHAS	
Elaboration of contents	EHAS	
Presential course of training for personnel	EHAS	
First coursework	EHAS	
Second coursework and workshop	EHAS	
Systematization of the activity and documentation	EHAS	
4. Design and implementation of the standardized procedures of maintenance of the network	EHAS	EHAS, GTR-PUCP, Beneficiaries
Participative design of the maintenance strategy	EHAS	
Elaboration of the maintenance plan	EHAS	
Revision, approval and plan formalization	EHAS	
Implementation of the procedures	EHAS	
Monitoring and assessment of the results	EHAS	
PROJECT EHAS - MADRID		
Activity	Responsible	Participants
5. Technical maintenance of the network	GTR-PUCP	EHAS, GTR-PUCP, Beneficiaries
Elaboration of the maintenance plan	GTR-PUCP	
Elaboration of the program of maintenance (training)	GTR-PUCP	
Coursework for local technicians	GTR-PUCP	
Conducted maintenance activities in the field	GTR-PUCP	
6. Implementation of the improvements to the processes of health attention using the EHAS systems	EHAS	EHAS, GTR-PUCP, Beneficiaries
List of participants in the workshops	EHAS	
First participative workshop on revision of the processes	EHAS	
Second participative workshop on improvement of the processes	EHAS	EHAS, GTR-PUCP, DIRESA, Local authorities
Implementation of a pilot project with the processes improved	EHAS	
7.Validation of the improved processes	GTR-PUCP	EHAS, GTR-PUCP, Beneficiaries
8.Sistematization of the information	GTR-PUCP	
9.Transfer of goods and donations	EHAS	EHAS, GTR-PUCP, DIRESA, Reg Gov. Local authorities
10.Elaboration of final report	EHAS	EHAS, GTR-PUCP
11.Assessment of the global results of the project	EHAS	EHAS, GTR-PUCP, DIRESA, Local authorities

Source: adapted by author from Formulation of the Project EHAS-Napo 2008, pp. 29-35.

1.3.7. Beneficiaries of the Project EHAS-Napo

The Project EHAS-Napo considered as the first group of beneficiaries all people attended in the rural health establishments of the health centers of its network, making it to match with the population in the area of intervention (aprox. 180,000 persons, users of the health services in Loreto (EHAS-Madrid: 5-6). Loreto, Maynas and Napo areas, have the highest level of vulnerability and alimentary insecurity measured by MIDIS in 2011 and their level of poverty was higher than in the rest of the country (Table 4.20).

Table 4.20 Characteristics of Population in Loreto and Napo

Indicators	Peru	Loreto	Napo
Total Population, 2012	30.135.875	1.006.953	16.221
Male ⁽⁴⁾	15.103.003	525.658	8.694
Female ⁽⁴⁾	15.032.873	481.295	7.527
Rural Population (%) 2007 ⁽¹⁶⁶⁾	24,1	34,4	82,0
Index of Vulnerability and Alimentary Insecurity MIDIS 2011 ⁽¹⁶⁷⁾	0,2304	0,3124	0,6815
Population in process of inclusion MIDIS 2012 ⁽¹⁶⁸⁾	15,4	17,3	37,8
Total Poverty (%) 2012 ⁽¹⁶⁹⁾	25,8	41,8	79,6
Extreme Poverty (%) 2012 ⁽⁸⁾	6,0	13,4	40,1
Rate of infant malnutrition 2012 (%) ⁽¹⁷⁰⁾	18,1	32,3	31,9

Source: Website of the Regional Government of Loreto (Regional Census 2012).

According to the Census of 2012, the population registered in the Health Center of the locality of Santa Clotilde reaches 6265 inhabitants,

¹⁶⁶ Census of Population and Dwellings 2007 - INEI

¹⁶⁷ Index of Vulnerability and Alimentary Insecurity (2011): This index is estimated with the media of the components of Alimentary security (a,b,c) and express the level of vulnerability to alimentary security at the level of districts, provinces and departments. Value of this index oscillates between 0 (none) and 1. (a) Availability: it is referred the quantity of food available in the area of calculation and is related to the sufficiency of supplies towards the requirements of population. It depends of local/regional/districts production or the quantity of imported food. (b) Access: it is the possibility of inhabitants to reach accurate quantity, quality and sustainable feeding. This factor corresponds to the food that a family/community can buy and the origin of these goods. (c) Consumption: related to the food that is preferred and consumed by the inhabitants of a community and is more related to their preferences, attitudes and cultural practices.

¹⁶⁸ Population in process of inclusion defined as population living in dwellings with 3 or more circumstances associated with processes of exclusion: a. Residence environment (rural); b. Ethnicity (Quechua, Aymara, Native); c. Education of the mother (head of household qualifications: primary school complete/incomplete or less); d. Socio-economic level of the household (first fifth of the total income) MIDIS 2012.

¹⁶⁹ From the report "Poverty and chronic malnutrition" (department level). Source: ENAHO 2012 (National Homes Survey) INEI. National and district levels estimated by INEI 2009.

¹⁷⁰ From: "Peru: Demographic and family health survey 2012: National and district levels estimated by INEI 2009".

distributed in small communities¹⁷¹. In 2012, the locality of Santa Clotilde was the biggest of the area with an average of 580 multi-familiar dwellings. In the same year, the population in Tuta Pishco reached 1104 inhabitants¹⁷². Tuta Pishco's community had electricity through a power line feed from a diesel generator having energy for about three hours every day (in average from 18:00 until 21:00). The shortage is frequent.

In the rural locality of Negro Urco there was one HC for attending 1235 inhabitants¹⁷³. From the total of this population, close to 650 live in the rural side. In this locality, the government is present through the National Program of cash transfers for the poor (*Juntos*) which has been implemented since January 2012 from the Ministry of Development and Social Inclusion (MIDIS). Negro Urco's community has a power line feed by a diesel generator, same then in Santa Clotilde. The shortage is also frequent.

The second group of beneficiaries of this project was the collective of the health personnel assistants working in the health facilities along the connected areas. These workers were assigned between the HPs and HCs and the Vicariate which also has a health facility.

Table 4.21 Health Care Personnel from DIRESA Loreto

Group	2009	2008	2007	2006
General Practitioners (GP)	141	118	111	143
Nurses	115	86	97	101
Obstetricians	99	82	75	68
Other health professionals	61	46	27	46
Technicians	874	688	633	790
Administrative	317	268	130	206
Total	1607	1288	1073	1354

Source: Budget Unit- DIRESA Loreto 2009, MINSA 2010, p.75.

¹⁷¹ Small communities of Santa Clotilde: Santa Victoria, Argentina, Diamante Azul, Rango Isla, San Jorge, Nueva Yarina, Copal Yacu, Copal Urco, Patria Nueva, Nuevo Almendra, Huiririma, Sargento Lores, Ninayacu, Pucabarranca, Lancha Poza, Moron Isla, Nuevo San Pedro, Vista Hermosa (Tambor River), Nuevo Libertador (Tambor River), Puerto Arica, Nuevo San Roque, Puerto Alegre, Lagarto Cocha, San Juan de Yanayacu, San Lorenzo, Fortaleza, Porvenir de Inayuga and Nuevo San José.

¹⁷² Communities of Tuta Pishco: Puerto Huamán, Nueva Vida, Nuevo Progreso, Florida, Nueva Libertad, San Román, Cerro de Pasco, Tuta Pishco and San Francisco de Pinsha

¹⁷³ Communities of Negro Urco: Antioquía, Nueva Unión, Floresta, Vencedores de Zapote, Libertad, Negro Urco, Esperanza and Paleta

Medical personnel can be classified in four professional categories: general practitioners and physicians (GPs), obstetrics, nurses and technical nursing personnel (auxiliaries, assistants). The first three categories correspond to the superior level of training, usually educated in urban environments with tendency to abandon the isolated areas in absence of incentives to work in isolated conditions. The technical nursing personnel have a lower level of training and usually were educated in rural areas which restricts their tendency to search for urban destinations and prefer instead to grow for more challenging positions with higher responsibilities in rural establishments which are usually in the worst conditions of health of the entire population due to the scarcity of all means, inclement weather conditions and remote distant location from their centers of reference. The technical nursing group is the most delicate and vulnerable, targeted as beneficiary group of the project EHAS-Napo.

1.3.8. Assessment of the Project EHAS-Napo

This part presents a summary of relevant information about the results of two studies related to the results of the Project EHAS-Napo in Peru: the study of Ricardo Oña (2010) and the study prepared by GTR-PUCP and the EHAS Foundation to find out about the Institutional results of the project EHAS-Napo in the regional government (2008-2009).

First, there is the study of Assessment of Impact in Health, achieved by Ricardo Oña in 2010¹⁷⁴ using data obtained between 2009 and 2010. Second, there is a set of eight in-depth personal interviews in 2008-2009 performed as part of the activities for the redaction of the Report of evaluation of the Project EHAS- Napo (EHAS-Madrid 2009), with members of the beneficiary group (administrative and health attention personnel, technical and maintenance personnel), members of the local governments and local representatives and members of the management

¹⁷⁴ The author of this thesis had a role in the formulation of the Project EHAS-Napo, the process of diagnostic of needs and the preparation of the workshops for the assessment of the EHAS-Napo project (PAMAFRO 2009:26), but no participation in Oña study. Thus, his study represents an important and valuable source of information to be considered in this research, but the interpretation of such data and the significance of ICTs installed by the project EHAS-Napo in policy and regulation corresponds entirely to the author of this dissertation.

groups from Universities and NGO's involved in the implementation of the Project EHAS-Napo¹⁷⁵.

Methodology for the Assessment of the Project EHAS-Napo

Since there are two studies referred for the interpretation of the results of these projects, there are two methodologies different from each other. First, Ricardo Oña (2010) used a qualitative methodology with a group of control and the second study did not apply a group of control. Second, for the study prepared by GTR-PUCP and the EHAS Foundation, in-depth personal interviews were applied to find out about the Institutional results of the project EHAS-Napo. The place selected by Oña for the Group of Control was Tamshiyacu¹⁷⁶ (Figure 4.21).

Figure 4.21. Localization of Mazan, Tamshiyacu and Iquitos



Source: Google maps, 2011.

Then, Tamshiyacu is per definition a land in similarity of conditions related to the experimental group but where Telemedicine has not been

¹⁷⁵ Reference in Appendix 3: List of interviews

¹⁷⁶ According to Oña, six were the micro-networks pre-assessed to become Groups of control: Requena, Putumayo, Nauta, Tamshiyacu, Contamana and Sarayacu. Assessed all the profiles, the Micro-network of Nauta had the highest coefficient of co-relation ($r=0.918$), but its location was closer to the city and could not be considered as rural. Therefore, Tamshiyacu ($r=0.818$) was more alike because of its demographic conditions and also situation of rural location. Also both locations (experimental Napo and group of control) are located in the sides of the same river, facing similar logistic challenges.

displayed or applied at all. In this methodology the assessment examines the conditions of both groups (experimental group and group of control) and determines the difference in the results caused by the experiment along the time of the application (monitoring).

Table 4.22 shows the list of the 12 health establishments which are the Micro-network of Tamshiyacu in the District of Fernando Lores that was taken by Oña as a group of control for the assessment of the project EHAS-Napo.

Table 4.22 Micro-Network of the Tamshiyacu (Group of Control)

Establishment	Location
Health Center I-3	Tamshiyacu
Health Stall I-1	San Salvador de Omaguas
	Yacapana
	Santa Ana de Muyuy
	Dos de Mayo
Health Stall I-2	Aucayo
Health Stall I-1	Esperanza Tahuayo
	Mangua
	Nuevo Progreso
	Nuevo Valentin
	Serafin Filomeno
	Panguana

Source: elaborated by author with data from Oña 2010, p. 48.

The Table 4.23 shows the parallel indicators of health in both groups in 2006 (before installation of the EHAS-Napo systems):

Table 4.23 Comparative of the Micro-Network Napo-Tamshiyacu 2006

Micro-network/ Diagnosis	Napo		Tamshiyacu	
	No. cases	Incidence (%)	No. cases	Incidence (%)
Ascariasis, non-specified	5002	19.8668	1531	7.5381
Acute rhino pharyngitis	4726	18.7706	1442	7.0999
Acute bronchitis	3490	13.8615	1852	9.1186
Diarrhea and gastroenteritis	2457	9.7586	1204	5.9281
Paludism (malaria)	2438	9.6832	1038	5.1107
Pyoderma	2151	8.5432	525	2.5849
Acute pharyngitis	1987	7.8919	1389	6.8389
Supervision of pregnancy	1840	7.3080	1461	7.1934
Acute tonsillitis	1756	6.9744	2010	9.8965
Anemia (deficiency of iron)	1601	6.3588	1692	8.3308
Pulpitis	787	3.1257	71	0.3495

Source: elaborated by author with data from Oña 2010, p.48.

After explaining the methodology used on his study, only a selection of the most important indicators is introduced in this dissertation for illustrating the results of the project EHAS-Napo.

1.3.8.1. Impact of The Project EHAS-Napo

The objective of the Study of Assessment of the Project EHAS-Napo written by Oña is focused on the results related to health population because it is a study of impact in health. Thus, in order to determine the impact in health (people) and the impact in health processes (health administration), qualitative research technique was selected based on (i) documents from official institutions such as MINSA, DIRESA, Regional Hospitals, ASIS, and so forth, (ii) documents from international official institutions such as UN, PNUD, AECID, (iii) documents written by local representatives and other studies conducted from GTR-PUCP and the EHAS Foundation, and (iv) in-depth interviews with local personnel and representatives of local governments and regional authorities.

(i) Impact in health of the Project EHAS-Napo

Based on the study of Oña (2010) and considering the main purpose of the current study, the analysis of five impacts was selected to evidence the significant effect of the ICTs for the delivery of health care services: (i)morbidity, (ii)mortality, (iii)reference of patients, (iv)submission of epidemiological information, and (v)travels of the sanitary personnel.

(i-1) Morbidity

Morbidity describes the quantity of sicknesses within a population. The two main indicators of morbidity are incidence and prevalence¹⁷⁷ (Oña 2010). For the purpose of this dissertation only the incidence is presented. The incidence reflects the changes on the measurement between the start and the velocity of expansion of a disease. The rate of incidence¹⁷⁸ is generally higher in the micro-network of Napo than in the group of

¹⁷⁷ Prevalence is the magnitude of the problem. The rate is calculated by estimating the total number of ill people considering new and previous cases from a specific population (punctual prevalence) or through an interval of time (periodical prevalence). This rate is usually applied for the assessment of chronic diseases.

¹⁷⁸ The rate of incidence is the number of new cases of a specific disease, diagnosed in a defined period of time divided by the amount of people within the total amount of population.

control. Table 4.24 shows the rates of incidence of the diagnosis between 2009 and 2010 in the Napo network in comparison with its group of control, showing at glance a higher level of incidence in Napo.

Table 4.24 Comparative evolution of the rate of incidence of the Napo Network and its group of control Tamshiyacu

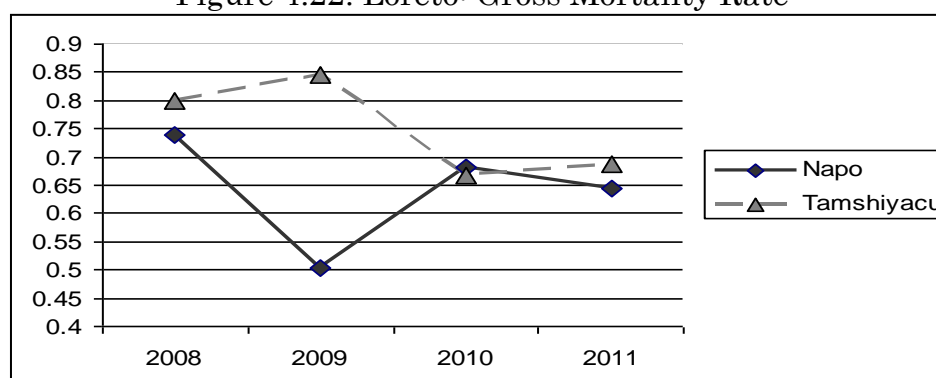
Micro-network/ Diagnosis	Tamshiyacu		Napo	
	2009	2010	2009	2010
Ascariasis, non-specified	12.38	11.34	24.05	15.27
Acute rhino pharyngitis	9.70	7.54	34.32	21.53
Acute bronchitis	16.04	6.73	16.26	11.32
Diarrhea and gastroenteritis	16.60	6.67	17.81	10.68
Paludism (malaria)	17.95	13.91	8.91	4.61
Pyoderma	12.28	7.21	7.43	4.70
Acute pharyngitis	8.97	5.82	11.00	10.32
Acute tonsillitis	6.38	2.15	12.38	5.81
Anemia (deficiency of iron)	2.14	1.62	15.98	5.77
Pulpitis	1.49	0.88	1.55	1.25

Source: elaborated by author with data from Oña 2010, pp. 51-70.

(i-2) Mortality

In Loreto there was a significant drop on the rates of mortality due to an increasing on the investment in health in the region. One of the highest difficulties of the present study, related to the fact that the registry of deceases was not updated in the health centers corresponding to the micro-networks, and the only data existent was collected from the municipalities Napo and Fernando Lores¹⁷⁹ (Figure 4.22).

Figure 4.22. Loreto: Gross Mortality Rate



Source: elaborated by author with data from Oña 2010, p.73.

This data shows that in terms of levels of mortality of the Micro-network Napo, it was on top of the group of control on 2010 and shown a significant decreasing until 2011.

¹⁷⁹ The inconvenient is that not all deaths are registered or notified. Therefore, Oña explains that the data reflects the tendency of the indicator, and should be taken as an approximation (Oña 2010)

(ii) Impact in Health Attention and Capacity of Resolution

(ii-1) Reference and Dereference of Patients

The process of referral of patients of the Peruvian health care system refers to the infrastructure of health attention network, the human resources, the norms and guidelines, and the procedures that allow the use and transfer of the medical records of patients. Also, these records are used for studies, diagnostics and reports between HPs and HCs and between one facilitator of services and another (private/public). The objective of the system of reference is to guarantee the accessibility, opportunity and monitoring of patients who may need special care according to the complexity of their pathologies. These procedures enhance the articulation of the health services putting together the primary, preventive and recuperative attention systems (Oña 2010).

In the reality of rural areas of Peru the system of referral of patients is overloaded because commonly, a person goes to the health center which is closer to their communities, and more commonly, goes when required, and not necessarily with an appointment. Sometimes the need of the patient is more demanding than the attention that the health establishment is able to provide. Then, in both cases, it becomes time consuming and costly to attend the patient immediately. The choices are to order the records and wait for the records to be sent to the health establishment or to transfer the patient to that reference center.

Oña also expressed a difficulty in collecting information from the group of reference since the number of references was not listed in some of the health posts. Therefore, the only comparison available was related to the evolution of the number of references for one micro-network and another from the evolution of the number of references received in the head of the micro-network: Santa Clotilde as HC head for Napo and Tamshiyacu for the group of control. Also has accounted information from the Regional Hospital of Loreto which only had register over 2008.

Results were highly positive related to the system of telemedicine. In the Micro-network Napo, the number of references was reduced in 50%

in the last three years, whilst in the group of control there was a tendency for the raising to the number of patients referred to higher hierarchic levels. Therefore, Oña highlighted the following results:

- Decreasing on the number of delays on the primary attention of health;
- Saving on trips for the sanitary personnel (who also have to abandon their work place for escorting the referred patients) and the patient;
- The reduction on the number of travels allows the technical and medical personnel in charge of the facilities to remind attending other patients in their facilities reducing the time of abandonment of their place of work, especially in the isolated facilities that only have one or two people in charge of the emergencies;
- The usage of the telecommunication network has been promoted; and
- The use of tele-assistance was promoted because the technical personnel used them as a result of the training programs that were significant part of the Project EHAS-Napo (Oña 2010: 78-81).

(ii-2) Submission of Epidemiological Reports

The system of epidemiological surveillance of the DIRESA Loreto is regulated by the General Law of Health 26842 in the reference to the national and international control of transmissible diseases, establishing that the authority of health is entitled to promote and coordinate with public and private persons and institutions for the achievement of activities in terrain with epidemiological and sanitary objectives. The DIRESA Loreto defines the concept of notification as the official communication of the detection of suspicious, probable or confirmed cases of a disease or event subject of epidemiological surveillance up to the General Direction of Epidemiology of the DIRESA¹⁸⁰ (MINSA 2010).

As shown in Table 4.25 and Figure 4.23, Oña found out that the micro-network of Napo reporting to Santa Clotilde dropped significantly from 2009 which evidences the use of tools to avoid transfers and trips:

¹⁸⁰ Following the procedure for epidemiological surveillance, every week this information should go in the shape of reports from the health facilities (HSs, HCs) to the Head of the Micro-network which collects the information from their dependents, organizes it and sends it to the DIRESA which is in charge to consolidate the regional information and sends it to the National Direction of Epidemiology in the Ministry of Health (MINSA 2010).

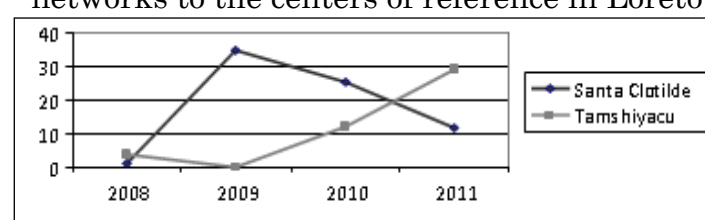
they are using the ICTs for the transmission of reports through the internet which mean a significant saving of time and energy in an environment where the only means of transport are fluvial, expensive and submitted to availability (Oña 2010: 81-82).

Table 4.25 Comparative rate of weekly reports not sent from the micro-networks to the centers of reference in Loreto

Micro-network/ Year	2008	2009	2010	2011(*)
Santa Clotilde	1.19	34.72	25.16	11.67
Tamshiyacu	3.60	0	11.93	29.01

Source: elaborated by author with data from Oña 2010, p.81.

Figure 4.23 Comparative rate of weekly reports not sent from the micro-networks to the centers of reference in Loreto



Source: elaborated by author with data from Oña 2010, p.82.

Furthermore, according to the study of Oña the system of epidemiological surveillance in the Loreto Region had not changed much in the previous 20 years. The formularies to complete in each establishment are intact as designed then and there and only the new technologies are available in certain micro-networks (such as Napo) making it harder for some than others to spread and send the information opportunely (Oña 2010:23).

(iii) Economic Impact

The project had a great impact over the savings on travels and transfer of patients by using the ICTs and resources of the project for coordinating diagnostics and treatments before making a decision about transporting the patient, also reducing significantly the need for abandoning the health centers due to transportation needs.

(iii.1) Travels of the sanitary personnel

There are many reasons why the sanitary personnel located in the health posts and health centers should abandon their work stations, such as (i) training programs from the DIRESA; (ii) vaccination campaigns

which required working on further locations on the jurisdiction of the facility; (iii) missions of service to support other establishments; (iv) convalescence to check over self-health of the personnel; and (v) referral of patients to a higher level of attention, amongst others.

There was limited data from the group of control and only the micro-network Napo has a complete register of transfers, making impossible to compare the data. Table 4.26 shows a summary of the travels of the personnel of the micro-network disaggregated by its causes.

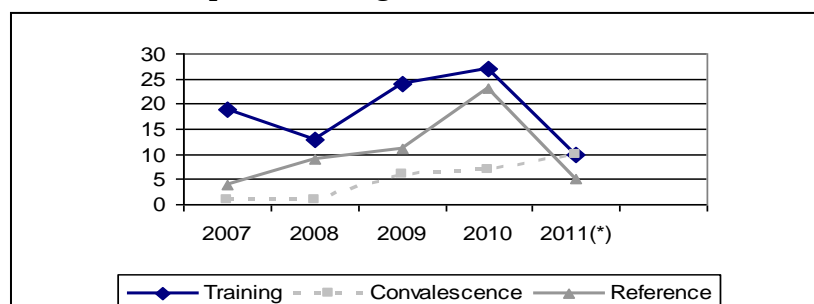
Table 4.26 Number of travels of the health personnel in the Micro-network Napo (training, convalescence and references)/Loreto

Micro-network/ Due	Number of travels of the health personnel in the Micro-network Napo (training, convalescence and references)				
	2007	2008	2009	2010	2011(*)
Training	19	13	24	27	10
Campaign	12	45	37	44	13
Mission of service	47	65	72	68	46
Convalescence	1	1	6	7	10
Referral	4	9	11	23	5
Others	12	23	31	41	16
Subtotal	95	156	181	210	100
Total	742				

Source: elaborated by author with data from Oña 2010, p.86.

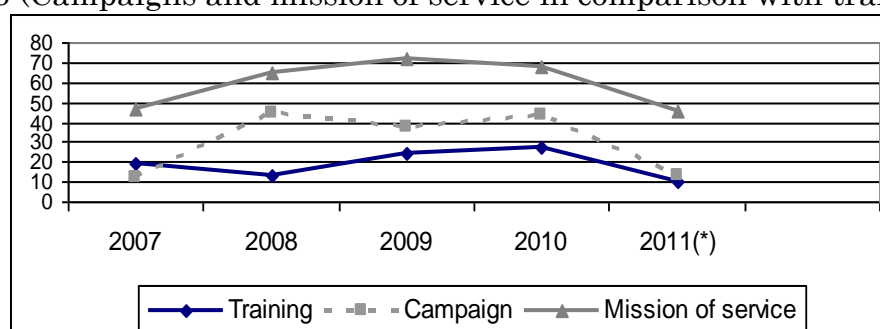
For example, the number of trips for training purposes, convalescence and referral of patients had risen progressively up until 2010, and then the tendency drops significantly. The following graphs compare the results obtained from the rest of the causes of abandonment of their work stations such as vaccination campaigns and missions of services. The comparison shows the number of occasions when training has been provided to the personnel, and the number of times required to go to other missions for supporting other missions (Figures 4.24 and 4.25).

Figure 4.24 Number of travels of the health personnel in the Micro-network Napo (Training, convalescence and references).



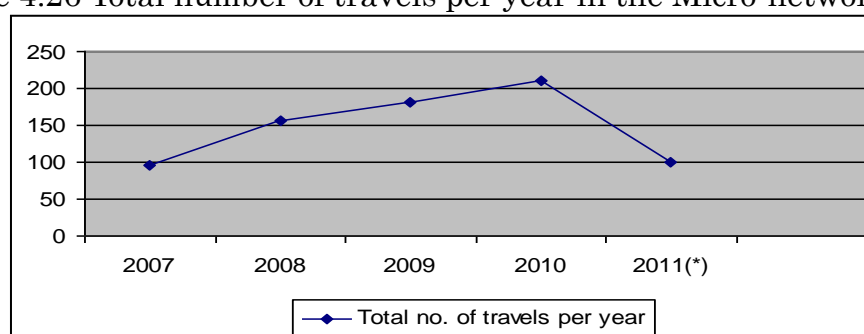
Source: elaborated by author with data from Oña 2010, p.83.

Figure 4.25 Number of travels of health personnel in the Micro-network Napo (Campaigns and mission of service in comparison with training).



Source: elaborated by author using data from Oña 2010, pp. 83-84.

Figure 4.26 Total number of travels per year in the Micro-network Napo



Source: elaborated by author with data from Oña 2010, p.84.

Figure 4.26 shows the total number of travels made by the professionals of health in the micro-network Napo. These graphics explain the decreasing in demand of traveling for health personnel and correspondent savings in time, availability and costs, due to the use of ICTs instead of constant trips for coordination and transportation¹⁸¹.

Nevertheless, results should be taken carefully since the methodology applied by Oña does not show its method for control of spill-over of information, and does not explain on detail of the measurements adapted by the DIRESA Loreto in its plan of actions from 2009. This lack on the explanatory data limits the precision of the study in terms of evidencing the quantitative significance of the use of ICTs for health improvement the delivery of health care attention even it does not interfere with the precise purpose of the current dissertation.

¹⁸¹ Also, the downward tendency towards 2011 raises the need to keep on monitoring these results to evidence quantitatively the implications of these indicators in terms of economy and productivity.

(iv) Institutional Impact

A special monitoring process was designed for finding about the institutional impact of the project EHAS-Napo, as part of the methodology of the project and to ensure the acceptance of ICTs and its adaptability to the public system. As part of the Report of Evaluation of the Project EHAS-Napo, there is a set of eight in-depth personal interviews in 2008-2009 performed by GTR-PUCP and the EHAS Foundation, performed with members of the beneficiary group such as administrative and health attention personnel, technical and maintenance personnel, members of the local governments and local representatives and members of the management groups from Universities and NGOs, finding positive results in an overall band but with a small database¹⁸² of eight interviewees¹⁸³. The questions were focused on use and impact of the project over the technical personnel to find out about their further needs and demands (to fit those between the roles of the consortium members) and to know if there is any other use they could give to the network for their further inclusion on the information society (and to consider it for future work).

The interviewees showed their appreciation for the positive changes in the institutional use of ICTs in the DIRESA Loreto, as it facilitated their work in the health centers. The interviewees also expressed the need of further support from the local authorities to break the organizational barriers of the systems (policies) to help them work supported by rules of the institution¹⁸⁴. They also referred to the need for funding to find a person for coordination of Telehealth use. In 2009, the DIRESA Loreto had a person in charge of the maintenance of their own systems, but not paid personnel for the purpose of ICTs in the micro-network, opening two positions for coordination of IT and coordination of telemedicine services

¹⁸² This data has been collected from December 2008 until March 2009, following the methodology of Foundation EHAS¹⁸² one year after the end of the operations in the field of work.

¹⁸³ Further details in Appendix 3: List of interviews

¹⁸⁴ From interviews with Dr. Jose Luis Rivas Lozano (Chief Doctor at Mazan Health Center) and Lic. Blanca Luque (Chief Nurse at Negro Urco Health Post).

at the end of 2009 (EHAS-Napo 2011). This was an important institutional change for the sustainability of the telemedicine service.

Personal comments about the positive results of the networks were expressed in the meetings, which had the interpretation of wide acceptance by the health workers and the authorities of the health institution. This perception may eventually lead in to a favorable attitude toward the implementation of ICTs as a formal communication means in the health system.

(v) Impact in Policy

The first five interviews were conducted to the directives at the regional level, and were more focused on finding results about the pertinence of the action, their perception about the role of the members of the consortium between university, NGO and local governments and information about the capacity of the local authorities to support the initiative in the long term. The response was generously positive at the time, and transformed into written commitments that were countersigned by the resident authorities from 2008 (EHAS-Napo 2011).

Political informal agreements in the Amazonia are commitments of the local governments. These agreements were often informal at the start, and were related to the use of public lands for the installation of antennas, the disposition of resources from the municipality for storage of materials and parts during the time of installation and use of the municipality installations for the workshops and training courses in Telemedicine for technical, administrative and health personnel. These agreements were often supported by the regional governments with intention to promote and replicate good initiatives for obtaining of political approval from the citizens.

At the end of the project EHAS-Napo and in order to transfer the project formally, several agreements were made with the representatives of the DIRESA Loreto about the commitments of the local authorities to support the costs of the networks. Thus, the implementation of political changes in the environment for institutionalizing ICTs for the processes of

public health was motivated from the users of ICTs such as DIRESA and health workers.

About training and building capacities in health workers, the interviewees agreed 100% upon the need to keep on training and achieve a better knowledge of the functioning of the systems for maintenance purposes. This strategy requires a policy to continue the processes of personnel formation due to the need of facilities and budget for preparing and doing the training sessions. The interviewees highlighted the importance of distance learning and training for medical and also administrative staff¹⁸⁵.

1.3.8.2. Sustainability of The Project EHAS-Napo

In June 2010, the EHAS Foundation started organizing the study of assessment of the project EHAS-Napo considering several aspects of sustainability such as social, technological, institutional and political. Using information from primary sources and data from the health centers (in-situ) and the partner institutions (GTR-PUCP, Regional Government of Loreto), this section aims to summarize the results.

Social Sustainability

The social environment of the project EHAS-Napo offered more attention and effort to the identification of the health problems of the area and the needs of the health personnel without including in the process the participation and the feedback from the regional authorities from the DIRESA Loreto and the regional government because their representatives were not present in the workshops for training¹⁸⁶. Still, the acceptance of the system of technologies was positive from the group of the authorities and the health workers independently.

¹⁸⁵ From interview to the Dr. Ulises Jorge (Assessor of Social Development from the Loreto Region) and Dr. Rolando Frias Urbizagastegui (Chief at the Emergency and Critical Units Department of the Regional Hospital of Iquitos; Cardiologist).

¹⁸⁶ Because the framework of the project EHAS-Napo was not part of any regulation, the authorities appear spontaneously in the facilities, compromising as authorities only with the organizers, but not with the health workers in the isolated health establishments.

Technological sustainability

One of the main obstacles of the health system found in the project EHAS-Napo was to reach the technical sustainability of the networks. Eventually, the time of response of the network was longer than expected, causing transfers for verification incurring in high costs of combustible. Other problems were related to the maintenance of the systems by not detecting the failures in the regular use of technologies in order to have a diagnostic and reparation before the requirement of physical verification.

Institutional and political sustainability

The main difficulty of sustainability of the project EHAS-Napo was the lack of an annual budget guaranteed from any of the regional or local authorities for covering the expenses for maintenance of the networks after the ending of the external donation. Thus, there was also the need for a policy to support the assignation of such as resources from MINSA or regional or local government but such as change was not achieved by this project.

In this situation, the representatives of the EHAS Foundation in collaboration with the executive team of GTR-PUCP and their collaborators from the local health establishments prepared a maintenance budget and a plan for sustainability as part of the efforts for sustainability of the project. The requirement for budget of the EHAS-Napo proposal involved organic changes in the structure of the personnel from DIRESA Loreto for the maintenance in two areas: continuous training and maintenance of the equipment, and it was informally accepted by the DIRESA Loreto.

1.4. The Project Putumayo (2010-2011)

The Project “Telemedicine for the border integration in the Putumayo River” aimed to reduce the rates of maternal and infant mortality in the basin of the Putumayo River. This are is located in the frontier between Colombia and Peru through the integration of the health systems of both countries using information and communication technologies¹⁸⁷.

The project was installed in Peru and Colombia from August 2010 until August 2011 and assessed between May and July 2012 by members of the executive team from the GTR-PUCP and ORAS. This project was chosen as a case of study for this dissertation due to its bi-national significance in the border region for improving access to health services.

The project Putumayo installed a communication network in seven health establishments in Peru and four in Colombia, located in the basin of the Putumayo River. This network had the capacity of supporting the transmission of information with medical images for diagnostic and remote training¹⁸⁸ and provided connectivity from the health posts to the regional hospital for specialized health attention¹⁸⁹.

1.4.1. Facts about the Border Region

In March 1979 it was subscribed the Treaty of Cooperation in the Amazonia between countries voluntarily reunited due to their interest in common objectives for the development of the populations living in their borders. After long periods of dialogue, these countries only achieved to subscribe bi-lateral agreements¹⁹⁰: Colombia- Ecuador and Colombia-Peru

¹⁸⁷ The proposal of this project followed one of the priorities expressed in the Plan Colombia-Peru for the Comprehensive Development of the Basin of the Putumayo River which proposes the creation of strategic networks using innovative technologies promoting the reduction of the digital divide and promoting the use of ICTs in the border areas.

¹⁸⁸ The project facilitated remote access for the health personnel to be trained in the National Strategies of Comprehensive Attention of Infant Prevalent Diseases (AIEPI), maternal health, nutritional and epidemiological surveillance courses.

¹⁸⁹ The project provided a network of communication with the capacity to support the transmission of information (data) and medical images (video) in a life stream format in 12 health establishments located in the border area of Peru and Colombia.

¹⁹⁰ The objectives defined in these bi-national agreements of borders integration are as follows: contribute to the quality of living of population through promotion and generation of productive activities and generation of employment; improvement of the infrastructure of basic services; promoting the integration of these communities toward the national areas as an element of

(March 1979)¹⁹¹, Brasil-Peru (October 1979), Brasil- Colombia (March 1981), and Bolivia-Brasil (August 1988).

In August 26, 1987, the Chancellors of Colombia and Peru subscribed a Joint Communication that they made public about the adoption of a plan of action centered in the issues of cooperation in the Amazonia. The first step was to call a commission to start the development of the Plan for Comprehensive Development of the Basin of the Putumayo River¹⁹². In 1990, the Plan covered a surface of 160,500 km² in areas equally correspondent from each country and covers a population of about 96.300 inhabitants in a population density of 0.6 inhabitants per km² (Figure 4.27).

Figure 4.27 Map of the Territory of the Plan for Comprehensive Development of the Putumayo Basin between Peru and Colombia.



Source: website of the Organization of American States, 2008 (last visited April 25, 2014).

development; promote the presence of bi-national organisms and enforce their integration with the communities; contribute to the delimitation of environmental areas as the base of territorial organization and for the implementation of models of production based on natural resources, and promote the environmental management in the frontier areas.

¹⁹¹ The Treaty of Cooperation in the Amazonia between Colombia and Peru establishes on its article no. 1 that this agreement has been signed to offer maximum priority and dynamism to the design and implementation of a cooperation policy in the Amazonia oriented toward the establishment of the mechanisms that can adapt the particular needs for the integral development of their territories.

¹⁹² The Plan of Cooperation between Colombia and Peru had objectives and a bi-national budget, and the opportunity for finding resources of international cooperation to work in the economic integration and improve the quality of living of these populations such as Telemedicine.

The Colombian area corresponds to the hydrographic basin of the rivers Putumayo (west), Caqueta (east) and the area of the Amazonian Trapeze between the departments of Putumayo and Amazonas. In Peru, the corridor comprehends the territory between the Napo River and the Amazonas River, and the area between them and the Putumayo River, reaching the provinces of Maynas and Ramon Castilla. In 2010, the north-west area of Puerto Leguizamo (Colombia) had the largest population of the area, the military base with doctors, and the only x-ray equipment available. In the south-east area is the locality of El Estrecho (Peru) and there was the only Peruvian health center with two medical doctors.

Population in the surrounding areas of the Putumayo River is dispersed in a big terrain with population density of 0.7 inhabitants per km². In 2010, there was a big proportion of young population signifying powerful working potential for economic development. Most of inhabitants live in the margins of the rivers and the population over 15 years old had a high percentage of illiteracy due to its rural character and lack of access to the educative system¹⁹³.

Regional Economy

Regional economy is supported by the trade activities and incipient development in other activities. The Peruvian area depends on external trade for ensuring good supplies. Agriculture is basically of subsistence, being the main crops dedicated to corn, rice, beans, plantains, cassava and sugar cane. People in this area were often related to extractive activities such as hunting, fishing, agriculture and forestry. Cattle activity is limited and developed in a deteriorated terrain due to inadequate traditional technologies applied for permanent seasons, deficient feeding, scarcity of sanitary control and limited supply of salts and concentrated meals. Artisanal fishing is commonly used in the region for subsistence, still insufficient for local supply.

¹⁹³ In the basin of the Putumayo River, there are eight ethno-linguistic groups, distributed in 41 human settlements. From these populations, only 34% of the dwellings are subscribed to the official registration, whilst 66% are informal or squatter settlements without titles of property (GTR-PUCP 2008).

Due to the fluvial nature of the terrain, there is an extensive hydrographic network of the rivers Putumayo, Amazonas, Caqueta, Napo and Yavari. This frame of fluvial communication emerges as a response to the problem of transportation. Therefore, most of the activities, including transportation of patients to the referral centers are done waterway, even when there is a limited pass through the frontier in terms of capability of pass and hours of flow (tides). Fluvial communication depends always on the level of the tides which in the condition of the infrastructure of the area are unpredictable.

Terrestrial transportation means are scarce, limited, of difficult access and the weather conditions and quick growing vegetation of the area represent a major difficulty for construction and high maintenance due to these geologic and climatic conditions.

Political and Administrative Structure

Public sector has a weak representation in the districts due to the absence of local government representatives or established offices of the municipalities in the area. Labor, social and politic organizations are scarce, and the low density of population keeps communities isolated from each other making the authorities weak¹⁹⁴.

In this scenario, citizens' participation on political decision making is scarce, due to several reasons: difficulties on availability of transportation means for attendance to meetings and communal calls, lack of interest, poor perception of the public services (mainly education and health), or lack of interest from the municipalities as perceived by indigenous populations. Health centers and schools are the only places that congregate small groups of the community to speak about topics of interest of the mothers and children of the region.

1.4.2. Situation of Health in the Border Region

The border area of Putumayo comprehends territories from Colombia and Peru. The Colombian area comprehends the departments of Putumayo and Amazonas, extended from Leticia to the Putumayo River,

¹⁹⁴ Native population keeps temporary relations with groups from the exterior for specific purposes, and they represent the mass of population of the area (85%).

and from the north limits with the Caqueta River. The Peruvian area comprehends the north part of the province of Loreto, reaching the provinces of Maynas and Ramon Castilla and involving the populations in the basin of the surrounding rivers.

The Main Health Problem

The main health problem in the area of Putumayo is the high levels of maternal and infant morbid-mortality. They were caused for delays in diagnostic and administration of treatment and the lack of coordination for transfers due to the difficulties of communication between the health posts and their reference centers.

There is a lack of an organized system of reference and dereference of patients due to lack of presence of specialists in the micro-network, and the incapacity of using communication means for second consultation. Transportation wise, the only available were sliders or small boats, which depends on the tides of the rivers and readiness to act in an emergency. Another difficulty on the reference of patients is related to the indiscriminate access of patients to the health services from one or another side of the border with or without medical records.

Furthermore, the inadequate practice of traditional healing promotes the massification of transmissible diseases, and the lack of access to safe water¹⁹⁵ enhances the spreading of diseases. These problems are intensified by the deficiencies in the health system such as the lack of technology, supplies and equipment for accurate diagnostics and communication means for coordination in the case of emergencies and treatment of viral sprouts.

¹⁹⁵ The conditions of sanitation of the area are unfavorable. There is a lack of complete networks of running water and sewage increasing the risks on diseases related to hygiene and feeding. There is not an organized system of disposition of excretions or rubbish collection, which generates negative conditions of sanitation and hygiene. In the area of intervention of the project Putumayo, only Puerto Leguizamo (Colombian side) a partial network of running water and sewage. In the Peruvian area only El Estrecho has a system of running water. In the Amazonian area between the two countries, at least 92% of dwellings use the water of the rivers for satisfying their needs. The rest of populations in the area of Putumayo do not have a system of potable water.

The Health System in the Putumayo Area

In Loreto, the health services are administratively decentralized and managed by geographical regions to facilitate its access to resources. MINSA manages the national health care policy and supervises compliance in over 80% of the health facilities at the national level. The rural areas are on charge of the DIRESA as a deconcentrated organism¹⁹⁶.

In the following tables there is a summary of the donation of resources in the health systems that integrate the micro-network of Putumayo as in Peru (Table 4.27) as in Colombia (Table 4.28).

Table 4.27 Institutions offering health services in the Peruvian border

Department/Area	Health establishment	Resources
Teniente Manuel Clavero	Health center- Soplin Vargas	Microscopy, satellite phone
Teniente Manuel Clavero	Health post – Angusilla	First aid, basic supplies
Teniente Manuel Clavero	Health post- Nueva Esperanza	Microscopy
Teniente Manuel Clavero	Health post - Santa Mercedes	First aid, basic supplies
Putumayo	Health post - San Francisco de Ere	First aid, basic supplies
Putumayo	Health post - Flor de Agosto	First aid, basic supplies
Putumayo	Health center - El Estrecho	Microscopy, satellite phone and sliders (transportation)

Source: adapted by author with data from the Report of Pre-feasibility GTR-PUCP 2009

Table 4.28 Institutions offering health services in the Colombian border

Department- Area	Health establishment	Resources
Putumayo	Hospital -Puerto Leguizamo	Microscopy, satellite phone, sliders
Putumayo	Health post - Nariño	Microscopy, sliders
Putumayo	Health post - Puerto Perea	Microscopy, satellite phone, boat
Putumayo	Health post - Cabildo Inca	Microscopy
Putumayo	Hospital- San Rafael	Microscopy, satellite phone, sliders

Source: adapted by author with data from the Report of Pre-feasibility, GTR-PUCP 2009

System of Reference and Dereference

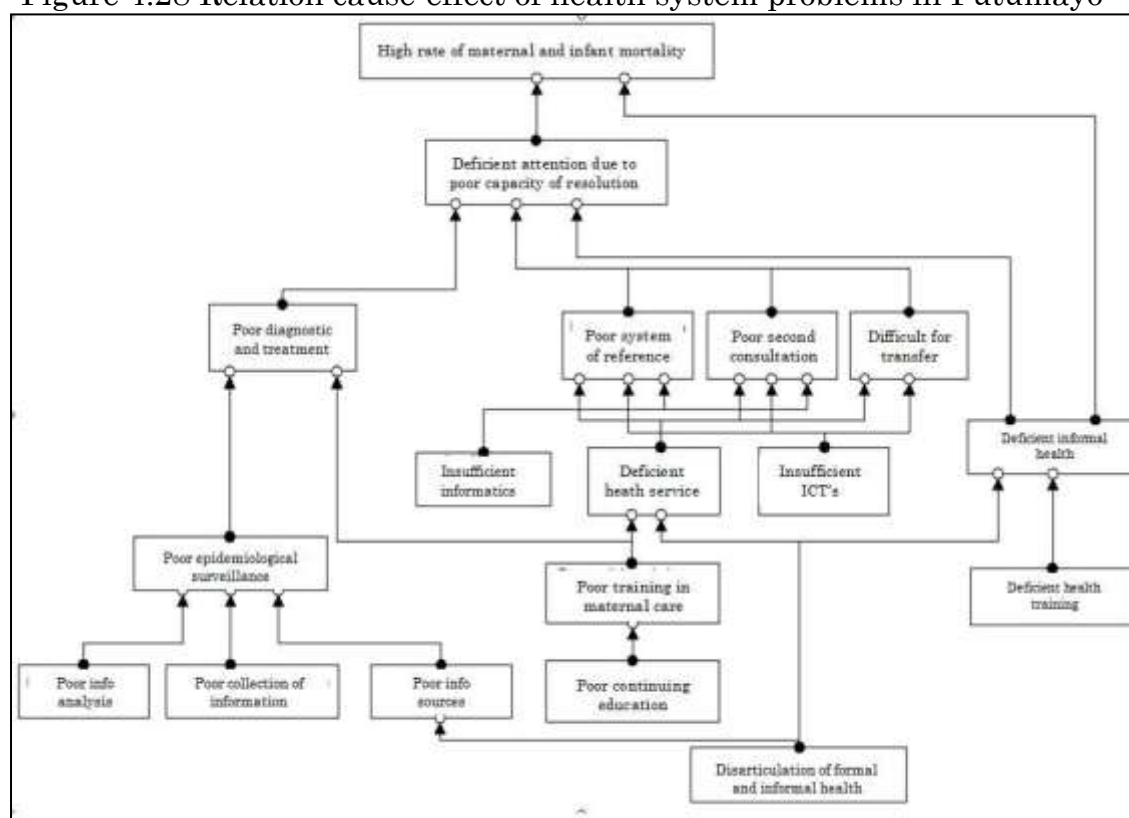
The system of public health in Putumayo area lacks of a controlled and standardized system of reference and dereference of patients for inter-

¹⁹⁶ Same in the previous cases of study, the health attention system in Peru is organized by: (i) levels of attention, according to magnitude of the cases that they are able to attend (emergency, diagnosis, treatment, surgery, etc), (ii) levels of complexity, according to the severity they are able to attend (internment, rehabilitation, therapy, dialysis, etc), and (iii) categories of the establishments, according to the medical personnel and level of specialization of the personnel in charge. The primary health attention systems are based on two kinds of establishments: health centers (HCs) and health posts (HPs) which are located within 80 up to 200 kms distance from the regional hospitals of reference. At this level, the personnel are organized in four groups: medical professionals, obstetricians, nursing staff and nursing technicians.

consultation with superior levels of attention¹⁹⁷, specialized levels and systems of immediate coordination for transfer of emergencies.

Previous to the start of the project and according with the reports of health of the area, more than 60% of births and at least 50% of infant diseases were not attended in a health establishment and registered or detected by the national system of health (MINSA 2008). Also, due to a deficient registry of data, substantial income from out-of-pocket attention was not collected as beneficiaries were not correctly registered. Therefore, the indicators of incidence are not trustable, making difficult the estimation of costs for prevention or assess the real impact of diseases in the area (Figure 4.28).

Figure 4.28 Relation cause-effect of health system problems in Putumayo



Source: Formulation of the Project Putumayo, GTR-PUCP 2009a, p.6.

1.4.3. History of the Project Putumayo

As mentioned before in this Chapter, the project Putumayo is the consequence of a long time of conversations between the Chancelleries of the government of Peru and Colombia with the mediation of the

¹⁹⁷ Superior levels of attention such as from the health posts to the health centers and the regional hospitals. The levels of attention refer to the capacity of resolution of the health establishments.

Community of Andean Nations (CAN) and the Andean Organism of Health (ORAS) for the implementation of a project for improvement of the health conditions of people in the border area. Since May 2007, representatives of the Colombian Chancellery came to Peru and vice-versa. As result of these conversations the agreement of Chancelleries was to order a study of feasibility of the implementation of a telemedicine network for the health establishments of the border area with intention to test the costs and capability of the technologies.

After a complicated process¹⁹⁸, the Project Putumayo was approved in the framework of the project “Economic and Social Cohesion of the Andean Community” (CESCAN) with financial support from European Union. The project of telemedicine aimed to provide connectivity to the health centers in the Putumayo area using ICTs for medical consultation and providing access to health services close to their neighborhoods. The main result of the project was the decrease of the incidence of transmissible infectious diseases and the morbid-mortality in maternal and infant health in the Putumayo border area between Peru and Colombia.

1.4.4. Partners of the Project Putumayo

The project Putumayo had the participation of four institutions: the Pontifical Catholic University of Peru as coordinator technological partner for design and deployment of the networks; the EHAS Foundation for the development of the strategy and coordination of the installations and training activities in the Peruvian and Colombian sides. Also, it had the participation of the National University of Colombia (UNAL) and the University of Cauca (UNICAUCA) as Colombian counterparts for the deployment, training and monitoring of the network activities.

This project also had the collaboration from the Regional Direction

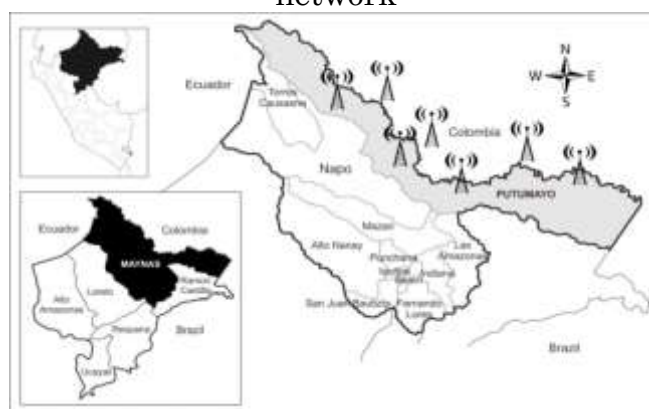
¹⁹⁸ The study took about three months in land and two months for the testing of technologies and preparation of the alternatives during 2008. Chancelleries received their reports and studied the alternatives, and in October of that year they decided to open a public contest for proposals to honor the commitments agreed by both countries. After an exhaustive process the selected proposal was announced by the end of the year and in January 2009 the design was ready for installation with support of the Chancelleries, CAN and ORAS.

of Health of Loreto (DIRESA Loreto), the Ministry of Health from Peru, the Secretariat of the Department of Amazonas and Putumayo from Colombia, and the direct coordination of the Andean Organism of Health on its agreement *Hipólito Unanue* (ORAS-CONHU) as sub-receptors and administrators of the donation from European Union.

1.4.5. Geographic Location

The frontier of Peru and Colombia has an area of 1.626 km² with an average of 0.7 inhabitants per km². The Colombian area comprehends the Departments of Putumayo and Amazonas, extending from Leticia to the Putumayo River, and from the north area limits with the Caqueta River. The Peruvian area comprehends the north part of the province of Loreto, reaching the provinces of Maynas and Ramon Castilla and involving the populations located in the basin of the Putumayo, Amazonas, Napo and Yavari rivers (Figure 4.29). In 2008, most of inhabitants were of indigenous origin (21%) and they live in the basin of the rivers due to the resources that the rivers represent for their daily living (MINSA 2010).

Figure 4.29 Map of the Region Putumayo and location of the telemedicine network



Source: elaborated by author

In Peru, the district of Putumayo belongs to the Department of Loreto, under jurisdiction of the Regional Direction of Health of Loreto. The localities where the ICTs infrastructure has been installed belong to the District of Putumayo (San Antonio del Estrecho, Flor de Agosto, San Francisco de Ere and Santa Mercedes), and the District of Teniente Manuel Clavero (Soplin Vargas, Angusilla, Bellavista and Nueva Esperanza). In Colombia, the areas of implementation of the project are

located in the Department of Amazonas in the locality (*corregimiento*) of El Encanto (San Rafael and Puerto Alegria), and the Department of Putumayo in the municipality of Puerto Leguizamo (localities of Nariño and Puerto Leguizamo).

The Putumayo River has a length of about 1.700 km from the critical point in Puerto Leguizamo until the area of Tarapaca, close to the frontier with Brazil. The main idea of this project was to work from the area of Puerto Leguizamo (in the Colombian side) until the point called *El Estrecho* (Peru) covering about 387 km over the border line in the area of the Putumayo River (Figure 4.32).

1.4.6. Services offered by the Project Putumayo

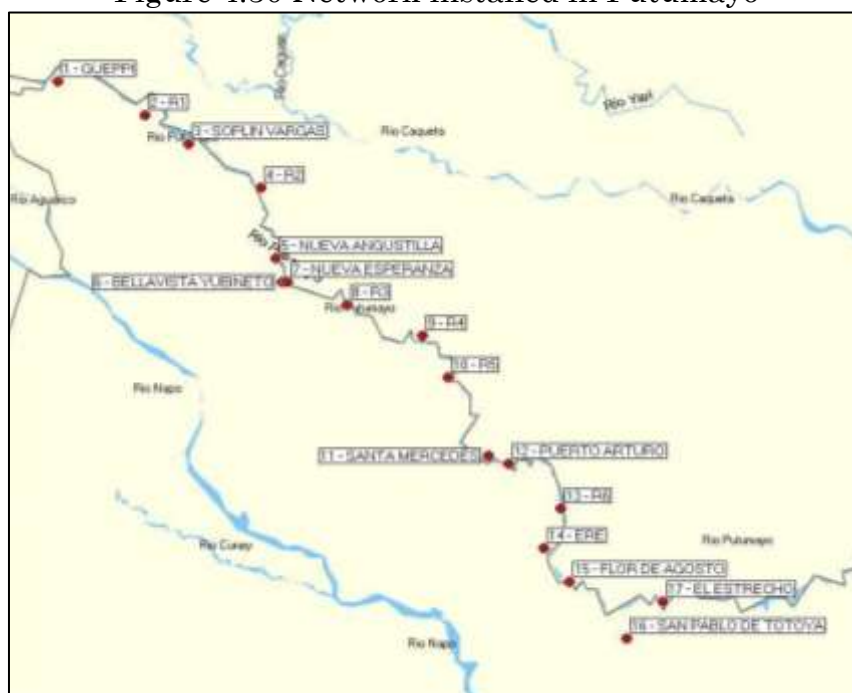
The project Putumayo provided supporting ICTs tools for the delivery of health care services as follows: (i) support for administrative systems and facilitating logistic coordination on remote bases; (ii) support for communication services between the regional hospitals and the local health attention establishments; (iii) support for coordination between the peripheral establishments and the hospitals for reference of emergency patients; (iv) support for breaking the isolation of medical personnel; (v) facilitates on-line consultation and promotes exchange of medical information such as second consultation, patient referral and counter referral, epidemiologic incidents, casualties and deceases.

The provision of connectivity and telemedicine services included: service of IP telephony; Internet service (navigation, e-mail, etc.); video-conference system; tele-stethoscopy system; tele-ultrasound and tele-ecography system. These services were implemented for providing tools to facilitate immediate diagnostic and treatment for maternal and infant care for physicians and health workers.

The Putumayo Network

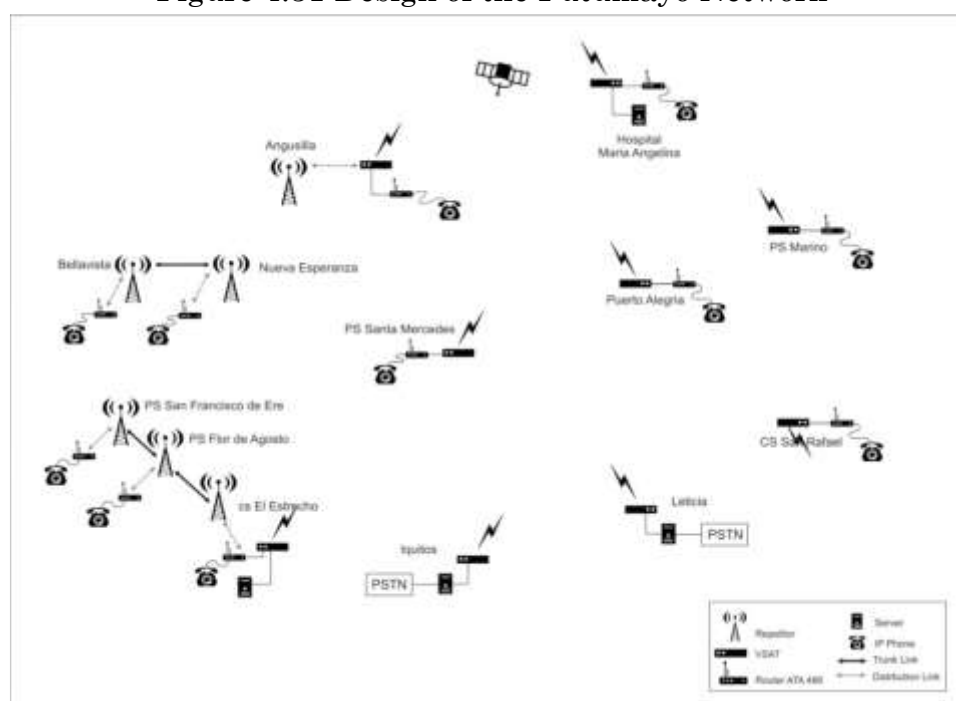
This network has been installed in 11 health establishments: seven in Peru and four in Colombia, using a combination of wireless and satellite connections (Figures 4.30 and 4.31; Tables 4.29 and 4.30).

Figure 4.30 Network installed in Putumayo



Source: Formulation of the Project Putumayo 2008, p.21.

Figure 4.31 Design of the Putumayo Network



Source: Formulation of the Project Putumayo 2008, p.23.

Table 4.29 Installation of nodes of telecommunications in Colombia

Health establishment	Network implementation
Hospital de Angelines	Satellite station V
Health post - Nariño	Satellite station V
Health post - Puerto Alegria	Satellite station V
Hospital- San Rafael	Satellite station V

Source: Formulation of the Project Putumayo 2008, p.18.

Table 4.30 Installation of nodes of telecommunications in Peru

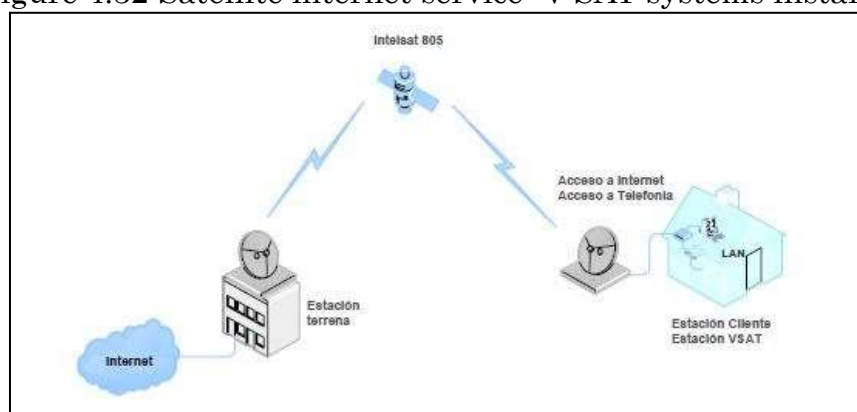
Health establishment	Network implementation
Health center - El Estrecho	Satellite station V-sat, Wireless Client station (WILD), Router and access point WILD
Health post - Flor de Agosto	Satellite station V-sat, Router and access point WILD
Health post - San Francisco de Ere	Satellite station V-sat, Router and access point WILD
Health post - Santa Mercedes	Satellite station V-sat, Wireless Client station (WILD), Router and access point WILD
Health post – Angusilla	Satellite station V-sat, Wireless Client station (WILD), Router and access point WILD
Health post- Nueva Esperanza	Satellite station V-sat, Router and access point WILD
Health post - Bellavista	Satellite station V-sat, Router and access point WILD
Health center- Soplin Vargas	Satellite station V-sat

Source: Formulation of the Project Putumayo 2008, p.19.

Technologies

For the installations in Peru, there is a hybrid technology using a combination of wireless antennas and satellite systems (V-SAT). In the Colombian side, due to challenging geographic conditions, there was mostly satellite engineering (Figure 4.32).

Figure 4.32 Satellite internet service- V-SAT systems installed



Source: Formulation of the Project Putumayo 2008, p.22.

Satellite engineering disposes the implementation of software and hardware capable of enrouting the transmission of the signal from the satellite through the air, and repeats the signal for provision of connectivity service to the client terminals on earth, in this case installed in the health establishments. This signal was used as a regular internet connection in the computers located in the health centers as equivalent to a wireless connection using a satellite system which is invisible for users.

1.4.7. Strategies, Objectives and Activities of the Project Putumayo

The Putumayo network provides connectivity between the three main centers of reference of the area and the peripheral health

establishments. These health centers are Puerto Leguizamo in the extreme north, La Frontera, and *El Estrecho* in the basin of the river.

The strategy used for the project Putumayo was based on four main pillars: (i) introduction of the strategy AEIPI¹⁹⁹; (ii) improvement of the systems of epidemiologic surveillance; (iii) improvement of the systems of reference and dereference and inter-consultation; and (iv) introduction of the informatics and telecommunication systems for strengthening of the system of maintenance of the health improvements proposed²⁰⁰. The main objective of the project was to improve the access to health services for maternal and infant health attention and to increase the capacity of resolution of the health workers²⁰¹. The activities of the project are detailed in Table 4.31 as follows.

Table 4.31 Activities of the Project Putumayo

Result	Activities	Partners
Result no. 1: Install of the telecommunication network	Design of the network	PUCP, UNICAUCA
	Adaptation of the wireless systems	PUCP, UNICAUCA, UNAL, EHAS
	Install of the infrastructure and equipment of the networks	PUCP, UNICAUCA
	Design, trial and training of the health personnel for use of the equipment	PUCP, UNICAUCA
Result no. 2: Improvement of the capacity of resolution of the isolated health establishments	Implementation of the system of second consultation	DIRESA Loreto, UNAL, EHAS
	Redesign of the process of reference and dereference of patients	DIRESA Loreto, UNAL, EHAS
	Redesign of the process of implementation and system of epidemiologic surveillance	DIRESA Loreto, UNICAUCA, UNAL, EHAS
	Training and formation of the health personnel on using the AEPI strategy	DIRESA Loreto, EHAS
Result no. 3 Research in tools of diagnostic per images	Adaptation of the video-conference system for the system of second consultation	PUCP, UNICAUCA, UNAL, EHAS
	Development of a system of control for maternal and infant perinatal care	PUCP, UNICAUCA, UNAL, EHAS

Source: elaborated by author with data from the Formulation of the Project Putumayo 2008, p.14.

¹⁹⁹ AEIPI: Strategies of Comprehensive Attention of Infant Prevalent Diseases

²⁰⁰ The strategy element of added value is the implementation of ICTs for streamlining the processes of coordination and communication in an area that is geographically accessible only by the rivers.

²⁰¹ The specific objectives of the Project Putumayo were as follows: (i) development of a network of telemedicine in the Putumayo River using appropriate self-sustainable technologies with capacity to support the transmission of information (data) and infrastructure for the transmission of medical images; (ii) improvement of the capacity of resolution of the health personnel by providing appropriate flows for main health attention processes such as second consultation, reference and de-reference of patients and transfer of patients, and medical services of promotion, prevention, diagnostic, treatment and rehabilitation supported by ICTs; and (iii) to contribute to the development of research in use of diagnostic tools per images and innovative telemedicine systems using wireless and satellite networks.

1.4.8. Beneficiaries of the Project Putumayo

The beneficiaries of the Project Putumayo were associated in two important groups: the patients as direct beneficiaries of the systems, and the health workers as indirect beneficiaries such as administrators and users of the telemedicine tools.

The population attended by the health establishments included in the project was estimated in 45,757 people. From them, 37,180 people belong to the Colombian community and 8,301 are in the Peruvian side (GTR-PUCP 2009a:1-5). At least 28% of these populations are young people (between 18 to 25 years of age) of low income families and dedicated primarily to the agriculture and cattle industry, having difficulties to have access to health and education services due to the high level of dispersion of population and scarcity of availability of transportation toward the centers. Health workers and administrators were distributed in 12 health establishments between the Peruvian (seven establishments, 17 workers) and the Colombian side (5 establishments, 19 health workers) (ibid: 5-8).

1.4.9. Assessment of the Project Putumayo

In August 2011, the Andean Organism of Health (ORAS) started the planning of a transversal study of impact of the Putumayo network in both countries. The initiative was accepted by the local partners of the project and achieved successfully by August 2012²⁰².

The method of assessment consisted in the application of a survey to the health personnel of the health centers and health posts in the beneficiary establishments²⁰³. It was a structured survey with open and close answers and free notes taken by the interviewers about usability, functioning and utility of the networks, as well as precise questions about institutional and political impact. This survey was conducted individually and includes interviews to the two functionaries of DIRESA Loreto in

²⁰² Originally, this was a preliminary survey of the project, with intention to program more surveys after the implementation, but due to a short on budgeting and other problems, this was the only impact study officially recognized and presented to the donors in December 2012.

²⁰³ Appendix 3: List of interviews.

charge of the maintenance of the project Putumayo from the Peruvian side. Questions were basically related to use of the systems, utility and capacities of the systems, quality of the network services and impact.

The samples were collected with much difficulty due to the geographic conditions of the area²⁰⁴. Collection and personal interviews were taken between 21 April and 12 March 2012 by the leader of the project in the frontier areas²⁰⁵, who had interviewed 17 employees from the health establishments in the Peruvian side²⁰⁶.

1.4.9.1. Impacts

(i) Impact in Health Attention and Capacity of Resolution

This part of the study considers the changes that were implemented by using ICTs for processes of health attention and how it impacted over the health services. Overall, health workers were satisfied with the services of communications provided by Putumayo network (97%), and the gross majority of workers considered that population is better attended using the networks (89%) (GTR-PUCP 2012:29-30).

Also, there was a high level of incidence on the improvement of maternal and infant attention, and 75% of the health workers consider that there was an improvement in the attention to mothers, pregnant women and infants by using IP phones and internet (e-mail) for consultations and coordination. The global of satisfaction with the quality of services perceived is high (average 85%) and the level of satisfaction with the services installed is also high (79%) (ibid: 29).

(i-1) Reference and dereference of patients

The study of impact of the project Putumayo found evidence that calls using the IP phones were used to second consultation about medical procedures toward the neighbor countries, due to the availability of medical doctors in one or another side of the frontier. In the Peruvian side, from a total of 17 health workers at least 50% declared using the IP phone for 5 to 10 calls a day whilst 75% declared making calls for consultation to

²⁰⁴ Also, there was an exigency from the donor to collect the surveys in printed format.

²⁰⁵ Leader of the project Putumayo: Eng, Leopoldo Liñan from GTR-PUCP

²⁰⁶ Data from Colombia was collected by the UNAL as correspondent counterpart.

the neighbor country sometimes and 20% declared doing it frequently. Also, 35% of health workers declared to had used the system for inter-consultation as a second opinion between 5-10 times (average of 52 calls), 29% between 11-15 times (average of 75 calls) ; and 50% declares to use the services often and at last 32% declared to use it sometimes for that purpose(ibid).

Only 7% of health workers in the Peruvian side declared to use the systems for video and transmission of images. The frequent destination of video calls is from the health workers to the Office of Telemedicine of the DIRESA Loreto, installed precisely for providing support and sustainability to the network of telemedicine.

(i-2) Exchange of reports, information and coordination of supplies

As expected, the use of internet becomes intense in any location where it was installed for the first time. In the Peruvian side 39% of health workers declared using the internet for working purposes between 2-4 hours a day, and 39% declared using it more than 7 hours a day. The impressive part is that at least 15% declared to use it for searching information about specialized procedures, diagnostics and treatments, 12% uses it for e-mailing and sending reports(GTR-PUCP 2012:21-23).

About frequency of use, from 17 health workers, at least 61% declared using the network services for providing or demanding health information or health attention services often and at least 20% declare to use it sometimes. Also, 42% of health workers declared to have used the services for administrative and managerial tasks sometimes and 41% declared have used it often. At least 82% expressed a positive opinion about efficiency of use of the IP telephony, and at least 66% expressed a positive opinion about using the services for internet for the solution of health attention tasks (ibid: 22-23).

(ii) Impact in health personnel

Before the project, most of the communications were done by radio registering frequent operative failure. The IP network was considered as useful by the health personnel in general. Therefore, there is a positive

perspective from the health personnel toward ICTs as they consider that it had improved their work in the health establishments and enhanced them to provide better service to the citizenship. According to the study, in the Peruvian side at least 90% of health workers think that their patients have a better perception of the health service than before the implementation of the health services.

In geographic isolation, it is important for the health system to have well trained human resources. Usually, health workers are technical personnel coming from the cities where their homes and their families are based. Thus, due to difficulties on overcoming the sensation of isolation, this condition becomes one of the main causes of high rotation of health personnel. The use of the communication network had helped them to overcome the feeling of personal and professional isolation. In the Peruvian side, at least 65% of health workers declared that the network helped them to feel closer to other health workers (GTR-PUCP 2012:28).

Quality of service is an important factor for the acceptance of the ICTs by health workers and health personnel because if the networks are slow or offer interrupted services, then they will search for other means to do their work and heading back to the traditional methods will reduce the sizing of capabilities of implementation of ICTs. In the Peruvian side, most of users considered that speed on the connection is an important factor (87%) but only 55% consider that the current speed offered by the project is good and 29% thought that it is average. Still, the telephony service has higher value for health workers, as 79% of the surveyed thinks that it is more important than the speed of access to the internet. It is important to say that the speed of connection does not depend only on the infrastructure installed but the plan contracted and the performance of the satellite internet service private company (ibid: 24-25).

The perception of improvement in the processes of health attention by the health workers and the authorities of DIRESA is important because it reflects the acceptance of the ICTs at institutional level. Overall, 85% of workers consider that there is better attention due to the use of the

networks for different reasons such as speeding on attending patients (then they can attend more patients in a day), facility of the coordination of transfers, reports and supplies, and use of the IP phone for administrative consultations. Thus, in the Peruvian side, at least 69% of health workers declared that the reduction of transfers and references due to the use of the network had decreased because it is possible to do second consultations and coordination before making a transfer decision.

(iii) Economic impact

The economic impact was shown in the reduction of the number of trips and frequency of transfers due to the use of IP phone and internet for second consultation, coordination and transmission of epidemiological reports. Also, the use of the phone facilitates coordination of the transfer of patients, as declared by health workers, making them feel safe and more comfortable that someone is waiting for them in the health establishment of reference. In the Peruvian side about 80% of health workers agreed that there were savings in time and budget due to transportation because they also had stopped traveling for delivering of reports (GTR-PUCP 2012:27).

Still, one of the main conclusions of the assessment was to recommend an exhaustive study of economic impact to determine the real savings and clear costs of operation of the network to use this information for sensitizing the authorities toward improvements in budgeting policy considering the needs of communication of the personnel on policy making.

(iv) Institutional Impact

The implementation of this project is significant because it is the beginning of a joint effort with international organizations, neighbor countries, community members, health workers, universities and NGOs for integrate efforts toward promotion of health and peace in the frontier area. The practice of using ICTs every day motivated the use of internet and facilitates the adaptability to changes for health workers.

This project promoted a change of attitude in the institutions toward ICTs in rural areas. For example, in the Peruvian side, 82% of the health workers recognized using the internet for receiving training courses

from the health centers of reference for use of other capacities of the system, and also for reading information about diagnostic and treatment. Thus, remote training is accepted and valuable for health workers then supported by the DIRESA. This change in the perception of ICTs for health open doors for motivating other institutions to use ICTs for public administration encouraging local and regional governments to use it for remote training and other programs.

(v) Impact in Policy

One of the most important impacts of this project over policy is about the official character of electronic communications for institutional compliance. Due to the new regulation implemented in Peru and Colombia about e-government in the last decade, the use of e-mailing had become a formal method for correspondence and institutional communication being encouraged by the availability of ICTs for delivery of reports and information. Still there are limitations about sending medical records, but certainly the phone was used for feeding transfer records of patients and case recommendations.

According to the Study of the Feasibility of the project Putumayo, previous to the installation of the project most of the health establishments in the Peruvian area (five out of seven) did not have access to telephony from the health establishments but only radio systems which frequently failed (GTR-PUCP 2009: 5-9). The use of IP phones was considered for most of health workers as convenient having an effect over all the health system in the area by promoting the institutional use of the networks. Then, a policy is a tool required to support the services toward sustainability. The deployment of this political network summarizes the capacity of their local governments for the achievement of concrete measurements toward improvement of systems in Putumayo area.

1.4.9.2. Sustainability

Unfortunately, the services of the Putumayo network have been partially suspended in the bi-national context from August 2012, due to political decisions made after the transfer of the property of the

infrastructure of the project from the donors to the DIRESA Loreto as a receptor. The circumstance is that there is a lack of payment in the monthly use of the V-SAT services as it was announced in the oral agreements previous to the transfer of infrastructure to the regional government, and both sides of the network scarcely shown political willingness to fix the problem has been shown²⁰⁷.

Social Sustainability

Social sustainability has been achieved and the systems were accepted and supported by the DIRESA Loreto, local government, health workers and patients, and they were considered as important and valuable for health attention. This project has been installed after previous experience of the DIRESA Loreto in Telemedicine projects under the lead of the EHAS Foundation and the GTR-PUCP, facilitating access in administrative processes and institutional agreements.

Technological sustainability

The Wireless connections are still working and connecting partially every two or three stations with signal transmitted using the repetitors and the infrastructure of antennas and towers installed. Therefore, the network connects the health establishments to exchange information partially, but the continuity toward the Regional Hospital and the Hospital of reference has been deactivated for over 75% of the peripheral health establishments on this initiative(GTR-PUCP 2012:28-30).

Institutional and political sustainability

This project was not the first of its nature in the Napo area. As show earlier in this Chapter, the project EHAS-Napo was installed at the same time than the project Putumayo, which facilitated administrative procedures in the regional and local governments. Institutionally, the implementation of a communication network had modified the channels of interaction of the reference centers and the peripheral health

²⁰⁷ One of the main achievements of the Putumayo network has been to be able to connect communities that were not connected before and helping them to gather together by using ICTs and finding a common solution to their problems. Though, the breaking of satellite services leaves 8 of the 12 stations out of the networks installed and working only 20% of its capacity of connection(GTR-PUCP 2012:28).

establishments making their participation stronger in the design of health attention processes. The availability of the networks in the rural health establishments and the constant coordination with their centers of reference from the regional hospital had promoted the rethinking and redesign of the health processes that were not possible to be achieved successfully before.

Previous to the donation and installation of the telecommunications infrastructure, oral agreements were made with the political authorities in the regional and local governments. According to these agreements for the project EHAS-Napo, it was expected that once the transfer of acquisitions and the property of the equipment was finished, the recipient health institutions represented in the area were in the capacity to assume the costs for maintenance of the equipment and systems of their property. Thus, the DIRESA Loreto on the Peruvian side and the Direction of Regional Health of the Putumayo Region in Colombia were the representative institutions advocated to find a solution at the end of the period of grace. The project had donation of one year maintenance expenses covered by the donation of EU. This donation included monthly maintenance costs of the systems and the payments for 12 months for the monthly bills of the satellite private company services for the provision of internet through the V-SAT systems.

Although, according to the coordinators of the project in the Peruvian side, there was not an article in the agreements related to the responsibility of payments of the satellite internet bills, it was clarified that there was a provision for the payments of one year but not indicated the institutional responsibility of payments after the period of grace²⁰⁸.

The institution in charge of the administration and transference of the project and the infrastructure installed was the Andean Organism of Health (ORAS). According to the local coordinators of the project, interviewed for this research²⁰⁹, there were difficulties in the coordination

²⁰⁸ This information was obtained in a telephonic conversation and exchange of e-mails with the Executive Coordinator of the GTR-PUCP Eng. Juan Paco between May and July 2014.

²⁰⁹ In the same interview, the coordinator of the technical side of the Peruvian end refers to the delays

for the transfer of funds from ORAS to the satellite company from the beginning due to deficiencies in the processing capacity of the payments of the institution, and there were also delays on those payments towards the provider in the last four months before the provision of the donation had finished. In consequence, after repetitive letters toward the Regional Directions of Health in both countries, and after the last month of subsidy finished, the satellite provider AXESAT decided to cut the service due to the breach of payment of the second billing correspondent to the following year's contract. Claims to the ORAS from the technical parts in charge of maintenance were not attended, and the networks were left without support by the end of August 2012²¹⁰.

1.5. Summary of the Chapter

This chapter has introduced in detail the particular context and situation of health of the scenarios of three cases of study of Telemedicine projects implemented in Peru under similar conditions: the project EHAS-ALIS, the project EHAS-Napo, and the project Putumayo.

The first case of study is the Project EHAS-ALIS which was fulfilled in the field of work from 2003 until 2006 and assessed in 2007. As a pioneer project, the most important influence of the project EHAS-ALIS is related to the introduction of changes in the directives of the communication systems used by the MINSA in the jurisdiction of the DIRESA Loreto implementing the use of ICTs as a coordination tool. In particular, the results of the installation of the EHAS-ALIS network had influenced toward the modification of the strategy of communication with the peripheral establishments, using the IP phone and e-mail more often than radio communications.

The second case of study is the Project EHAS-Napo which was installed from 2006 until 2009 and assessed in 2010. The main

on reply from the Ministries of Health of both countries and assumes that it expresses the lack of political will to assume these costs as their directives were not conclusive, nor taking part of the matter.

²¹⁰ At the moment of closing the collection of information of this research (July 2014), and according to the coordinator of the project in the Peruvian side from the technical maintenance side (Eng. Juan Paco from GTR-PUCP) the circumstance of negotiations between the Regional Directions of both countries were not favorable for reestablishing the service. Meanwhile, reports from the coordinators of the technical part of both countries have been sent in written, but yet not attended.

significance of this project is related to the crucial political moment when the transfer of the donation was given: the transition of an increasing economy of Peru, and the peak of ICTs for development in the world. This project promoted important changes in the enforcement of the policies of regionalization and decentralization of the country, taking the first steps of the Organic Law of Regional Governments that encouraged the DIRESA to take a challenging role over the development of health services and strategies for the delivery of health services.

The third case of study is the Project Putumayo, which was installed from 2010 until 2011 and assessed in 2012. The most important impact of this project over policy is the official character acquired by electronic communications for institutional compliance becoming the e-mail as a formal method for correspondence and institutional communications. Unfortunately, the services of the Putumayo network have been partially suspended in the bi-national context since August 2012, due to political decisions regarding the inconsistency of payment commitments for the maintenance expenses of the satellite connection after the transfer of the project to their beneficiaries. Also, the use of the networks and the donation of tools of this project had contributed to the optimization of the capacity of diagnostic of the health personnel through the implementation of videoconference for second consultation, tools of tele-estetoscophy, tele-microscopy and tele-ultrasound and remote control of critical cases. Additionally, the system provided the implementation of a central system of control of medical supplies, prescriptions and medications.

The three projects shared a common structure of organization such as NGO, University and local governments. Also, their financial systems, common strategies and objectives and the services offered in every installation were similar with slightly variant technologies. Although these projects share a common ground and the implementation of Telemedicine was similar from the point of view of the organization of the projects, these projects generated different outcomes due to several factors.

These factors are external and internal to the condition of implementation of the projects. External factors are related to the context such as the conjunctural economy, generating increase or decrease in the availability of funds for external financing of projects of ICTs in developing countries of Latin America. Also, the changes in the political will of the governments for incorporating resources of technologies in the public administration, and the political willingness of the regional governments for supporting the adaptation of the health systems in the provinces to the changes proposed by the installation of ICTs were important factors. Internal factors are related to the particular condition of the implementation of the project which relates also to the impact of the use of Telemedicine in the economic, institutional and political administration of the health systems in Cuzco and Loreto, and the options for sustainability offered by the regional and local governments in terms of social, technological, institutional and political sustainability.

These three projects involved political and social actors of all sectors including national and international organizations. Overall, the projects generated positive impacts on the administration and delivery of health care services and had awakened the interest of the health authorities toward the situation of isolated indigenous populations in border areas.

Furthermore, in the three projects relevant changes in policy were achieved at different moments of the history of the implementation of ICTs in the delivery of health care. The most remarkable change is without a doubt the institutionalization of electronic communications as an official tool for communication in the administration of health services and as a tool for the health system. Relevant findings about the three cases of study are analyzed under the scope of the theoretical framework proposed in Chapter II, and are presented in detail in Chapter V of this dissertation.

Chapter V. Politics, Policies and Rural Health Underserved

Since the beginning of Telemedicine in Peru, several policies from different sectors of the government such as health and telecommunications were implemented independently according to the institutional objectives creating changes in the political scenario for ICTs in health. These political changes in Peru had happened in a period of adaptation of the health institutions to the use of ICTs in health attention, especially the need for designing norms and internal procedures for the safety of users and patients. Also, there is a parallel process of adjustment of the administration of the local and regional governments to the e-government policy which promotes ICTs for transparency.

In this scenario, this chapter aims to show the influence of politics in the policy making process from the experience in Telemedicine found in three cases of study: EHAS-ALIS, EHAS-Napo and Putumayo. The main idea of this chapter is to present these effects as consequences of the characteristics of the institutional interaction, as part of the process for ICTs' policy making, and as effects of the changes in the policies organized along a timeline and interpreted in the light of the literature review and the theoretical framework presented in Chapter II.

Following the hypothesis of this dissertation, this Chapter discusses the gap between the strategies and plans of the government institutions concerned by the use and spreading of Telemedicine services. This Chapter argues the alignment of the official documents as guidelines for Telehealth such as the National Plan of Telehealth and the Technical Norm in Telehealth and the applicability of the ICTs' related policies in the cases of study.

According to the rationale proposed in this research this chapter presents the findings of the effects of the implementation of policies at the macro and micro levels, applying an original framework of analysis designed for the purpose of interpreting the macro-changes in the institutions and national policies in the micro-reality of the cases of study in Telemedicine for rural areas.

1. The policy making process for ICTs in health: informality, bureaucracy and limited capacity of the government for policy compliance

In the case of Telemedicine projects in the Amazonia of Peru, the use of ICTs was an initiative of the civil society responding to the need for covering the gaps in the health system. The idea of these projects was to provide communication means to health establishments in rural areas where internet had never been used before for coordination of health services and remote training.

In the cases of study, the institutions supporting these initiatives are the Ministry of Health (MINSA) through the Regional Direction of Health (DIRESA) and the local and regional governments. As autonomous government bodies, these institutions are entitled to support citizens' initiatives without a specific policy, up to the limit when the interaction with other governmental bodies is required such as the Ministry of Economy (MEF) or the Ministry of Transports and Communications (MTC) and technical bodies (OSIPTEL, ONGEI).

In this situation, for Telemedicine to be recognized as an institutional practice, there is a process of policy making which has not been articulated (Sanoni 2012). Therefore, each institution reflects in their policies and guidelines the particular interest of their sector regarding to ICTs but generating independent normative and decrees without inter-sectoral coordination.

Informality in the policy making process for ICTs in Peru

The informality is a part of the Peruvian tradition. It appears in the popular culture as a natural reaction to solve problems and complex situations out of the institutional rules (De Soto, 1986). The informality and the informal sector in Peru are reflected in the everyday of simple transactions and also as a vice of the public administration (Burky and Perry 1998:128-130). It appears that de jure-system is mostly overtaken by an informal system creating a parallel organizational structure where the written rules have low levels of compliance (ibid: 129).

According to a report from the World Bank, the institutional informality in the Peruvian system is a parallel policy that works as a subjacent organization which exists in the shadow of the institutions. This parallel process on the side of the norms transgresses the procedures established and the guidelines, and replaces them for a simple non-standardized way, which eventually becomes in the usual way of doing things (ibid).

In the three cases of study presented in Chapter IV, more of the initial arrangements for the development of the infrastructure and the networks were in function of informal agreements with representatives of the regional and local governments that became written agreements in the process of development of the projects (EHAS-ALIS 2002, 2007; EHAS-Napo 2011; UNAL-ORAS 2012). Initially, for the formulation and the approval of the donations, the donors usually demand from the organizers of the project such as the NGO or the University representatives, to attach letters of support. These letters should be from the organizers, as they are institutional guarantors of the funds and counterparts of the projects, and from the local institutions as a proof of the willingness of the authorities to support the efforts to be made in the project. Also, these documents are useful as a first commitment from the local governments for receiving the infrastructure at the end of the projects, and eventually to contribute for maintenance and further development toward sustainability. This informality can be interpreted as an element of flexibility of the organizations led by NGOs, different than governmental initiatives.

Five years of Telemedicine without regulation

Telemedicine initiatives were working as private initiatives since 1999 until 2004 when the first official document related to Telemedicine was released by the National Commission of Telehealth, announcing the National Plan of Telehealth²¹¹. The document is a plan based on statistics

²¹¹ In 1999, the first telemedicine project was installed in the area of Alto Amazonas, and other initiatives in Cuzco and small networks in the basin of the Napo and Amazon rivers. In 2004, the Ministry of Health convoked an ad-hoc commission named the National Commission of Telehealth for the preparation of the National Plan of Telehealth released in 2004 and in 2008 the Ministry of Health proposed and approved the Technical Norm of Telemedicine in Peru.

of the country suggesting a general strategy of action for the health systems lacking of specific plans for the rural isolated areas, or supported in a decree. It was in 2008 that the Technical Norm of Telemedicine was released. The only rules during the first five years were the restrictions imposed by the General Law of Health in terms of resources and expenditure, and the General Normative of Telecommunications from the MTC for the use of the aerial space.

The project EHAS-ALIS was installed in Peru from 2003 to 2006, and it started without any norms apart from the general regulation framework of the use of the internet for public services, the support from the local representatives of the Ministry of Health, the health workers and the good will of the regional and local governments facing the challenges of the public administration. The project EHAS-Napo finished installation by 2009, just one year after the promulgation of the Technical Norm in Telemedicine, a product of an effort of the MINSA for formalizing the practice and spreading the initiative at the national level. For the implementation of project Putumayo, Peru and Colombia had a normative for the use of Telemedicine, but it was not homologated because it was not established in the bi-national agreement (GTR-PUCP 2012:12-14).

Therefore, the general formalization of processes and creation of norms in Telemedicine was post-implementation in the three cases of study. This informality was eventually supported by the regional representatives of the Ministries and the local authorities. This support is motivated by the knowledge of the difficulties for institutional change from the side of the local and regional authorities. Also, these institutions had experienced delays in the process of approval of new processes, authorizations and norms because of the length of time it takes for approvals in the health sector.

Highly bureaucratic process for policy implementation causes slow institutional changes

Regional governments are autonomous according to the law, but in practice, to reach the national portfolios such as economy (budget) and

health, the regulations are required to pass through high level filters where government policy makers are sometimes not aware of the context of the proposed changes or the urgency of the needs in rural areas. These high level filters are found in the national congress where proposals are elevated from at least one member of the congress, and approved or discarded after discussions in assembly.

In the case of rural population, most of the initiatives for the regulation of procedures are led by the regional governments due to difficulties in creating the documents and specifications required for the formalization process at local levels. In this respect, there is a lack of representatives in the congress and multiparty commissions with deep knowledge of the situation in rural areas, making it difficult to obtain proposals for initiatives in Telemedicine coming from the upper levels of the government, and also for the proposals from the local initiatives to pass the filters at the national levels. A clear example is the proposal of the Health Reform 2013 which is still in the process of revision at the submission of this dissertation.

In this situation, it is possible to identify three levels of bureaucracy: one level in the policy making process at local and regional levels where the proposals come from and the initiatives take shape; a second level where the initiatives are presented from the local representatives to the local and regional governments; and a third level when the proposals are ready for approval at the national level.

In the first level of bureaucracy identified, the common problems found in the cases of study refer to the difficulties in procedures for implementing the technologies in the regional and local health establishments. At the interior of the Ministry of Health, the DIRESA from Cuzco and Loreto experienced delays in the decision making for the transfer of resources and access to information. In the case of the project EHAS-ALIS, there was not enough time in the project to include a coordinator of telemedicine in the DIRESA Cuzco, whilst in the project EHAS-Napo after two years two functionaries were integrated to the

DIRESA Loreto to support the coordination and technical maintenance of the networks. In the case of the Project Putumayo, an extended bureaucratic process for the transfer of resources from the ORAS to the health establishments due to dual control procedures and delays which caused difficulties in the maintenance of the systems. This bureaucracy caused also poor coordination between the Chancelleries due to the double controls established by ORAS and ended with the suspension of the satellite connection due to unpaid duties after the end of the donors' subvention²¹².

The second level of bureaucracy identified was in the process of policy making at local and regional levels. In the cases of study the informality on the processes was the common factor generating problems for the continuation of the projects. The third level of bureaucracy appears in the instance for approval of the policy proposal from the local and regional governments to the executive power of the state. One representative in the congress needs to find the support of the political parties' representatives obtaining the majority of the votes for approval or the proposal.

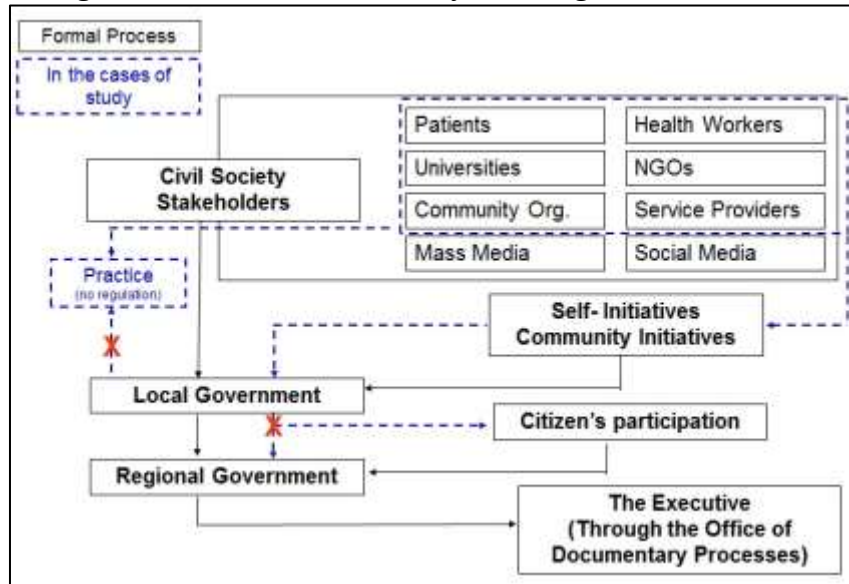
Formal policy making process for ICTs different than de-facto

The following diagram describes the difference between the formal process of policy making in Peru and the reality of the informal processes found as a common result in the three cases of study for ICTs in health at all bureaucracy levels. According to the information in the website of the Peruvian State, there are two levels of consultation for approval of a law, norm of regulation.

Figure 5.1 shows the second level of bureaucracy, highlighting the difference between the formal process for policy making according to the regular guidelines, and the common flow followed in the cases of study in the local and regional governments. At this level, the proposal for regulation of ICTs for health started at the level of civil society stakeholders and includes citizens' participation.

²¹² Information obtained in an interview with the Executive Coordinator of the GTR-PUCP, Eng. Juan Paco in July 2014 as a response to the questioning about the results of the project Putumayo.

Figure 5.1 Flow of the Policy Making Process in Peru



Source: Adapted by author from the Law of Regional Governments (No. 27867)

In this scenario, since 2002 the policy making process for ICTs in Peru has been primarily fed by the institutions of the government in their administration considered as the only feedback providers. As a result of this research clear procedures for processing of feedback from different users of the information and communication services were not found.

In the cases of study, the projects EHAS-ALIS and EHAS-Napo started following the initiative of the organized members of civil society such as community members, NGOs and universities. These actors engaged together and found support from other organizations for solving the problem of delivering health care services in rural areas of Cuzco and Loreto. In the particular case of Putumayo, the initiative departed from the chancellery of the countries, but the projects were under the supervision and administration of the university as a technical partner and the representatives of the Ministry of Health in the area.

In all cases the regular process of policy making was not applied which is the reason that explains why sustainable changes were only partially achieved. Most policy implementation at local levels occurred at the operational level of the telecommunication systems. At structural levels, changes such as implementing a formal standardized training system or assigning resources from the Ministries for developing the

networks and extending it for other rural localities were not found through the cases of study.

Concerning the third level of bureaucracy, the Figure 5.2 shows the flow of the process for policy approval, highlighting the difference between the formal process and the common flow observed in the cases of study. This Figure aims to highlight the difficulties for the policies to be implemented in the bureaucracy where, despite of the regional autonomy given for decentralization of the state, certain systems remain centralized.

Figure 5.2 Flow of the process for approval of laws and normative in Peru



Source: Adapted by author (information from the website of the Peruvian Congress).

At this level, the representation of citizens is in the hands of the congressmen who eventually do not come from the reality of rural areas or are not precisely related to the situation in isolated health facilities, but are only supported by advisers who make the difference for the destiny of the proposals guiding the votes in congress towards the support, rejection or revision of the proposals²¹³. Thus, the National Plan of Telehealth (2004), and the Technical Norm in Telehealth (2008) were approved without further processes based on the feasibility of the proposals but

²¹³ Furthermore, the emergence of regional and local political parties in provinces displacing the traditional centralized powers in the absence of the representatives of the government in the most isolated regions generates important changes in the process of policy making. These changes are for example: adopting proposals which are initiatives of the communities and the citizenship, or proposing temporary arrangements for representing the interest of the voters, but without a plan to accomplish such as initiatives (Regional Magazine *Con distintos Acentos* <http://www.condistintosacentos.com/los-movimientos-regionales-nuevos-actores-en-la-politica-peruana-2/> (Last visited July 14th, 2014).

without considering a provision for balancing the limitations of the provinces deprived of basic services, such as health establishments with limited access to electricity, medical supplies and access to regular transportation services.

Limited capacity of the government for policy compliance

The cases of study also received the effect of Laws that appeared to be favorable for the development and sustainability of the Telemedicine networks, but in the long term did not demonstrate real support due to issues related to the lack of capacity of the government to compel. The Law of Universal Health (2010) was approved unanimously during the administration of Garcia, but the process of implementation of the norm evidences the limitations of the health system to deliver the service of universal insurance.

Similar situation was found in the case of the Policy of Universal Access in the Law of Telecommunications from the MTC (2003), which aimed to support the e-government policy released by the central government as a response to the decentralization process and regulated by the ONGEI in charge of the Presidency of the Congress (PCM). This Law proposed universal access to the internet in Peru, but from promulgation it was short in its capacity to reach all municipalities in the national territory.

In the cases of study included in this dissertation, there were serious limitations regarding to the sufficiency of resources for accomplishing the Laws presented lines above. Concerning the Law of Universal Health, severe difficulties were found to attend massively the rural populations in Cuzco and Loreto due to scarcity of human resources, deficiencies in the infrastructure and restrictions in access to the rural areas for referring the patients. Regarding the spreading of ICTs, the infrastructure of telecommunications such as longitude of the optical fiber cable and access to antennas for extending connectivity did not reach the health establishments in rural areas. In addition, high level of illiteracy in the use of technologies and insufficient technical capacity for providing

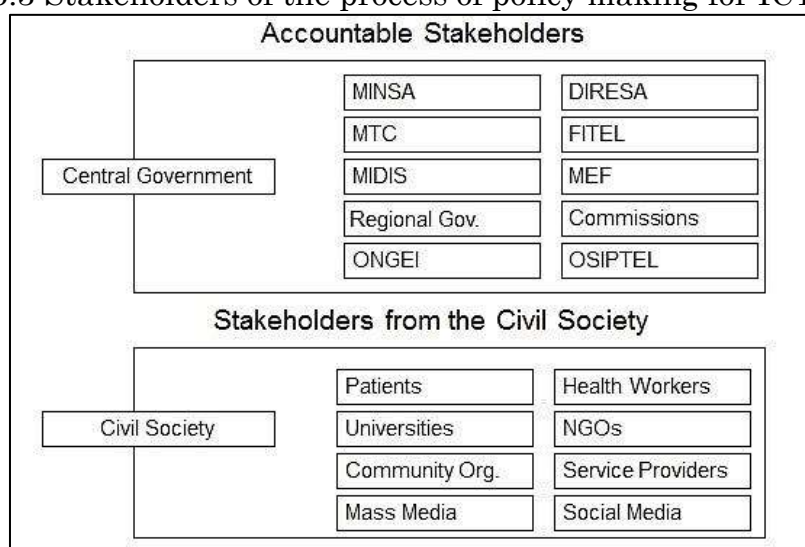
maintenance to the networks installed was found in the rural local governments of the cases of study. These examples are common in the three cases of study, and show the limited capacity of the government for compliance of their own proposals.

At this point, the question arises about which institutions are in charge of addressing the policy making process and providing good advice to the different sectors for making policies that effectively rule the country. As ICTs are transversal tools and can be used for supporting several sectors of development such as education, governance and health, its regulation require feedback from all the sectors of users of the systems. Telemedicine is a practice that seems to be centered in the health sector, but requires contribution from other institutions and from the central government to find its resources for further development.

2. Stakeholders in the Process of ICTs implementation and Policy Making

Following the model of analysis of Blank and Burau for the revision of the actors of policy making in context (Figure 2.1), this section aims to identify the stakeholders of the process of policy making for ICTs²¹⁴. The Figure 5.3 shows the stakeholders of the process of policy making in two groups according to their relation with the government and their responsibility in this process.

Figure 5.3 Stakeholders of the process of policy making for ICTs in Peru



Source: elaboration by author

²¹⁴ For the purpose of this dissertation, a stakeholder is defined as an actor of the process of Telehealth that participates from the flow of the process of policy making for the case of ICTs in health in Peru.

First, there is the group of accountable stakeholders as representatives of the government institutions or technical bodies with responsibility for the processes of policy making. Second, there are the groups from the organized civil society which are collaborators, contributors and users of the health system, but unaccountable politically due to their informal status in society and independence from government bodies.

Accountable Stakeholders

In the organization of the State, the authority over ICTs for health related issues lies with two important institutions of the executive power directly related to the process of policy making for ICTs in health. They are the Ministry of Health (MINSA) and the Ministry of Transport and Communications (MTC). Also, for the purpose of control of the resources of the state in these ministries, the Ministry of Economy (MEF) assumes a role of supervision, and the Ministry of Social Inclusion and Development (MIDIS) operates as a side contributor by promoting social programs to support the access to health services of populations in extreme poverty. These institutions are under the Presidency of the Council of Ministries and operate independently in the policy making. They act interdependently in their functioning as MINSA, MTC and MIDIS, still they require approval and support from MEF for budget related decisions. These Ministries are also connected by issues of common interest and liaised by ad-hoc commissions nominated by coordination or superior call.

In parallel, there are two Specialized Organs as technical bodies who also depend on the Presidency of the Council of Ministries: the Organism of Supervision of Private Investment in Telecommunications (OSIPTEL) and the National Office of electronic government (ONGEI). They are considered as technical and regulation specialized organs. There are also specific ad-hoc commissions from the central government such as Commission for Development of the Society of Information (CODESI), and the National Institute of Research and Training in Telecommunications (INICTEL), which are entitled to pronounce their opinion for policy

making but are not regulatory institutions.

In the cases of study, there are two important actors from the Ministry of Health, the General Direction of Health and their representatives in the regional governments (DIRESA Cuzco and DIRESA Loreto), and the Micro-network of Health which groups the peripheral health establishments and links them to the Regional Hospitals.

Stakeholders from the Civil Society

These actors correspond to the groups and associations that organize themselves for the promotion of the initiatives of ICTs for public health in rural areas such as universities, NGOs, community based organizations (CBOs), and other local groups. Also, there are the beneficiaries of the telemedicine systems using the technologies such as administrative and health personnel and the patients.

In this scenario, private companies play an important role as telecommunication service providers. In 2012 there were at least four private operators of rural telephony in Peru: *Rural Telecom*, *Gilat to Home*, *Valtron* and *Telefonica del Peru*²¹⁵. The mission of these companies is spreading the networks and the broadband of communications carrying on with the cost of maintenance and infrastructure at market prices. There is interest in rural communities to integrate for telephony services and also capacity to pay for the services (Martinez et al. 2005, Sanoni 2012).

In the cases of study, the actors from the civil society were an important part of the Telemedicine initiatives as promoters of the use of technologies in rural areas. In the field of ICTs, the partnership between Universities and NGOs appears first as a strategic alliance between research and social application later becoming an ideal model of synergy toward development of low cost technological solutions at the service of the empowerment of rural populations (Cox 1999). In the cases of study, the formulation and execution of the project EHAS-ALIS included 12 international partners including the NGO Engineering Without Borders,

²¹⁵ To the closing of this dissertation, there is penetration of more than 15 companies of mobile telephony, but due to their scarce impact on Telehealth processes, they are not considered for further analysis in this dissertation.

the NGO EHAS, and the participation of four universities and others as researchers, technological and medical partners also from the civil society. The project EHAS-Napo was led by the EHAS Foundation and accompanied by the university as a technological partner, and the project Putumayo was supported in the same manner plus promoted by international cooperation and the bi-national agreements.

Furthermore, as civil society stakeholders, there are also actors from mass media and social media as supporters of the mass opinion in the implementation of technologies and use of health technologies in rural areas (Magro 2012). The strength of the media in Peru has become greatly more important during this decade, due to its power for congregating mass movements using social media network tools²¹⁶ for supporting or showing massive disapproval to government proposals.

Consequently, these stakeholders interact in an environment regulated by laws and norms for ensuring and promoting health access for all Peruvians, but also for providing channels for distribution of resources from the central government to the regional and local governments as ultimate representatives of the state in the most isolated populations. Coherently with the explanation about informality presented in the section 1 of this Chapter, the interaction of these stakeholders suppose an informal culture where agreements are made to support their particular interest such as election of providers, and internal processes of decision

²¹⁶ Social Media Networks (SMN): According to Magro on his Review of social media use in e-government, the definition of SMN is related to the social interaction of people to create and exchange opinions and information in virtual communities using the facilities of internet platforms ((Magro 2012: 148). These opinions and information are called contents, and there is an extended effort in the world for examining their potential in learning and development.

Social media can be used for empowerment of people and for a soft power to promote ideas and initiatives. It allows anyone with access to the Internet to express their opinions inexpensively and to publish or broadcast any information, effectively democratizing media. In terms of time, social media technologies allow users to immediately publish information in near-real time (Magro et al. 2009, Magro 2012, Bertot et al. 2010).

The use of SNS include social networking applications such as Facebook™ and Google+™, micro-blogging services such as Twitter™, blogs, wikis, and media sharing sites such as YouTube™ and Flickr™. Social media is considered to be a part of the Web 2.0 movement, which is characterized by user-generated content, online identity creation, and relational networking. Social media has a particularly appealing potential for e-participation (Magro et al. 2009: 4-5).

making that may also affect the deployment of Telemedicine projects²¹⁷.

3. Mechanisms of the Laws and Regulations related to ICTs for Health

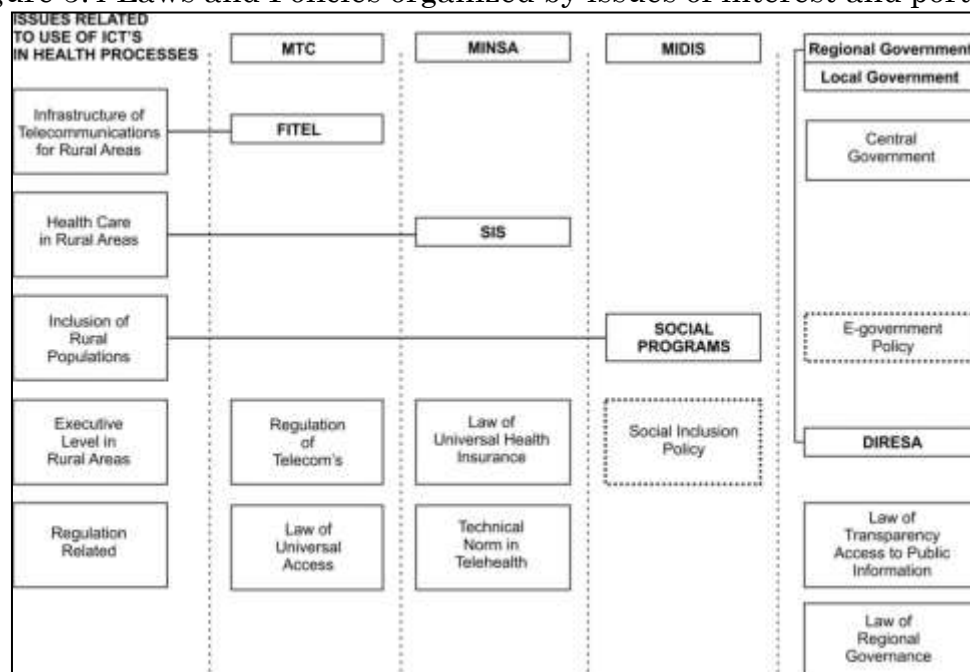
These mechanisms are identified in the framework of the theories of Neo-institutionalism as selecting the relevant institutions for the analysis, and the functions of the state established by Londoño and Frenk in their theory of Structured Pluralism. The institutions considered in this framework of analysis are the ones concerned with the aims of Telemedicine such as financing the services, modulating the coherence of their policy, articulating efforts with other sectors and deliver the services of health and communications as these institutions are accounted for compliance.

In the case of regulation for ICTs, this research has not found an integrated policy, but pieces of regulation from the different portfolios such as transports and communication, regional governments, education, health, and so forth. These pieces were articulated in the following diagram with their correspondent stakeholders to organize the alignment and orientation of the normative. The Figure 5.2 shows the stakeholders in the process of policy making and the regulations that are correspondent to their functions in the state. The purpose of this diagram is to relate the laws and policies to the institutions which are accountable for those regulations.

This diagram has a double orientation: from up to down, it relates the institutions as stakeholders with the technical bodies, programs and the area of regulation accordingly with the nature of these institutions; and from left to right it relates the regulation and laws with the areas of interest which surrounds the environment of ICTs for health in rural areas (Figure 5.4).

²¹⁷ In this circumstance, the health system receives formal and informal support through the institutions concerned by Telemedicine such as the DIRESA in provinces and the influence of the regional government decisions. Also, the health service receives the flow of the changes in the guidelines of the Technical Norm in Telemedicine and other norms and laws from different sectors such as public health and transport and communications.

Figure 5.4 Laws and Policies organized by issues of interest and portfolio



Source: elaborated by the author

This chart also shows the alignment of the regulation according to the institutions as accountable for compliance of these regulations, and the issues of the interest of ICTs for the organisms of the state. Thus, this figure summarizes the laws and policies included in this study and align them according to their correspondent Ministries.

Every case of study had received the effects of different laws according to the moment when these laws were implemented as explained in the following section of this Chapter. However, in the three projects it occurred that the coordination toward the regional governments and the participation of representatives of MINSA through the DIRESA had become more intense having a positive effect in the projects. This intense participation was motivated to improve health services and to increase the capacity of resolution of the health personnel. Also, the literacy in ICTs of the rural health workers had increased significantly due to the institutionalization of the use of the telemedicine system for the transmission of epidemiological and administrative reports by e-mail.

Law of Regional Governments (LRG)

The Law of Regional Governments establishes that every government is organized by the Regional Council at the head, a Regional

Secretariat and the Regional Management offices according to the needs determined by the region. In practice, each regional government organizes their work independently and aims to act as a coordinator for the local governments in their charge²¹⁸.

From the institutional side, the three projects were supported by the regional governments and the collaboration of the local governments such as municipalities and civil society members. The difficulties arose when the projects reached the end of their financial support and were transferred in property to the DIRESA Cuzco and DIRESA Loreto, generating the need of formal processes and policies for operating and institutionalization. Consequently, in the three projects the use of ICTs had promoted the communication between the health authorities and the peripheral establishments for supervision of performance and for providing support shortening the time of response and minimizing the transfer of health personnel from the periphery to the center.

Law of Transparency and Access to Public Information (LTAPI)

The part of the law correspondent to transparency, considers on its discourse the application of ICTs for the spreading of information national and international wide in areas of health, education, environment, public investment, safety and security, justice and access to the resources of information of the local and regional governments to promote citizens participation based on the principle of democracy²¹⁹.

The norm corresponding to access to public information in Peru restricts the access of citizens to contents that may jeopardize the safety of the institutions and distinguishes the information in three blocks: secret information, reserved information and confidential information. These modifications were considered later in the Law 27806 which is the official text corresponding to the Law of Access to Information.

²¹⁸ As explained before in Chapter III, the organic body in charge of delivering the resources of the Ministry of Health in the regions is the Regional Direction of Health (DIRESA) as a representative of the Central Government in Health matters. The main functions of DIRESA are the delivery of health services, regulation, monitoring and evaluation of the Health System. Every DIRESA is supervised by the MINSA in their departments.

²¹⁹ Also, consideration is given to the transparency of the processes of public accountability, streamlined by the use of ICTs as strategy of e-government.

In the cases of study, the networks from the regional governments were not installed at least until 2006 (MTC website), but the LTAPI ordered the use of ICTs for public administration promoting the use of online resources for internal coordination of the health system such as transfers, supplies, and so forth from 2002. Thus, whilst the initiative of Telehealth systems in rural areas promoted the use of ICTs, the regional governments had limited or declined access to the required infrastructure and training for compliance. From its perspective, the Regulation of Telecommunications (RTC) and the policy of universal access were created to support the deployment of telecommunication networks nationwide for spreading connectivity and the use of ICTs for the public administration.

From their perspectives, FITELE and the RTC have the advocacy to promote the networking in rural areas from 2006. In that year, the installation of the networks for Telemedicine was provided by private sources such as in projects of development. In the case of the project EHAS-ALIS it was not until 2008 in Cuzco when the deployment of connectivity gradually started for the public administration from the office of the DIRESA Cuzco to the peripheral health.

Law of Telecommunications and Universal Access (LTUA)

The relations between FITELE and OSIPTEL for ensuring compliance in quality of service, adequate infrastructure and correspondence with the basis of the Law of Universal Access has been difficult in the past years ²²⁰. In practice, OSIPTEL had advocated its services to solve the issues of the private operators of telecommunications that had increased in the last decade (from four to twelve private companies) solving complaints nationwide about services and irregularities on the services, and the supervision over consumer satisfaction. Meanwhile, FITELE demands the accomplishment of the agreements on extension of the infrastructure signed first by *Telefonica del Peru* in 2001, at the end of the monopoly. This agreement established

²²⁰ There is an open discussion promoted on the social networks about the destiny of the gross fines applied to telecommunication companies about irregularities and sanctions since there are not channels to address those funds to the extension of networks in isolated communities jeopardizing the future of the funds for FITELE (Saravia 2013:1-13)

that part of the utilities of the company will pass to extend the telecommunication network in areas of low density population.

From the perspective of the rural areas, it appears as evident the incapacity of the government to provide the infrastructure of telecommunications required for a fair universal access. In fact, in 2003, the project EHAS-ALIS was the first project of telemedicine in Peru that implemented the use of ICTs for institutional communication, setting a precedent for later changes. Subsequently, the success of the ICTs applications promoted by the project EHAS-ALIS acted as predecessors for local and small investments in telecommunications for rural development, promoting the creation of tele-centers in the area as source of familiar income, and to the implementation of private telecommunication companies that provide telecommunication services for rural area such as G-lat and Rural Telecom. These were enterprises that found their markets out of the initiatives of telehealth and started with small contracts with the local municipalities and now provide companies for their own businesses.

The use of ICTs for e-government from the Regional Government through the DIRESA Cuzco and DIRESA Loreto had promoted training in literacy of informatics for municipal workers and health workers. Due to the application of the policy for e-government promoted by ONGEI, there was also an increasing of demand from the institutions to the public servants for reporting with higher frequency than before having ICTs, in order to reach compliance for the objectives of transparency and publication of relevant information online.

Law of Universal Health Insurance (LUHI)

From the side of health, the LUHI was approved in 2010, and for the first time it aimed to include all citizens in a national insurance program to provide health services particularly to people in isolation and extreme poverty. The LUHI has increased the number of people registered in the national insurance SIS, and also increased the funds from the DIRESA for attending more people through the administration of the

Fund for Public Health FISSAL. Also, the application of the Technical Norm in Telehealth (2008) and the adaptation of standardized processes of attention applying the normative were registered according to the assessment of the projects EHAS-Napo and Putumayo.

4. Alignment with the Guidelines of the National Plan of Telehealth

In 2004, the Ministry of Health (MINSA) nominated the National Commission of Telehealth which in cooperation with the National Institute in Research and Training in Telecommunications (INICTEL) elaborated the National Plan of Telemedicine ²²¹. This document represents a landmark for the practice of Telemedicine in Peru, as it was the first document from the government and from the MINSA which officially recognized Telemedicine as a supporting system for the delivery of health care services nationwide.

The National Plan of Telehealth proposes five guidelines for policy making in Telehealth²²² suggesting in 2004 the development of policies in promotion of ICTs in health, decentralization of the health system, policies for administrative and health processes, access to health information using ICTs, and remote continuous training of health personnel (INICTEL 2004:67). This research found the document Technical Norm in Telehealth from 2008 as the only response from the government to these guidelines, as most of the Telemedicine initiatives especially in the rural sector were led by actors from civil society.

²²¹ The National Plan of Telehealth is organized in six chapters departing from the conceptual framework, the ethical and legal framework, vision, mission and basic principles, description of the national situation in health attention, guidelines for policy and objectives, axes of development of the plan, strategies for the implementation of the axes of development, and a last chapter for supervision, monitoring and evaluation.

²²² Detail of the five guidelines proposed by the National Plan in Telehealth for policy making in Telehealth: first, implementation of policies for the promotion of the application of ICTs in the health services for improvement of the access to health services and improvement of the quality of health attention. Second, implementation of policies for the decentralization of the health system using ICTs and delivering health services without discrimination. Third, implementation of policies for facilitating the articulation and modernization of the essential administrative and health attention processes through the integration of the systems of communication and information of Telehealth and the national system of information. Fourth, policies for promoting the remote access to information in health and to create a culture of prevention, rights and duties and strengthening the mechanisms of social control of the public administration in health toward human development and democratization of the country, and fifth, policies for contributing with the actualization and continuous education of the health personnel using remote training programs tailored to the needs of the health centers (INICTEL 2004:67).

In the cases of study, the determination of the National Plan for Telehealth supported largely the penetration of the Telemedicine systems in the administration of the regional hospitals. In Cuzco, with the project EHAS-ALIS, the resistance to the use of technologies derived from the perception of health workers and directors of the regional hospital that Telemedicine would be complicated to implement or to use. After the announcement of the National Plan of Telehealth, MINSA promoted the use of ICTs and the acceptance of technologies had increased. After finding the systems friendly, social acceptance of the project and the use of ICTs for health became more popular, increasing the capacity of replication (EHAS-ALIS 2007).

The Technical Norm in Telehealth (2008) is a document of the MINSA, which established the basic parameters for the use of Telemedicine such as the units of the MINSA that are authorized to deal with the systems, the specific processes of health attention authorized for using ICTs and providing guides for the management of medical records and administrative procedures. However, neither the National Plan for Telehealth nor the Technical Norm in Telehealth define the mechanisms for balancing the difference in access from the urban to the rural areas, or explain the procedures for provision of resources for the ICTs to be implemented in the isolated peripheral health establishments.

In the project EHAS-Napo, the Technical Norm in Telehealth supported the design of processes of health attention for the extension of the networks from the regional hospital towards the peripheral establishments²²³. In the case of the project Putumayo, this project was designed following the guidelines of the Technical Norm. Although, the Technical Norm in Telehealth helps for the standardization in the health services authorized for the use of Telemedicine, the most important significance of this norm is in the institutionalization of Telemedicine as a regular process for the health system. The difficulty is on the inequality of

²²³ The EHAS-Napo project is the result of the results of the project PAMAFRO (2007-2008) and EHAS-Madrid (2008-2009) as indicated in Chapter IV of this dissertation.

conditions for applicability between the urban and rural health networks²²⁴.

4.1. Framework for policy analysis

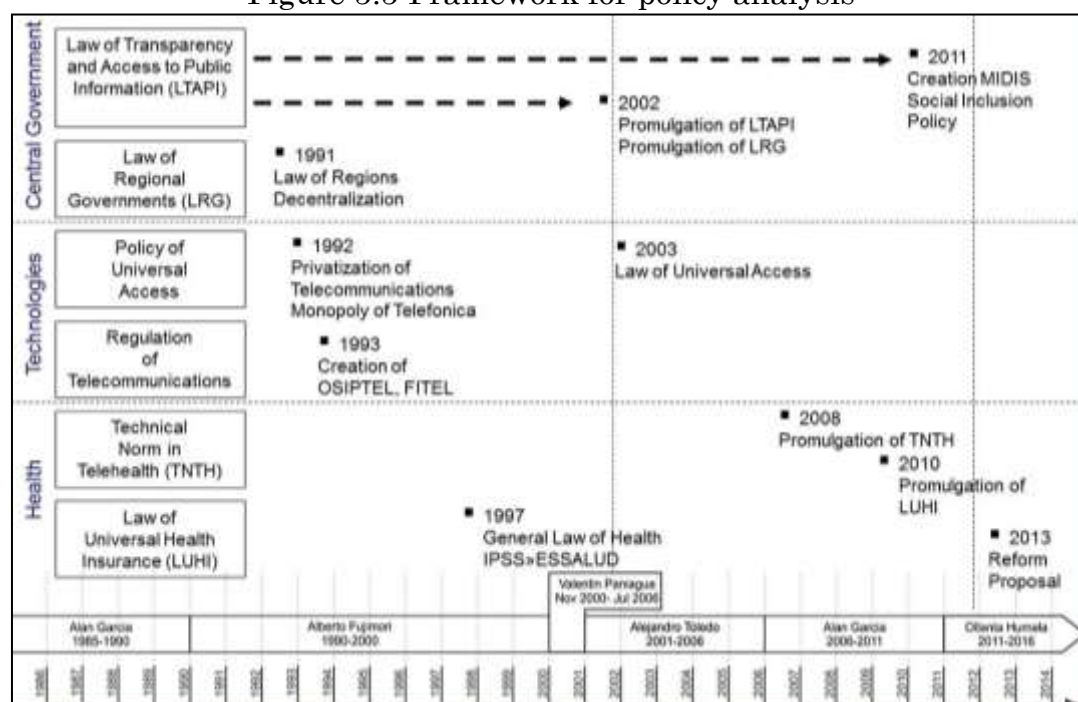
The framework shown in Figure 5.3 organizes the events in the political arena from 1985 until 2013 and their influence in the policy making process for the six laws and policies identified as the regulatory framework of ICTs for health. This framework was constructed following the reference of the Neo-institutional approach, with the main purpose of offering a dynamic perspective of the policy making process and the effects of the regulation in ICTs from the perspective of the institutions.

From the perspective of the theory of Structured Pluralism, the effects of the policies in the cases of study are directly related with the functions of the institutions that support such as policies. In fact, regulation is made with the purpose of the institutions to finance the resources for the implementation of services, modulate the coherence of the policy with the magnitude of the need, articulate efforts with concerned organizations and finally to deliver the health and connectivity services through the different channels of the public administration.

In this regards, this framework associates the policies and laws of the current scenario of ICTs' regulation grouped by the three topics of interest of this study: government, technologies and health, and proposes to examine their effects in the cases of study from the perspective of the objectives of the policy as functions from the institutions. The Central Government is in charge of the implementation of the Law of Transparency and Access to Public Information (LTAPI) and the Law of Regional Governments. Technologies are regulated by the policy of universal access and the regulation of telecommunications; and the health sector is regulated by the Law of Universal Health Insurance and the Technical Norm in Telehealth which summarizes the efforts for ruling the use of ICTs for public health (Figure 5.5).

²²⁴ It refers to the inequality of infrastructure, structure of health services and limited access to electricity and medical supplies in rural areas.

Figure 5.5 Framework for policy analysis



Source: elaborated by the author

For the purpose of reading this framework, two arrows were traced from left to right from the LTAPI indicating the related events. Along with the time line are aligned the governments of Peru from 1985 until 2013 as part of this study. The black bullets in the horizontal space correspond to the politic events and events from the context that influenced politically the processes of decision making towards the regulation for ICTs²²⁵.

Furthermore, this framework is applicable for analyzing the effects of policies in further studies, as it enhances a visual identification of the reactionary character of the policies according to the political context, and it graphically links the policy implementation with the governments in charge.

4.2. Effects of politics and regulation in the project EHAS-ALIS

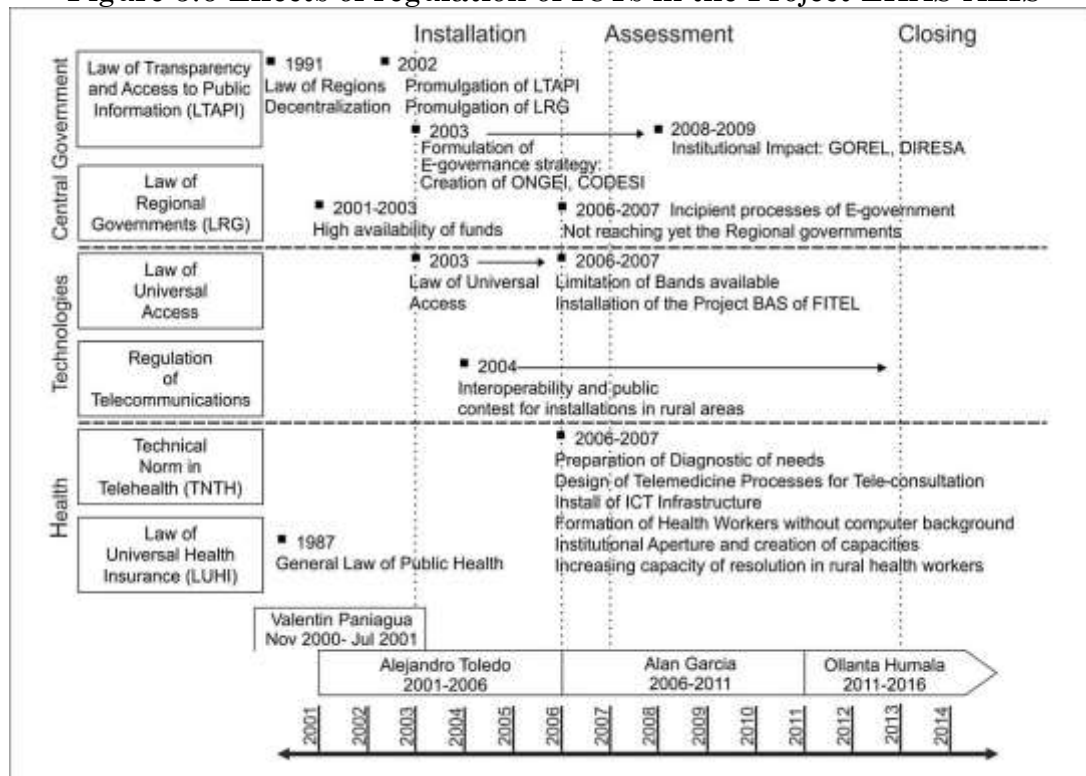
As shown in Figure 5.6, the project EHAS-ALIS began with a donation from the program Alliance for the society of information (ALIS) of the European Union (EU) in 2003²²⁶. The political circumstance of the

²²⁵ For more information about the Law of Regional Governments and Law of transparency and access to public information, Regulation of Telecommunications and policy of universal access, and Law of Universal Health and Technical Norm in Telehealth, consult Chapter III (Context) of this dissertation.

²²⁶ This project concentrates the efforts of universities, NGOs and local partners for implementing ICTs for health in rural areas of three countries in Latin America: Cuba, Colombia and Peru

agreement of EU for supporting Latin America in the implementation of technologies favored the initiative as high availability of funds made a point of difference to the other two cases of study.

Figure 5.6 Effects of regulation of ICTs in the Project EHAS-ALIS



Source: elaborated by the author

Regarding the central government and the Law of Regional Governments and Law of Transparency and Access to Public Information, both were declared in 2002, just one year before the implementation of the networks in 2003. This law has given more importance to the regional governments and their representation in the local communities, facilitating the presence of members of the DIRESA Cuzco and their visit to the installations of the project giving their approval and support. These incentives had influenced the results of the project in the long term toward sustainability, providing support for facing professional resistance from a fraction of the health personnel and functionaries.

The formulation of an e-government strategy from the administration of Toledo had positively influenced the interest of the regional government in receiving feedback from users of the services due to the call for transparency and online publication of activities. Still, by the time of the end of the implementation of the project EHAS-ALIS, the

strategy of e-government did not reach the rural localities of Cuzco. Nevertheless, the e-government policy had influenced the results of the project until after their integration with the DIRESA Cuzco (from 2008).

Regarding the regulation of telecommunications and policy of universal access, the institution in charge of supporting the extension of the networks to rural areas is FTEL (MTC) but they did not have physical presence in the area of intervention of the EHAS-ALIS project until 2006. Also, the project had their own private provider of internet at the time, and their own source of electric installation.

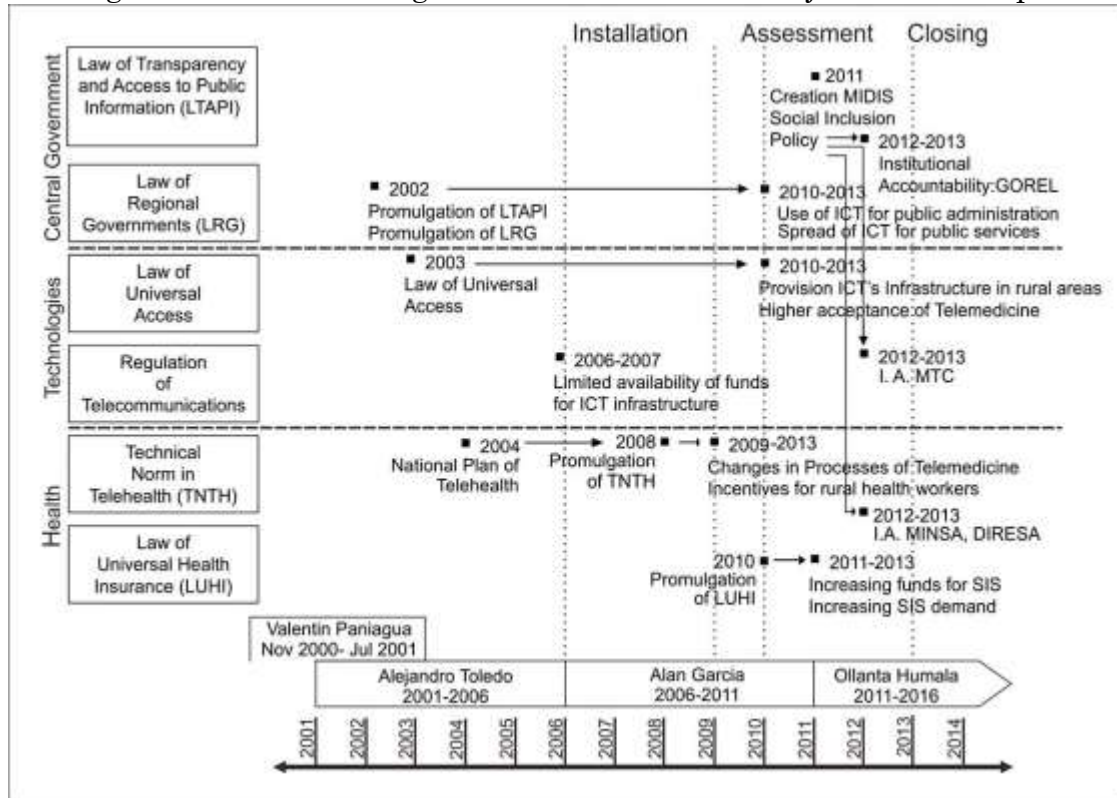
In 2004, the MTC opened the telecommunication systems of the state for interoperability in rural areas and revised the regulation in telecommunications after many years of services provided only by the national company *Compañía Peruana de Telefonos* becoming after privatization in the monopoly of *Telefonica del Peru*. In 2013, the state announced a public tender for providers of rural broadband services, opening the market for the penetration of multiple telecommunication companies promoting competency and better services for the communities.

From a different perspective, the Law of Universal Health Insurance implemented from 2010 promoted the inclusion of population living in extreme poverty and isolation to register in the public health system (SIS), also enforcing massive health attention. Furthermore, the assessment of the Project EHAS-ALIS crossed paths with the moment when the central government and international organizations were promoting actions for achieving improvements in infrastructure of telecommunications with emphasis on rural areas.

4.3. Effects of politics and regulation in the project EHAS-Napo

The formulation of the project EHAS-Napo was strongly influenced by the ideas of ICTs for e-government promoted by the administration of Alejandro Toledo, and the influence of the proposals of ONGEI as a promoter of the e-government and e-health strategy. Figure 5.7 summarizes the changes in policy that affected the results of the project.

Figure 5.7 Effects of regulation of ICTs in the Project EHAS-Napo



Source: elaborated by the author

According to the Law of Transparency and Access to Public Information and ONGEI, all regional governments were ready (or getting ready) to start implementing e-services from the websites of their local municipalities to the citizenship, promoting the use of ICTs for the public administration, including health and education sectors.

Concerning the regulation of telecommunications and policy of universal access, the use of ICTs for other sectors of the public administration as a directive of the central government motivated users and public servants to contribute to the institutionalization of ICTs.

The assessment of the project EHAS-Napo (2010) finished just a few months before the promulgation of the Law of Universal Health Insurance, and also crossed paths with the start of the implementation of the Program Rural Broadband for Isolated localities (BAS) of FITEI. This program was designed with the objective of connecting 700,000 people and has achieved 15% of its goals since 2010 (MTC website²²⁷). This project

²²⁷ Official website of the Ministry of Transport and Communications, FITEI
<http://www.fitel.gob.pe/pg/fondo-inversion-telecomunicaciones-fitel.php> last visit July 2nd, 2014

had enhanced telecommunications to 255,000 Peruvians living in isolated areas with low density population²²⁸ through the implementation of a broadband satellite connection adjudicated to the private company *Telefonica del Peru*. This initiative did not have immediate impact in the results of the project, but shortly after the transfer to the DIRESA in 2009, but one of its main effects in the Napo network is the extension of the national broadband as a provider of internet for the area, increasing the speed of use of internet and improving the connectivity for health workers and other spaces of the public administration.

4.4. Effects of politics and regulation in the project Putumayo

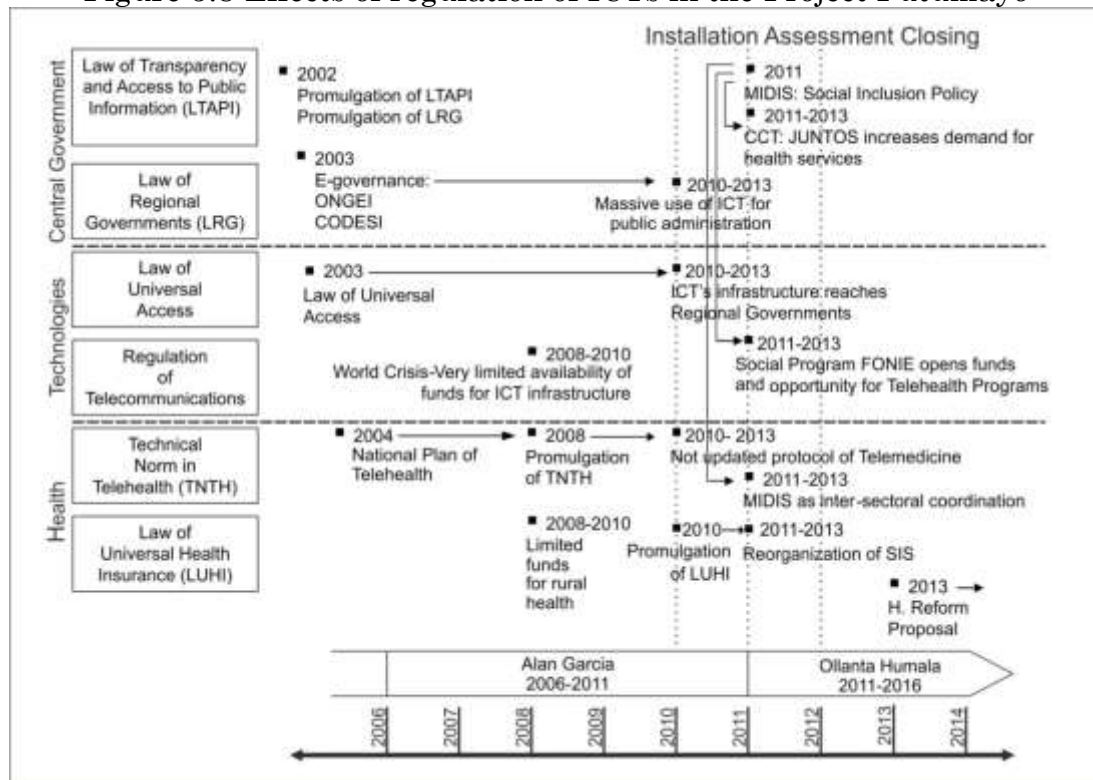
The project Putumayo started in a moment of high restriction of funds from international cooperation agencies for financing the expansion and infrastructure of ICTs networks in the developing world. For the particular case of Peru, the fast growing internationalization of its economy decreased the availability of external funds for ICTs development due to an increase in the per capita income and the growth of foreign investments, conceding priority to other developing countries in the region. There was a swift offer of international support from ICTs for development of topics of sanitization, hygiene, purification of water, development of safe water provision, sewage infrastructure and water networking in poor countries. This change in international cooperation affected significantly the interest of agencies on financing any further development suggested by the bilateral cooperation between Peru and Colombia, reunited for the accomplishment of the Putumayo health network.

This project represents a historical binational initiative for improving health in the frontier area of Putumayo. Thus, support from the central government and the chancelleries of both countries motivating this initiative that had serious problems of sustainability related to the unclear financing policies toward the future of the networks, and the lack of political will for solving the problem in the frontier area. Figure 5.8 shows

²²⁸ Diario Gestion <http://gestion.pe/noticia/337100/proyecto-banda-ancha-rural-ya-brinda-servicio-255-mil-peruanos> last view July 2nd, 2014.

a summary of the main aspects of the politics that influenced the results of the project and the changes in the public health care service provided in the frontier area.

Figure 5.8 Effects of regulation of ICTs in the Project Putumayo



Source: elaborated by the author

This project was influenced by the political relations between the chancelleries of Peru and Colombia, and brought together the strengths of members of international cooperation agencies such as CAN and ORAS for finding the resources required to make this project possible. Also, it promoted the development of academic and practical research in technologies from the GTR-PUCP, UNAL and UNICAUCA ²²⁹, in a binational effort for building hybrid technologies to overcome the difficulties of the weather and geographic conditions and bring connectivity to the health posts and health centers in the frontier area.

This project also appeared at the peak moment of the application of the Law of Transparency and Access to Public Information, when all regions of Peru had a mandatory webpage and had to be interconnected

²²⁹ Group of Rural Telecommunications from the Pontifical Catholic University of Peru (GTR-PUCP), National University of Colombia (UNAL) and National University of Cauca (UNICAUCA).

using ICTs resources provided by the central government in compliance with the national e-government policy and strategy of transparency. At the least, there was guaranteed access to internet in the offices of the regional governments facilitating access for workers in the municipalities and local dependencies of the government.

In 2011, up until the close of this dissertation, the Technical Norm in Telehealth had not experienced any changes or updates despite significant changes in the use and proceedings of ICTs for health in the health establishments and despite of the changes and reorganization of the Comprehensive Health Insurance System (SIS) toward massive inclusion in rural areas. These changes are related to the procedures for registry and reference of patients, modifying the coordination of ICTs reference and consultation for the Putumayo Project.

Furthermore, the negotiations for a binational agreement about the responsibility over payments for the use of the satellite services remain unresolved to the submission of this dissertation. This situation maintains the network installed partially connected and the system of reference and transmission of reports severely affected, generating avoidable transfers of health personnel, leaving the health posts unattended for extended periods of time (1-2 days).

5. Same inputs, different outcomes

The three Telemedicine projects depart from a common ground such as objectives, organization, financing, technologies and the fact that they were applied to the same health system. However, some of the difficulties for delivery of health care faced by each project were slightly different, and so were the mechanisms for the administration of resources in each regional government. Applying the adapted method of Mill's for comparative analysis tailored for this research, this section aims to highlight the different outcomes of the three cases of study and proposes an explanation based in the information provided by these cases.

Consequently, there are differences in the outcomes they obtained as results in the aspects of technological, institutional and political

impacts reached by these projects by 2012. It is important to highlight that after the end of the projects the donations were given in property to the local governments. Therefore the projects do not exist as they were named, but now they are part of the public administration of the national Peruvian health system.

Regarding the technological impact, the project EHAS-ALIS as a pilot project of Telemedicine in 2003 was challenged by the traditional health administration without a clear regulation about the use of communication technologies, and with limited support from the health system as the application of the Universal Health policy was scheduled to start ruling few years later. The project faced several cultural concerns about the use of technologies of communication; in particular for health consultation and the handling of medical records, but the participative design of new processes was useful to overcome the complications. The application of the Norm in Telehealth (2004) was incipient, and barely reached the rural areas, but its existence supported the acceptance of Telemedicine services. The efforts of this project were significantly bigger than the other two projects in facing the initial difficulties on the acceptance of the technologies by the beneficiaries and to overcome the difficulties of illiteracy of the health and administrative personnel in the use of ICTs (EHAS-ALIS 2007).

Concerning the institutional impacts, the project EHAS-ALIS as a pioneer in Telemedicine for rural areas in the region Cuzco was challenged by introducing the culture of ICTs to the health system for the first time in the region. Difficulties and rejection were overcome by showing to the beneficiaries the advantages of the Telemedicine systems. In particular, the results of the installation of the EHAS-ALIS network influenced the modification of the strategy of communication with the peripheral establishments and the possibility of expanding the experience in other areas. This effect has also taken place in different intensity in the projects EHAS-Napo and Putumayo, as their applications after 2007 were closer to

the modern administration and use of informatic resources by the health workers and the administrative personnel.

Concerning the political impacts, the project EHAS-ALIS started facing important changes such as the first year in the implementation of ICTs in the public administration. The practice Telemedicine in rural areas in 2003 demonstrated the need of norms and guidelines for regulation in Telecommunications, and the Technical Norm in Telehealth (2004) did not cover aspects such as provision or distribution of the services, advising on difficulties in the long term for sustainability of the networks due to the lack of clear policies in the use of the technologies.

The challenges faced by the project EHAS-Napo in 2006 were different, as the size of the project demanded important changes in the administration of the regional government and the resources assigned to the DIRESA Loreto for implementing the processes of Telemedicine in the health centers and the health establishments which promoted a fine work in the design and implementation of the administrative processes. Although, this project implemented significant changes in policy as it implemented Telemedicine processes in the health system and pushed the DIRESA Loreto to formally design the mechanisms of transference and assignments for maintenance of the systems.

In the politic arena, the project Putumayo implies a significant change because it promoted interaction between two national health systems (Peru and Colombia) with the purpose of providing health attention to a disperse population, applying the bi-national agreement of cooperation, which had been unused for the health system. This project was challenged by the bureaucracy of the political system²³⁰, and it is operating partially due to misunderstandings and political differences at the level of the Chancelleries but basically due to a lack of clear regulation.

²³⁰ The project Putumayo was achieved with the coordination of the Andean Organism of Health (ORAS) as an intermediate between the binational chancelleries and the administrators of the project. This information has been obtained from the interview to the Eng. Juan Paco from the GTR-PUCP in July 2014.

Consequently, as presented in the cases of study in Chapter IV, the three projects included in this dissertation have in common that they certainly generated improvements in the areas of health attention and capacity of resolution of the health workers in isolated establishments, increased the use of ICTs for second opinion and the processes of reference and dereference of patients, and improved the system of exchange of reports and coordination of transfers and provision of supplies.

6. Other findings

In the particular circumstance of the Project EHAS-ALIS, the international context favored the incentives for extending the connectivity toward rural populations, and contributed towards the concession of funds for this three-country project in Latin America. From a different perspective, the enforcement on the e-government policy promoted by Toledo (2006) and the obligation of the regional governments to compliance with the Law of Transparency and Access to Public Information (2002) settled the request for public institutions to promote literacy in informatics for public servants motivating the use of the systems also for their particular interest increasing their expectations about ICTs and Telemedicine.

In the particular case of the project EHAS-Napo, two studies of assessment²³¹ concluded that the application of ICTs for the delivery of health care services in rural areas of Peru is pertinent and capable of contributing towards sustainability²³². Also both studies agree that the key factor for sustainable maintenance of the network is based on the

²³¹ First study of assessment by Ricardo Oña and second by GTR-PUCP.

²³² As a result of the interviews of the workshops achieved in 2009, the interviewees stated that in general, the systems are (i) friendly to use; (ii) they use it often for the coordination of daily activities; (iii) access to internet have helped them to solve of immediate consultations such as understanding the medical terminology and review of cases as a second consultation. To the question about the aspects of higher impact in the use of the systems, they said that (i) it facilitates second consultation with specialist in the centers of reference and the coordination of transfers of patients, (ii) helps to control and request for medical supplies and (iii) supports the flow of exchange of epidemiologic information. Most of people in this group had shown their appreciation for (i) the potentialities of the system; (ii) the capacities of the system related to the immediate transmission of data; (iii) the increasing on the capacity of resolution of the isolated health posts; and (iv) the dramatic reduction of trips between the health facilities and the centers of reference. Most of the medical personnel added the importance of the network for having control over the activities of the rural personnel and to be able to support them on second opinion through the distance to facilitate early diagnosis of patients.

institutionalization of the use of ICTs and in the building of technical and managerial capacities to empower users and beneficiaries.

The project Putumayo was a pioneer intervention for improving health services in the border region of Colombia and Peru and a signal of interest of the health authorities toward the situation of disperse indigenous populations. Though, relevant changes in policy were not registered in the assessment study.

Concerning the standardization of Telemedicine services at the national level, this has been a long-standing issue all over the world²³³. These three projects contribute toward designing of a standard model of Telemedicine based on effective results as referred in the assessment of the cases of study.

Finally, it is important to highlight that during the period of closing the assessment of the project Putumayo, MIDIS started the implementation of a campaign toward social inclusion nation-wide, including the rural provinces of Maynas and also in Cuzco included in the health networks. The social program *Juntos* provides conditional cash transfers promoted health campaigns through the health centers in the frontier areas. This probably had influenced positively the use of health services for families and individuals. Although this research could not include the measurement of these results, it is encouraged that further studies consider the impact of social programs in the increasing access to health services and Telemedicine in rural and isolated populations. Also, the inclusion of Telemedicine in the proposal of Reform of the Health System in 2013 is of great significance in the institutionalization of Telemedicine for health services and settles the basis for nationwide replica.

²³³ Advocates for the development of telemedicine have wrestled with incompatible software and devices using proprietary specifications as well as a lack of agreed upon protocols, guidelines and business strategies. Until recently, the market for telemedicine-specific medical devices has not been large enough to attract major industry efforts to create unified technical standards. However, in some cases, telemedicine has benefited from technical standards developed for interrelated markets.

Chapter VI.

The Role of the Government in Policy Making for ICTs in Health

This chapter aims to discuss and integrate the results obtained from the analysis of the cases of study with the theories about regulation for ICTs in health. The core objective of this chapter is to contribute to the literature on the topic of politics, policy and regulation of ICTs for health in Peru. The analysis starts from highlighting the relevant political changes in the scenario of policy making for ICTs. Then, this chapter proposes a perspective about the role of the government in the policy making in ICTs for health in rural areas, discussing the four basic functions of the government proposed in the Theory of Structured Pluralism such as financing, delivering, articulation, modulation and articulation (Londoño and Frenk 1997). Discussion leads to affirm that the accomplishment of these functions is linked to the capacity of demanding compliance. Thus, if the central government fails in financing or delivering health services in rural areas, then it is not in a position to claim for compliance at local and regional levels.

This chapter also discusses the reactive and proactive strategies for policy making in Peru and the informality in the stages of the policy cycle (Bridgman and Davis 2003). Additionally, there is a discussion about the influence of the politics in policy making and the coherence of the policies for facilitating access to rural health (Osuna 2011). This section aims to highlight the difficulty for compliance when the policies are not coherent with the capacity of the institutions to provide the services.

Finally, this chapter discusses the topic of institutional accountability by contrasting the theoretical model proposed by the World Bank (2006) and the reality reflected through the cases of study. The chapter also includes a case of non-compliance in ICTs policy as an example of the current situation of the policies and institutions in Peru, closing with a review of the relevant aspects of sustainability for Telemedicine projects as an alternative for delivery of health care services in unattended rural areas.

1. Politics in the ICTs Policy Making

Since the last decade, Peru has been one of Latin America's successful stories, achieving sustained economic growth under political democracy, cutting poverty in half and producing an expanding new middle class (Sanborn and Young 2014: 61-62). The country grows strong due to the benefits of globalization and the penetration in external markets and increases the capacity of the domestic expenditure as a consequence of the expansion of a rising middle class²³⁴.

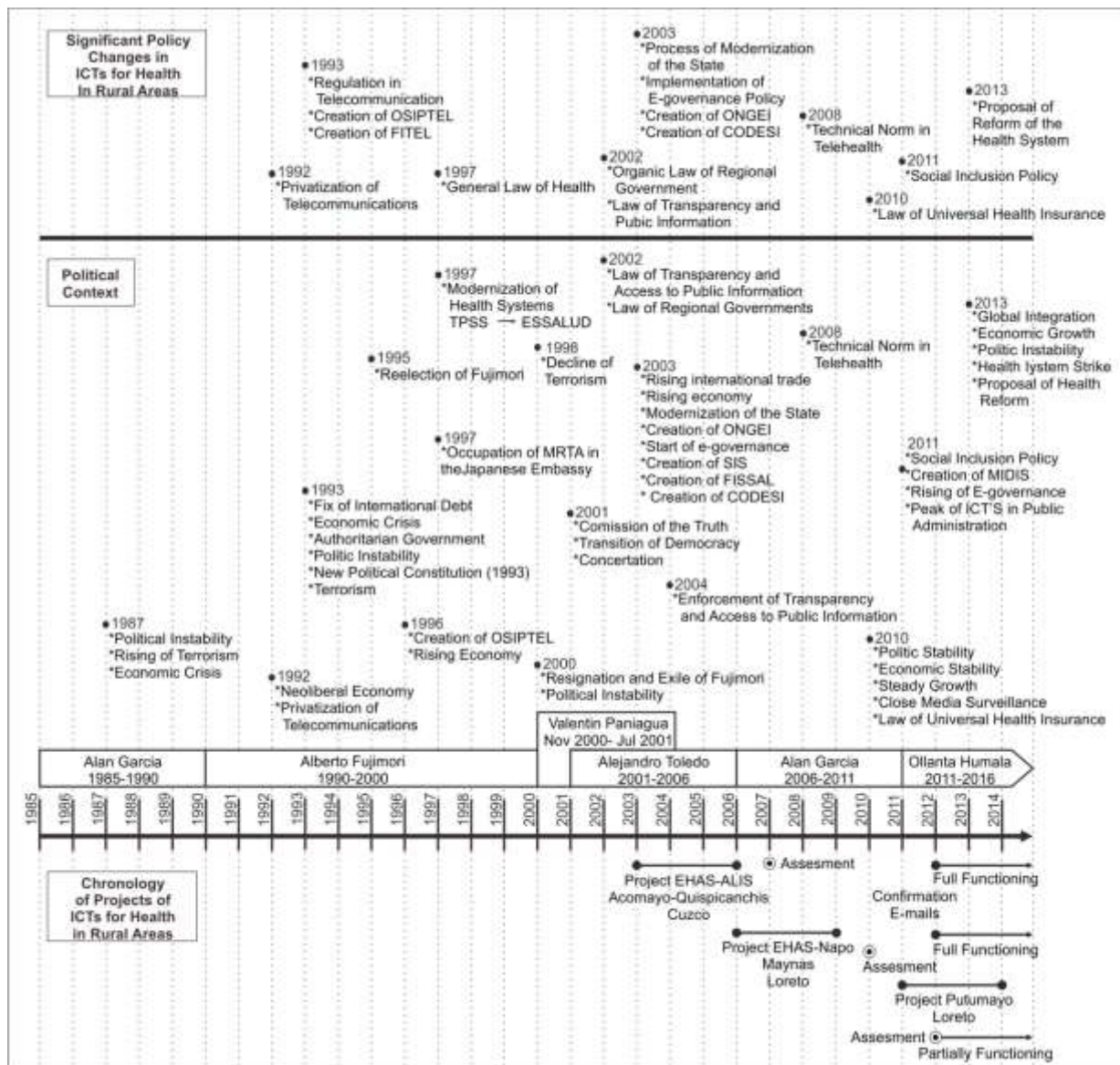
Figure 6.1 highlights the significant policy changes in ICTs for Health in rural areas in Peru including the political facts surrounding these decisions from 1987 until 2013. These are considered as findings of this dissertation, due to their importance in the regulation and policy making process of ICTs for health, with emphasis in rural areas. The relevance of Figure 6.1 is to show the link of the events in politics, and their influence in policy making decisions in the Peruvian government.

This figure is organized in three parts, from top to bottom: the first part highlights the significant policy changes related to ICTs and health in rural areas, the second part explains the political circumstance of such decisions and relates the political facts to the governments in turn, and the third part relates the deployment of the cases of study in the time line of these events. Thus, the figure helps to identify visually for facilitating the articulation of the cause-effect relation between the changes in the political context and its possible effects in the policy decision making. Also the graphic helps to identify collateral effects of decisions taken before, after, or during the implementation of the projects that are object of this study. Therefore, it explains the political facts which influenced changes in

²³⁴ These changes for becoming sustainable require strong channels of communication with their strategic partners. Thus, ICTs are considered as tools for nurturing a growing economy, requiring also a policy for promoting connectivity as a strategy for integration into the world's economy. This problematic is more common in the big cities, where the central government has direct intervention. In the rural areas, the central government is represented by the regional government offices and the municipalities constituting one of the main reasons why civil society becomes stronger to fill the gap between local governments and the citizenship.

the policies, and the effect of these policies in the projects according to the political moment²³⁵.

Figure 6.1 Chronology of Politics and Policy Changes in ICTs for Health in Peru



Source: elaborated by the author

Changes in Politics that affected the policy of Telemedicine

The final years of the 1980s and the first of the 1990s in Peru were critical due to the political instability of the government of Alan Garcia²³⁶

²³⁵ In chapter III of this dissertation, an introduction about the political situation of the governments of Peru has been introduced, but details on the effects of the politics over the governments' administrations were not explained. This chapter focuses on finding the politic events that shape the policy making processes surrounding the implementation of ICTs' regulation.

²³⁶ During the 1980s and most of that decade, members of the organized civil society represented by NGOs and associated with CBOs decided to start working in rural areas toward development and integration, assuming the representation of the cities and the voice of the indigenous communities in

reflected on the crisis of the rising of terrorism which affected rural areas. At the end of the administration of Garcia, the country was facing a terrible economic crisis of hyperinflation and economic isolation (Sanborn 1991), surrounded by a sphere of informality and with policies that institutions bailed (De Soto et al. 1986). The first years of the government of Alberto Fujimori²³⁷ brought drastic changes from the closing of the congress, the creation of the Democratic Constitutional Congress (CCD), changes in the Political Constitution of 1979 and changes in the model of economy and the patterns of trade, settling the basis for a neo-liberal model that fits in the international economy to replace the populist model proposed by the previous governments²³⁸.

These changes in policy interfered with the policy of telecommunications and the extension of services in rural areas firstly, due to the privatization process of service of telecommunications, which created the institutions for supervision of the private investment. Secondly, though privatization was focused on reducing the public price for telecommunications and reducing bureaucracy. This latter evidenced in the flexibility of the regulation for the private companies and the incentives given by the government to promote the industry in favor of the

the regional governments, and pushing toward participative policies that address the real problems of population and transparency in the management of public resources (Pajuelo 2006: 20-21).

²³⁷ The government of Alberto Fujimori was hardly criticized by the economists of the decade for making changes without having the economic bases for it (IDB 1999: 5-7), Fujimori proposed among multiple changes (self-coup, referendum, reelection, etc.) an authoritarian model of a single chamber²³⁷ to recover control over the politics of the country and have the freedom to elaborate policies toward compliance such as recovering power over the domestic income (taxation system) and control over the army and military force.

²³⁸ Changes in the political economy and institutions in Peru during the government of Fujimori (IDB 1999), it has been found that after selecting many examples of experiences of decentralization in the health services in developing countries such as Chile, Colombia and Bolivia, through the municipalities, in provinces and rural areas, the Program of Private Administration (PAC) and the conformation of the Permanent Committee of Coordination and Support to the PAC (COPAC), which was implemented in 1994 and coordinated by the Ministry of Health (MINSA) and the Regional Directions of Health (DIRESA). The contracts for the health services in the communities were ensured and paid by the DIRESA with the local non-profit associations (CLAS) created for the function of giving health attention, as they were usually doing in the absence of the governments' assistance (IADB 1999: 21-29). The plan did not work for long and by 1997 the PAC and COPAC functions and working places created for the purpose were assumed by the DIRESA, and leaving clear the strong role of CBOs and organized civil society in the public health care services. The CLAS system exposed the difficulties of supervising private investments in provinces and highlighted the need for a public system of health for people in extreme poverty.

private investments. The appearance of the private investment incorporated these companies as new social actors for the process of policy making, introducing new rules and regulations.

The problem of orientation

Following the rationality of Lasswell, the problem is not about policy making only, but about identifying on the rule of the law those who are responsible and are appropriate to accomplish such as mission (Turnbull 2008:157). Then, for the particulars of Telemedicine it is fundamental to recognize the primacy and lead of the Ministry of Health as the principal accountable institution for providing public health services, and in second term the Ministry of Transports and Communications in charge of extending the access for ICTs in rural areas.

In this perspective, the current Telemedicine policy is a joint effort of several institutions for providing health services and telecommunication services proposing rational policies with limited coherency due to a fragmented authority over the issue of health access. This research proposes that if many institutions are trying to regulate different sides of the processes of Telemedicine it does not mean that there is a coherent policy which regulates the mechanisms of action of Telemedicine, but many authorities are missing the point of improving health access and centering in their particular sectors. Thus, from an institutional approach there is a missing point in the orientation of the problem toward Telemedicine by centering in ruling the use without a clear panorama of the resources available.

In this scenario, the problem of policies for equal delivery of health services precedes the implementation of Telemedicine projects. Since 1995, despite the political difficulties of the country and the differences with the international system ²³⁹ which did not approve the installation of an authoritarian regime and took drastic changes in the economic sector (IDB 1999: 6), the economy of the country was improving due to the restitution

²³⁹ After the self-coup, the international institutional super powers such as World Bank (WB) and the Interamerican Development Bank (IDB) trusted the perspective of the Minister of Economy Carlos Boloña, who had strong influence in the external economy led by these institutions, and who promised to continue their programs for the country (IDB 1999).

of international credit and the increasing attractiveness of the market for international investments (Sanborn and Young 2014) promoting a culture of private service as more efficient than the services provided by the government. Thus, after overcoming the crisis of terrorism²⁴⁰, the central government worked hard for modernizing other portfolios to keep increasing the attractiveness of foreign investment and attracting the private companies for health services and retirement pensions.

Typology of health system: the out-of-pocket model

As mentioned before, according to Blank and Burau, the current health system in Peru oscillates between the private insurance and the social insurance system, with an out-of-pocket model (Blank and Burau 2010:12). Thus, the citizens who can afford the market offer for private services such as AFP and EPS or private health attention can have access to a free market system and the rural areas remained in charge of the MINSA using the SIS. Although it was expected that with the Law of Universal Health Insurance and the increment in the dotation of the Intangible Fund for Health FISSAL will impact positively to the level of affiliation of SIS, still there are several barriers for recruitment of affiliates due to the geographical and environmental barriers of rural isolated population for access to the health services distances.

2. The Role of the Government in ICTs for Health

During the 2000s, the fever and interest of the world motivated the institution of the society of information and the reduction of digital barriers with an intention to promote the installation of broadband telecommunication systems. Soon, the information technologies were incorporated in the public administration. The administration of Toledo promoted and incorporated ICTs as a government strategy after his democratic election in 2003 (Sanborn 1991). In the case of ICTs for health, from 2002 the initiatives of remote health attention in rural areas in Peru was taken by private initiatives and promoted by the model of organization network that involves universities, NGOs and local

²⁴⁰ Referring to the crisis of hostages in the residence of the Japanese Ambassador by the MRTA/1997.

governments ²⁴¹ (Sanoni 2012). However, the role of spreading ICTs corresponds to the government institutions as they are accountable for the regulation and implementation of public services.

From the point of view of the Neo-institutionalism, there is a double role of the government: as a rule maker and as a power in charge of enforcing compliance. The first role of the government is to use its structures of power such as formal institutions for creating the rules of the game and designing a system which provides services to all jurisdictions in equal of conditions (Charnock 2009:65-69). The second role of the government is to enforce compliance from the institutions and the organizations as sub-systems of the institutions, as if good laws are not enforced, they cannot be effective (Burky and Perry 1998: 124-126, 75).

From the point of view of the functions of the state, Londoño and Frenk established in their theory of Structural Pluralism four essential functions of the institutions for ensuring the provision of health services. These four functions are as follows: financing of the process of establishment of the health services; delivering of the health services; modulation for addressing coherent solutions to the magnitude of the problems of the health system; and articulation of the inter-institutional efforts for providing better health services making good use of the resources of the state (Londoño and Frenk 1997:20-24).

Partially financing health access for rural areas

Health care services for rural areas are the responsibility of the Regional Direction of Health Services (DIRESA). In this context, the rural inhabitants are attended by the DIRESA only and its capacity is insufficient due to a dramatic lack in medical personnel and logistic resources (Martinez et al. 2005). At the moment, and for over two decades, MINSA is apportioned with low level of economic resources in the

²⁴¹ In fact, GTR-PUCP (university representative) and Fundacion EHAS (NGO) have been working in the Amazonia with the communities of Alto Amazonas from 1999 implementing initiatives of telemedicine supported with discreet funds from international cooperation agencies, but only with local support from the municipalities, in the search for improving the health attention for their small populations.

assignment of their labor (1.7% of the national budget) and a heavy social responsibility. The Ministry of Health is the only Peruvian institution advocated to provide health services to most of rural populations through the Comprehensive Health Insurance (SIS). Although, the rate of registry in the SIS is limited to people who can have access to the health centers, at least 39% of population has no access to public health in rural areas (MINSA 2010:18).

Meanwhile, communication tools provided by the state such as radio or phones were not permanently available in the peripheral establishments such as health centers and health posts, making costly the coordination of any transfer (documents or patients) due to limited resources for transportation. In this context, ICTs are useful and powerful tools that often came supported by private investments (Martinez et al. 2005:66). In this scenario, although the MINSA is working towards financing the health services, the MTC is unable to ensure the availability of telecommunication networks in the rural and isolated areas. Yet, as during the time of the projects, there is a scarce presence of the local governments in the isolated areas, therefore the function of delivery has not been yet accomplished. In the health sector, pressure and budget constrictions from the executive and the MEF, showing the limited the capacity of decision of MINSA (Alcalde-Rabanal et al.2011:248-250).

Difficulties with the inter-sectorial modulation

In regards to modulation, the inter-connection or coordination between the Ministries lacks of instances of coordination of their actions. The MTC and MINSA are the authorities leading the sector of telecommunications and health respectively and are responsible for the coordination between their organizational bodies. MINSA is a deconcentrated unit which delegates representation and functions in the DIRESA which assumes the authority of the portfolio in the regional levels. The team of functionaries of the MINSA works within the Regional Government in each region.

In the three cases of study, different than the MINSA and their regional representatives in the DIRESA there is an absence of representatives of the MTC watching after the extension of infrastructure of telecommunications in each region. The MTC maintains a centralized organization system. In the reality of rural and isolated towns, MTC and MINSA do not seem to cross paths in their functions as their departments work for different Ministries and there is a lack of an intermediate instance for coordination of their actions regarding Telemedicine. These institutions seem to work independently from the perspective of the local and regional governments.

Articulation without delivering

Articulation is the function where the governmental institutions of the health system search for common efforts to attend the needs of the citizens. The idea of this function is for the institutions to process the citizen's needs and give them an accurate interpretation to transform these needs in policies, and to find the right institutional partners for achieving the delivery of health services. Also, this process helps to create the capacity in the citizens' representatives to reflect their needs in terms of the political resources available²⁴². In the rural communities of Peru, often NGOs assume this role to cover the gap of representation of the governments in the isolated communities.

In the cases of study of Telemedicine in rural areas, the difficulties are related to the capacity of the government for delivering the health service and the coordination of the government action for supporting this delivery. In principle, Telemedicine projects are an initiative to cover the gap in access to rural health, evidencing the lack of the government in delivering basic health services. Concerning the coordination of actions from the government, the fragmentation of the support coming from the MTC, FITEL, MINDIS and MINSA in different channels demonstrates the lack of a unified strategy for the government for tackling the problem of

²⁴² Citizens demand better health services, but they are not able to express in terms of strategy or in terms of the processes that shall be modified for them to feel satisfied. Therefore, the function of articulation is where the state finds tools and methods for approaching the language of the needs to the language of the policy making process to serve the citizenship.

health access in rural areas. This situation also weakens the leading power of the Ministry of Health, diminishing institutional effectivity and acting in detriment of the optimization of the resources of the state.

3. The Health System appears insufficient for supporting the policies: from a national health system to a market lead

In 1997, in urban areas and small cities, the reform in the health sector promoted the massive construction of infrastructure of hospitals under the direction of the Ministry of Health. The promulgation of the General Law of Health in 1997 and the transformation from the old public system from Peruvian Institute of Social Security (IPSS) to the new system ESSALUD made significant changes in the public administration of health services²⁴³, increasing power of the state through the presence of DIRESA in provinces, weakening the unions and separating the system of health from the system of retirement²⁴⁴.

Furthermore, from 1997 the introduction of the EPS system²⁴⁵ (Entity Provider of Health) as a mix model of cooperation between the private and the government system, the health system in urban areas had moved toward market offer, because the citizens are part of a private system of attention establishing co-payments, settling the access according to the capacity of expenditure²⁴⁶ (Alcalde-Rabanal et al. 2011: 248).

For population sin extreme poverty, the implementation of the Comprehensive Health Insurance (SIS) and the extension of its funds in 2009 made a significant change in the processes of health attention for populations in poverty and extreme poverty. From 2009 with the Law of Universal Health, the SIS is available nation-wide for people with limited

²⁴³ Years later, ESSALUD will separate the payroll collection system for employees from the social services for people in extreme poverty which attends the rural communities.

²⁴⁴ The retirement system corresponds to the pension plans, which were modified by implementing the private system of pension (AFP) toward efficiency and improvements in the retirement system.

²⁴⁵ The EPS creation is important because it's a landmark of penetration of the private sector in the public delivery of healthcare services. The Law of Social Security in Health (law 26790) created the EPS system as a compliment to the national health attention system.

²⁴⁶ The introduction of the AFP and EPS in the Peruvian system is part of the strategy of the government for improving the access of citizens to private pension and health services, in the search for tackling the bottle necks of the national system. Although, the rates of co-payments for the private system may discourage the deprived groups from inclusion, still it seems to promote access only for the groups in capacity of affording to pay the market prices.

economic resources with higher impact in rural towns. In practice, the implementation of the SIS as a social health insurance, impacted positively but not massively in the increasing of demand of Telemedicine services due to limitations in the processes of affiliation in the system.

Rationality and coherence of policies

In this discussion, policies are considered as the institutional rules from the government for promoting welfare, and for addressing the resources of the state to the solution of the common problems of society. In this sense, the most important part of public policy is the design. For accomplishing an accurate design, the main condition is to know the system from the need of the users to the mechanisms of interaction of the system. In this scenario, Osuna et al. proposes a deep thinking around these two topics of vital importance: the rationality and the coherence of the policy (Osuna et al. 2011).

The rationality of a policy responds to the relevance and pertinence of the policy on its context based on an impartial judgment about the political concept of the problem. In the cases of study, one may think about the relevance of building telecommunication networks in rural areas with limited access to electricity, for example. The answer is not yet simple, but Telemedicine provides access to health services by offering a coordination vehicle for saving people's lives. Thus, the implementation of a tailored policy for the regulation of ICTs in health for rural areas of Peru is relevant. In depressed populations, where there is scarcity of every resource, the implementations of ICTs have the potential of offering opportunities for development. If there was no electrification, then the system should be designed for having a provision that can be also shared for other purposes and promote a better quality of living.

The coherence of the project is related to the policy actions and if they correspond in magnitude and impact to the problem that is going to be solved. In the case of policy for Telemedicine in rural areas of Peru, the action seems much reduced toward the magnitude of the problem of the limited access to health services in rural areas, and certainly small when

compared to the reality of the entire rural area of the country. Nevertheless, the projects implemented are demonstrative projects with intention to promote replication and show the regional authorities the need for similar projects until the moment when a comprehensive policy can be achieved.

Osuna et al. as discussed above, highlights the importance of the pertinence of policies for offering tailored solutions according to the magnitude of the problems (Osuna et al. 2011). Thus, the problem of ICTs in health shall be oriented toward the capacity of the policies of ICTs and health to offer an inter-sectorial solution that is feasible for covering the lack of health care services in rural areas.

In the three cases of study, the alternative of solutions offered by the implementation of Telemedicine is pertinent for alleviating the immediate problem of transfer of patients and immediate consultation, but in the long term, is not coherent to solve the problem of delivery of health care service but only if applied to a massive scale. Thus, the real impact of the projects is related to the institutional and political sustainability of the changes implemented.

4. Reactive strategies for policy making in ICTs for health

In Peru, the implementation of Telemedicine services from 1999 are mostly private initiatives²⁴⁷ for supporting delivery of health services in rural areas. These initiatives were in every case supported by the regional and local authorities, representing a strong public demand on the government as a reaction to the inefficiency of the health systems.

It is the position of this dissertation that reactive strategies do not necessary have a negative interpretation as they are common in democratic regimes. Though, when there is a reactive policy which is not coherent with the strategic framework established by the government it fails to contribute with the development of the aspect that it aims to rule.

Reactionary policies without effective results for rural areas

In 1993, after the privatization of the Telecommunication services,

²⁴⁷ Private initiatives from 1999 from the EHAS Foundation, GRT-PUCP, and the NGO Engineering without borders (ISF) as presented in Chapter I.

OSIPTEL was created to regulate the services of telecommunications in Peru. In 1995, OSIPTEL included the regulation of internet provision due to the pressure of the RCP for the use of internet bands and later satellite bands. Telemedicine as a practice appeared in 1999 when there was no formal regulation about the aerial space. The first initiatives of Telemedicine where appropriate technologies were applied to improving radio communications²⁴⁸, pushing the MTC to reconsider the restrictions and to authorize a limited spectrum of high and low frequency bands to be used for radio communications for the health establishments²⁴⁹. During the decade of the 2000s initiatives in spreading information technologies and networking were implemented by promoting e-initiatives²⁵⁰ mostly from private organizations. Telemedicine was growing in rural areas with different shades such as education and emphasizing the capacity of empowerment of people from the use of telecommunication networks always promoted from the Telemedicine systems in health establishments.

In 2004, the MINSA with support of the National Institute of Research and Training in Telecommunications (INICTEL), nominated the National Commission of Telehealth and prepared the National Plan of Telehealth, which is the first document that recognized officially the potential of ICTs for health attention in Peru. This document proposed the guidelines for implementation of Telemedicine services with emphasis in rural areas of Peru. It also proposed the principles of alignments of the

²⁴⁸ HF and VHF stand for High Frequency and Very High Frequency. In 1999, there was no internet in rural areas of Peru, so the first initiatives were promoted by research in Telecommunications from universities to enforce the radio systems. HF and VHF systems, allowed the radio service using a rustic enrouting system and transmitting through the aerial sign chains of voice and data over an IP phone, reducing the failure in radio communication just with an improved version of radio frequency systems (Sanoni, 2007).

²⁴⁹ Supreme Decree N° 029-2001-MTC “Modification about the norm about authorization, services and application of sanctioning relative to the services of radio-diffusion” which establishes the procedure for obtaining permission to use the radio band with specific purposes or particular services and modifies the Law of Telecommunications in its article no. 127, including this process.

²⁵⁰ Projects of e-government, e-education and e-health such as for Telemedicine became popular in this decade for NGOs in association with different local actors due to the availability of funds for networking and information technologies offered by public contest from the international cooperation agencies. Projects such as *Plan Last Mile Initiative* from Voxiva with support of USAid in 2004, *Jovenes TIC* from the NGO Intermediate Technology Development Group with support of the Inter-american Bank of Development BID in 2006, and *Proyecto Red Marañon* from the *Vicariat of San Francisco Javier del Jaen* with support of the German Agency of Cooperation GTZ in 2003, among others (Sanoni 2008).

policy for promoting the use of Telemedicine services, yet without establishing the mechanisms of the state for addressing the allocation of resources (INICTEL 2004: 67-68).

In 2008, after many private initiatives from the civil society in Telemedicine and the upswing of private enterprises providing private Telemedicine services in the urban areas²⁵¹, the MINSA approved the Technical Norm in Telehealth in a document of nine pages which expressed the permitted applications of Telemedicine, restrictions in use of medical records, referring to the installation of administrative online platforms, and determining the responsibilities of at national, regional and local levels for the implementation of the plans. This document also indicates restrictions in the use of ICTs such as restricted use of the medical records for the privacy of the patients and the kind of information that can be transferred through the systems, but it does not explain standardized procedures tailored to the reality of rural areas in Peru.

Consequently, the National Plan of Telehealth and the Technical Norm in Telehealth provide important political alignments creating precedent in regulation, they seem to have found limited results in improving access for health services or infrastructure of telecommunications for the rural areas. These plan and technical norm can be interpreted as a reaction of the health system to calm the public pressure of the civil society, and to affirm in public the intention of modernization of the state by implementing technologies for improving access to public services in a situation where the administrative capacity of the government and infrastructure lacks of efficient strategies for distributing the resources of the state to reach isolated populations in rural areas.

5. Telemedicine Policies in the Policy Cycle

According to the Policy Stages approach of Lasswell, for the analysis of a policy it is required to define the object of study (Turnbull

²⁵¹ For example, the Enterprise *ITMS Telemedicina de Peru* is a private Company established in 2004 for provision of infrastructure and installation of telemedicine software and services, mostly for private clinics in Peru. Reference: <http://www.itms.com.pe/>

2008). For the present analysis it is useful to use this abstraction for observing the ICTs' policy from its policy making process in the policy cycle. Bridgman and Davis proposed the analysis of these roles in the policy cycle as a tool to find out the sequence of steps to turn ideas into Cabinet recommendations, and also helps to find the gaps between the formulation and evaluation to consider the effectiveness of the norms, and to determine if they are aligned and accomplish the objectives that they were made for.

Applying the Adapted Model of the Health Policy Cycle (based in the model of Bridgman and Davis 2003) presented in chapter II, the list of eight steps started with identifying issues, making a policy analysis, identifying the policy instruments, doing a process of consultation, coordination, decision, implementation and evaluation of the policy in question. First, the issue identified is the object of this study: the policies for ICTs in health, with emphasis in rural areas of Peru. The policy instruments are the supreme decrees and normative decrees. In the analysis of the cases of study, they are the Law of Regional Governments, the Regulation of Telecommunications, the Policy of Universal Access, the Law of Universal Health and the Technical Norm of Telehealth.

Coordination of the services of ICTs to reach the health systems has been designed for the individual interest of service providers and technical availability, expecting technologies to fill the gap between administrative pitfalls and the provision of medical services. Here is the first problem: this fragmentation of the services provides several challenges related to the level of functional coordination between the systems as well as the transmission of information between each of the sub-levels.

Decisions about the implementation of ICTs were made, and they are progressing. One of the main decisions is about the institutionalization of ICTs as an official channel for communication from the central government and implemented in every DIRESA. The authorities in charge of the health system agreed with the use and implementation of the networks in the three cases of study. Here appears the second problem: it

is about decisions made for improving previous policies related to compliance of private enterprises with the agreements established before and after privatization, following meticulously their steps along the fiscal year, fixing up schedules for compliance and not making fines the only process for temporary solution of the problem.

Implementation of the norms finds problems when it is not clear where the supplies for establishing the services should be collected or demanded from. For instance, to apply the Technical Norm of Telehealth, it is required to have the infrastructure to accomplish the actions and it is not clear if these actions should come from the Regional Direction of Health or from the MTC through FITELE, or from the Presidency of the Council of Ministries through their technical/normative bodies as there are antecedents on social programs organized from the local governments. On the other hand, for implementation, training is essential, and most of the Telehealth initiatives are funded and established by private projects supported by international cooperation and administrated by universities and civil society organizations. Still, there is no sustainability ensured if budgeting activities on implementation of the technical norm does not provide for training and maintenance.

Evaluation is probably the most critical point. In Peru, for the issue of Telehealth and for the establishment of ICTs for development in general, there is a lack of a clear system of assessment of policies established for the measurement of results and/or processing feedback. Media acts spreading information collected from the facts, making a summary of the advancement that ICTs promote as governments seems to ignore the pertinence of ICTs to rural areas. There is also a big gap between urban and rural living conditions deepened by the limited access to electricity and sources of energy are already a challenge on infrastructure.

There are four issues from the analysis by policy stages: the fragmentation of the health services in ICTs services; the decisions made for fixing up previous decisions to justify non-compliance; the implementation of the regulation does not establish clear responsibility

over the process of ICTs for health attention; and the lack of clear methods of assessment for compliance of the regulation or feedback processing.

Institutional fragmentation of power

As shown in the cases of study, most of the agreements with local and regional governments as well as the deal with the MINSA and their representatives in the DIRESA depart from informal agreements²⁵². These informal deals which are important for the first stages of the Telemedicine projects as it express the will of the regional governments for improving the health services for rural populations, weakens the power of the regional governments to go forward with support to the networks toward the upper political levels due to its irregular and non-standardized procedures for supporting the initiatives.

The advantages of both institutions (MTC and MINSA) are related to their independence for proposing and implementing actions toward the enforcement of their institutional objectives. On the other hand, their main limitation is the lack in inter-ministerial coordination systems for optimization of resources, fragmenting their joint capacity for negotiating with the central government. The multisectoral commissions nominated ad-hoc commissions such as the CODESI, and the Commission for Telemedicine offered so far analysis documents and plans that respond to the strategies of the state, but there remains a lack of a strategy to conduct a real inter-institutional coordination. They are yet to be considered mechanisms of coordination. Scarce information has been found about joint plans of the ministries toward the inclusion of ICTs for health services²⁵³. In the Table 6.1 there is a summary of the institutions which are accountable in the policy cycle.

²⁵² As mentioned before, the institutions involved in the process of policy making of ICTs for health in Peru are basically the Ministry of Health and the Ministry of Transport and Communications. These institutions are accountable for delivering health and infrastructure of telecommunications, respectively, and for accomplishing the processes of e-government and social inclusion according to the current policies. Then, the letters of commitment and the written authorizations for installation are submitted by the local authorities. These documents ensure the commitment of the local authorities about receiving the transfer of the property of the networks at the end of the projects.

²⁵³ Furthermore, ICTs and Telehealth regulation are the objects of accountability as the Ministries. ONGEI and OSIPTEL are the transmitters of regulation responsible for policy analysis and the processes of consultation and coordination of policy making whilst the decision is in the hands of the representatives of the executive power such as ministries. What they are accounted for is basically the

Table 6.1 Accountability of Government Institutions in the Policy Cycle for Telehealth.

Stakeholders/ Policy Cycle Process	Who makes	Who cuts	Who serves	Who is accountable
Identifying issues	Beneficiaries, Technical personnel, nurses, doctors, (front desk, medical and technical personnel)	(Not applicable)	(Not applicable)	MINSA, MTC
Policy analysis	ONGEI	ONGEI, OSIPTEL	DIRESA, FITEL	
Policy instruments				
Consultation				
Coordination				
Decision	Ministry of Health (MINSA), Ministry of Transport and Communications (MTC)			
Implementation				
Evaluation				

Source: elaborated by the author

In this Figure, ONGEI has the official role of making the ICTs' cake in Peru as they have access to all sources of information and access to the national citizen participation mechanisms. OSIPTEL cuts it; as they are in charge of regulation of operators who are the only providers of telephony service in rural areas and they have the mechanism for collecting complains and irregularities from the citizens and they are accountable for using that information as feedback. Also, ONGEI has a role as an administrator of the e-government resources to use policy instruments and make the corrections needed for the system noticeable. MINSA and MTC appear to have a transversal role through their different inference levels in the service provision of health and ICTs at the national level. DIRESA and FITEL appear as agents facilitating services for the less privileged and taking accountability for splitting responsibility with units of power coming from the Presidency of the Council of Ministries.

Thinking about compliance and the private enterprises, the MTC has the power of negotiation that can be used in two strategies: for making agreements with private providers in rural areas, but also for pushing the organisms of supervision in law compliance which is an advantage

compliance of their mandatory call for providing access to health services and access to Information and Communication Technologies to isolated populations in rural areas.

regarding the power of negotiation of MINSA dealing with medical expenses with poor insurance systems²⁵⁴. For example, if the price of a fine for irregularities done by the operators is higher than the cost to change the private processes to achieve compliance, then institutions will be resistant to follow the law and eventually it will become into a formal process the fact to receive fines instead of effectively assuming the commitments with the law and invest in the extension of the networks in the rural areas, quite different from the posture of MINSA.

From a different point of view, in the reality of telecommunications for rural health in Peru, most of the projects found their source of financial support from external aid, constituted by all the programs and sources of international agencies of cooperation as private funds²⁵⁵.

6. Institutional accountability and the effect of policies in Telemedicine implementation

Accountability is the obligation and responsibility of the governors to give accounts of their acts and inform about their decisions (Ochoa-Enriquez 2004: 457). Thus, in the scenario of regulation and stakeholders, each of them has a responsibility over the compliance of the norms that were given in charge by the approval of the executive.

Consequently, institutional compliance has impact over the deployment of ICTs for health in rural areas, because if one fails, then the rest of the systems will fall behind. For example, as it is the case, if the MTC fails in procuring the delivery of the resources for FITELE, then the infrastructure of telecommunications will be jeopardized, the services will not be delivered, the population will not be attended, etc. All these effects

²⁵⁴ History is an important factor that defines the character of the institutions. In that sense, through the context, the MINSA was historically postponed after any other portfolio, and only received reactionary solutions due to the strikes (in 1982, 1987 and 2013), plagues (cholera in 2002, or events out of control such as the phenomenon El Niño (2000)). In contrast, the MTC have flexibility in their budget for projects, funds, equipment, infrastructure and foreign technologies faster and easier than the MINSA.

²⁵⁵ These are part of the system of support of the basic three actor's model University-NGO's- local governments trinomium (Sanoni 2012), but since they do not have authority over decision making in policy, the sustainability of their actions becomes unpredictable and the organization of the administration of projects becomes subject for compliance of the rules of the destiny institution of the dotation, in this case, DIRESA with the telemedicine infrastructure

are responsibility of the DIRESA, and the consequences will be reflected in rates of health, quality of attention, etc.

For example, in the case of study Putumayo, it was not expected the interruption of satellite connectivity services. It happened when at the end of the project, the agreement of transference of the property to the local government did not leave clear in the documents which institution will assume the costs of payments of the satellite services (V-SAT). Until that point, there was a mistake of coordination. At the end of the subvention, the governments of both countries did not give a response to the situation. Not through their Ministries of Health from Peru and Colombia, nor from the local or regional authority, leaving the gap to lead into the partial interruption of services. There is a lack in policy to enforce compliance, and the institutions accountable for this arrangement are not responding²⁵⁶.

According to Ochoa-Henriquez, accountability is “the call of the governors to give counts of their acts” (Ochoa-Henriquez 2004: 457). Accountability is not considered an obligation but a political advocacy. The concept of accountability has been tailored to mean precisely the obligation of the governments to give account to the citizens and society.

Table 6.2 summarizes the institutions accountable for the implementation of the law and policy frameworks that have impact over the ICTs for health. This Figure aligns the laws accordingly with the institutions in charge of laws’ compliance, and helps to determine the responsibility of the authority toward the laws that were tailored from the central government of the Executive.

²⁵⁶ For that purpose, the Law of regional governments and the law of transparency in the case of the Peruvian jurisdiction will have to wait until the declaration of expenses and budgeting and declaration of results before the budget for the next year gets assigned, but there is not a chance to recover the lost time until the reports will enforce the institutions to respond.

Table 6.2. Effect of Policies and Politics over the ICTs for health

Legal Framework (chronological order)	Accountable stakeholders	How it affects to the ICTs for health?
Regulation of Telecommunications	OSIPTEL FITELE MTC	Provision of physical infrastructure and access Budget constrictions Technical Sustainability
General Law of Health	DIRESA MINSA	Does not consider procedures for Telehealth
e-government Policy	MINSA MTC Regional Governments ONGEI	Provision of technical infrastructure of ICTs Demonstrative programs promoting ICTs' literacy
Law of Transparency and Access to Public Information	Regional Governments Local Gov. ONGEI FITELE	Promotes the use of ICTs by public servants, facilitating the acceptance of technologies Provision of software and hardware for public service in rural areas
Law of Universal Health Insurance	Regional Governments DIRESA MINSA	Provision of resources for financing SIS Increasing of potential demand of services (more affiliations)
Social Inclusion Policy	ONGEI FITELE	Promotes health and education in the most depressed sectors of rural areas Includes targeted groups
Proposal of Reform of the Health System	MINSA Regional Governments	Inclusion of telehealth in the institutionalized processes of health attention.

Source: elaborated by the author

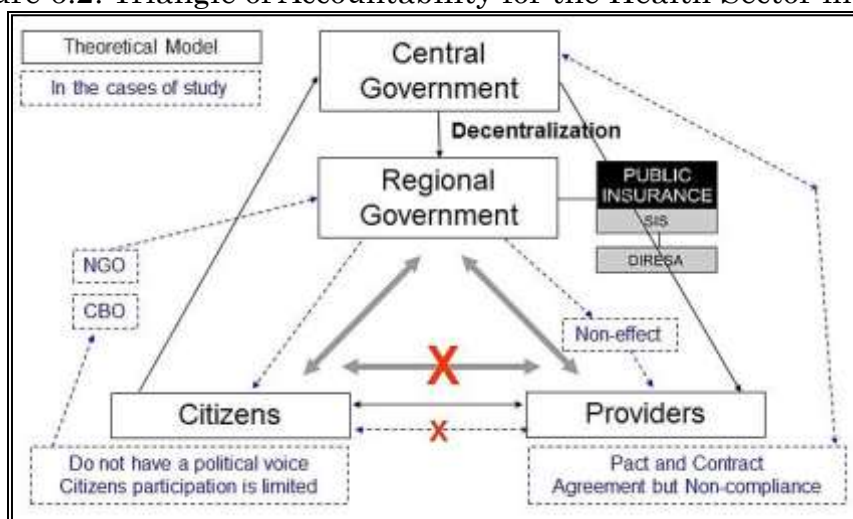
Thus, the institutions accountable for offering accurate services of health in rural areas in Peru are the MINSA and the MEF: one for the function and another for the budget and development issues, adding the MTC due to the liaison between ICTs and health following the proposal of telemedicine for attending remote populations. These institutions, despite having the accountability on their shoulders are unable to resolve the demands of rural areas due to different factors liaised with resolution capacity in their local processes, bureaucracy of their own system and scarcity of resources for supply delivery and limited autonomy in the deal with private enterprises and availability of services. The Ministries have the call and advocacy for attending the bases of the services for assurance all over the country, but one depends on another as without vital resources

in the hands of the MEF, liaised with the national budget, one Ministry cannot make expenditures bigger than their income.

At the level of regulation and policy making, there are processes established for revision of the budgets such as citizens' control and the annual reviews of participative budget, but they are found by the current governments as designed according to the interests of the previous partisans in governance. Participative decision making in local governments has increased in practice in rural towns due to the scarcity of resources to satisfy a list of demands and requirements to prioritize according to the needs expressed by the inhabitants. Also the media plays an important role in highlighting the accomplishments and pitfalls of the governors in charge and mobilizing political power against irregular procedures. From all perspectives, accountability in Peru is considered as a process towards society and no longer an option: governors are obliged to explain their acts and decisions to the citizens and be responsible for the consequences of the actions and the neglect of their governments.

Figure 6.2 shows the stakeholders of the process of policy compliance in the case of ICTs for health, based in the model of the Accountability Triangle proposed in 2006 by the WB in their study about how to make services work for developing countries. The graph highlights the theoretical model against the reality of the cases of study, and shows how the process gets broken step by step.

Figure 6.2. Triangle of Accountability for the Health Sector in Peru



Source: elaborated by author based in the model of World Bank in Cotlear 2006, p. 111.

In this scenario, the central government devolved authority to the regional governments, but at the same time it makes straight negotiations with providers which are usually private companies interested to invest in the country as in many cases of privatization and consignment of services or lands for temporary exploitation. In the theoretical model, the central government has mechanisms to hear the voice of the citizens, but in the reality of the cases of study, the three cases report the presence of NGOs and CBOs which become representatives of their communities and become their political voice and transforming the demands of the citizens in political claims and proposals of policies.

On the side of the regional governments, once the central government closes the negotiation of services with the providers, the exercise of authority of the regional government for demanding quality of services becomes difficult as the representatives of the agreements with private companies have no representation in the regional level. Then, even after policies are written, compliance by the private sector is dependent on the negotiations with the central government, beside of the public structure, making the citizens' claims and the authority of the regional governments to have no effect over the rules of the providers.

7. Informality of the system is a barrier for compliance

The Neo-institutionalism interprets the informality of the institutions in the Peruvian government as a barrier for the organization of the public services due to the instability of their functionaries and the double rules. These double standards make the provision of equal and quality public services difficult (Burky and Perry 1998: 129) as the ideal models of public administration are written rules. When irregular procedures become the parallel rule as a practical normative, they are eventually different from the formally discussed, agreed and written procedures. The promotion of functionaries is also relative to their relations with their partisans or due to their relation with the higher spheres of power, but rarely based on merit. Then, in a situation of non-compliance, it happens that an excess of rules creates conflicts in

coordination of activities as each institution has a clear idea on how to act, but if the coordination is hard to accomplish it causes fragmentation of the system.

The three key relationship: informal arrangements in the chain

To interpret the relation among the regional government, the citizenship and the providers, there is the theoretical model of the service delivery chain, which consists of the exchange and flow of information that can be established for better results of ICTs policy making: between poor people and providers of the services, between poor people and policy makers and between policy makers and providers of the services (WB 2004).

In Peru, often the deal between the private providers and the national governments precedes to the establishment of the formal agreements for provision to the public administration due to the traditional informality found in the three chain relationship, leaving without effect the formal authority of the regional governments as representatives of the citizens. In this regards, the regional governments have got higher capacity of negotiation than the civil representation, but informality often prevails.

8. Compliance Issues

Important events related to compliance affect the development of the Telemedicine networks in the isolated rural areas. From the side of the health system there is a Universal Health Policy but the incapacity of the government to deliver health care services in rural areas. From the side of the telecommunication systems, there are compliance issues about the capacity of the government to enforce private companies toward extending the telecommunication networks in rural areas.

Also, there are issues about policy compliance as private telecommunication companies prefer to pay the fines than to accomplish their formal commitments. There is also a discussion about the destiny of the gross fines applied to telecommunication companies for irregularities. Ideally, those funds shall be addressed to the extension of networks in

isolated communities but there are no mechanisms to transfer them to FTEL (Saravia 2013:1-13).

As mentioned before, the health system in Peru depends of the representatives of the Regional Direction of Health DIRESA. Therefore, the coordination of the Ministry of Health and the Municipalities is essential for compliance and delivery of health care services. The difficulties arose when the telecommunication networks are not provided by the state to offer connectivity nation-wide as established by the policy of Universal Access, the health services do not find paved roads or communication means to attend rural populations as established in the Law of Universal Health, and there is not enough qualified health personnel in the rural health centers. These facts are evidence that there is a gap between the policies and the capacity of response of the health systems in rural areas. From a different perspective, there are also significant barriers (economic, geographic, cultural, etc.) which limit the access of Peruvians to the health services²⁵⁷.

From the side of the institutions, the Supervisor Organism of Private Investment in Telecommunications OSIPTEL started activities in January 1994, right after the privatization of the only two companies' providers of telecommunication services until 1993²⁵⁸. *Entel Peru* and *Compania Peruana de Telefonos* were sold to *Telefonica de España* to constitute the private consortium Telefonica del Peru (Campodonico 1999:15-24).

In March 2014, OSIPTEL fined Telefonica del Peru for 714,000 nuevos soles (255,000 USD) for poor service due to irregularities found in closing of contracts of individual customers at a massive scale²⁵⁹. In October 2013, OSIPTEL ratified the fine against *Telefonica del Peru* for

²⁵⁷ Approximately 20% of the population has the possibility to access to the Social Services (ESSALUD), only 3% is attended by the Health Services of the Armed Forces and 65% depends on the public services (MINSA) and 25% of the entire population has no possibility to reach any kind of health service at all (MINSA 2012).

²⁵⁸ The only two telecommunication providers before privatization in 1993 were *Entel Peru* and *Compania Peruana de Telefonos* CPTSA (Peruvian Company of Telephones) that were sold to the Spanish Corporation *Telefonica*.

²⁵⁹ Note from newspaper *RPP News* http://www.rpp.com.pe/2014-03-01-osiptel-multa-a-telefonica-con-mas-de-s--714-mil-por-mal-servicio-noticia_673675.html last visited June 25th, 2014.

over 521,000 nuevos soles (187,000 USD) due to the application of rates higher than the ones agreed and informed to the regulatory body as the company was billing local calls as rural calls (higher rates), condemning the company to reimburse the money to users for the first time²⁶⁰. In February 2011, OSIPTEL fined *Telefonica del Peru* for 193,000 nuevos soles (69,000 USD) for noncompliance of call rates, according to the agreements and contracts with their individual customers ²⁶¹ . In September 2003, OSIPTEL fined *Telefonica del Peru* for an amount of 455,000 nuevos soles (about 163,000 USD) for failing in compliance of the installation of basic services of public telephony in 24 rural towns of the country in the Amazonia and Andean area²⁶². Unfortunately, history shows that corrective activities of the normative organs were effective only by increasing the amounts of those fines that seem to be of limited significance for the private enterprises.

At this point, it is clear that the Ministries have the last word, evidenced by regulatory bodies imposing penalties on private companies for noncompliance. However, there is scarce evidence of corrective actions being taken. In numbers, those fines do not reach 2% of the gross trimester profit of the private companies²⁶³ (80 million USD as first trimester 2013) and no mechanism has been found for fine funds go to improving access to public services. Looking closely, those fines are ‘tips’ from the private companies because they are cheaper for them to pay than to make effective compliance of the law and work their profits for connecting the rural areas as stipulated in the contracts with the government.

²⁶⁰ Note from newspaper *Gestion* <http://gestion.pe/empresas/osiptel-ratifico-sancion-contra-telefonica-peru-mas-s-521000-2079781> last visited July 3th, 2014.

²⁶¹ Note from newspaper *Peru 21 News* <http://peru21.pe/economia/osiptel-multa-telefonica-s193800-incumplimiento-tarifas-2170347> last visited June 25th, 2014.

²⁶² Note from newspaper *El Comercio* <http://elcomercio.pe/economia/peru/telefonica-debera-pagar-multa-455-mil-impuesta-osiptel-noticia-1630826> last visited June 29th, 2014.

²⁶³ Note from newspaper *El Comercio* <http://elcomercio.pe/economia/negocios/ganancias-telefonica-aumentaron-16-durante-primer-trimestre-noticia-1565966> last visit July 3rd, 2014.

9. Regulation and Policy for Sustainability

One of the main difficulties of ICTs in health for rural areas of Peru is about sustainability. According to Pade, it should be reached at the same time in many fronts: economic, financial, institutional, technological, and educational. Also, it shall contribute toward building capacities in health workers and administrative personnel as users of the systems and it has to consider social factors and specific cultural characteristics of the field of intervention (Pade 2006). Politics are an important variable since instability of the parties' interest can make significant changes on delay or advancements in policy, especially at the end of the periods in government. Also, politics can be influenced by the interest of private providers in a state where enforcement and regulation are weak, evidencing gaps in the legislation.

According to the experience in the three cases of study, there is a lack of a clear policy for supporting the deployment of infrastructure of telecommunications and the expansion of Telemedicine services from the health systems, jeopardizing the sustainability of Telemedicine projects. About sustainability of Telemedicine projects, Yellowlees proposed seven principles oriented to predict the capacity of sustainability of Telemedicine systems. Those were as follows: pragmatic criterion for selecting the area of implementation of Telemedicine, appropriation of the system by health workers, telemedicine management shall follow best business practices, user friendly criterion on the selection of technologies, emphasis on training and technical support, continuous assessment and feedback, and sharing information principle (Yellowlees 2005)²⁶⁴. Still, the reality seems

²⁶⁴ The most relevant ones were consider as follows: First, Telemedicine applications and sites should be selected pragmatically. In the cases of study, the decision of selection of location for the implementation of the ICTs projects for health was based in the need for health access, but also the fact that in the localities of Cuzco and Loreto, the local governments were open for Telemedicine initiatives as it is not possible to find financing resources without political support. Second, clinician drivers and telemedicine users must own the systems in the sense that they should know the processes, capacities and limitation of the Telehealth system. In the cases of study, the health personnel received a training course and hours of practice, but still due to the high levels of rotation it is a challenge to keep the personnel up to date in the use of technologies. Third, Yellowlees proposes that the criterion for selection of Technologies should be as user-friendly as possible. In the cases of study, technologies were first designed with free software (ubuntu, linux) with intention to lower the costs, but it was not

more challenging than applying these seven principles as the main difficulty for sustainability of Telemedicine is in the absence of a policy for supporting the administration of the services fed with public resources as a public service.

In Peru, the positive results obtained from Telemedicine projects pushed the representatives of the government as stakeholders to design a regulation in order to observe, document, formalize and in the long term design mechanisms to provide sustainability for Telemedicine. Thus, the policy making process has been affected and influenced by the current context of ICTs in Peru, and the political rules of the institutions involved, as well as the mechanisms of interaction of these institutions for coordinating these ruling process.

In the three cases of study, the first stage of action of the Telemedicine projects corresponded to a training period for the administrative and health personnel. Also there was institutional work for motivating the institutional functionaries of DIRESA and the local governments towards the acceptance of ICTs as a regular procedure. Thus, before installing the infrastructure of the projects, the executive team designed the organization of the Telemedicine process. Each case of study prepared a participative design where physicians, health workers, health administrators and technicians were ready for coordinating the Telemedicine services (EHAS-ALIS 2003, EHAS-Napo 2011, GTR-PUCP 2009a).

The second stage of action required to establish a positive political environment where the institutions involved in the regulation of the project supports the peripheral arrangements toward sustainability. In the cases of study, these arrangements corresponded to institutional changes to be implemented in the short term for installing and making the networks operative, and in the long term for supporting the sustainability of the networks. Thus, issues such as the formal procedures for transferring the infrastructure of telecommunications to the DIRESA, the

friendly, and on the first year of the project it had to turn to proprietary software (windows) as the health workers of the DIRESA Cuzco and Loreto were trained to use basic software packages.

assignation of a budget for maintenance from the regional and local governments at the end of the donation and the assignation of the economic and logistic resources for having a Telemedicine coordinator, were solved by establishing the principles of a policy for the regional administration of the services.

In summary, this Chapter discussed the effects of politics in the policy making and the effect of these policies in the reality of the cases of study. Sections one to three of this Chapter address the problem of the role of the government in the delivery of health care services using ICTs, and how the politics influence the policy making process. Sections four and five precise the characteristics of the policy making process in Peru, and finally the sections six to nine aim to focus in the effect of policies in accountability, compliance and sustainability of policy changes.

Chapter VII.

Conclusion: Fragmented Policy for Telemedicine

This chapter presents the conclusions reached from the analysis of the information provided by the cases of study and a theoretical discussion conducted in the framework designed for this purpose. This chapter examines how the findings of this dissertation have satisfied the objectives of the study. Then, it presents the conclusions of the study on two important levels due to their significance in policy and in the practical application for future Telemedicine endeavors.

The first level aims to present the effects of politics in the policy making process for ICTs in Peru. This level of the analysis addresses the role of governmental institutions and social actors toward the policy making process, and the importance of the characteristics of the process of policy making such as informality and fragmentation of power in enforcing the regulation for compliance.

The second level aims to present the effect of policies and current regulation in the use of ICTs in health services with emphasis in the effect of these norms in rural areas. This level of the analysis is oriented to explain the effects of reactionary policies and the issue of fragmentation of power which generates unclear policies from different sectors leading to confusion and failure in regulating ICTs in the public administration of health services.

As a conclusion, this study recommends the re-organization of the alignment of policies for ICTs in health in two important areas: policies for the health services oriented to the users and beneficiaries, and policies for the design and enforcement of the government strategy for universal health. The latter is addressed to increase the capacity of the government for delivering health services, by aligning the institutional resources to ensure access to health services and equity in the access to health services.

1. Objectives of the Research, Research Questions and the Hypothesis

The objectives of this research were intimately related to the research questions, pursuing the final goal of introducing an analytical framework which incorporates elements of politics, health policy and technologies. Each objective was also liaised with a research question as explained in Chapter I.

Regarding the first research question, it inquires about whom are the protagonists' actors in the process of policy making for ICTs regulation in Peru. This question is answered in this dissertation by recognizing the stakeholders of the process of implementation and those for policy making of ICTs for health. Also, the communication channels and processes for policy making provided by the state were identified in Chapter V and discussed in Chapter VI. This research divided the stakeholders in two groups: accountable stakeholders and stakeholders from the civil society. This division sharpens the analysis of the role of the accountable actors as they are the responsible for the decision making processes about ICTs for health, including Ministries such as MINSA, MTC, MEF, MIDIS the regional representative of the health services DIRESA, the regional governments and the regulatory organisms from the executive power such as ONGEI and OSIPTEL (Chapter V). This research question also responds to the first objective of this research which proposes to do an analysis of the current regulation of ICTs and the identification of the characteristics of this regulation.

The second research question inquires about the strategies and policies used by the accountable stakeholders for improving health access for rural populations, and it has been answered by identifying the current policies and the mechanisms to be implemented for the rest of the system to promote institutional compliance and citizens' participation in policy making systems. The laws and current regulations were associated in three groups: the ones related to central government, to the technologies and to the health system. For these three groups, laws from their sectors were identified. For the first group, the regulations to be analyzed in this

framework are the Law of Regional Governments and the Law of Transparency and Access to Public Information. For the second group, there are the Law of Telecommunications and the Policy of Universal Access, and for the third group there is the Law of Universal Health Insurance and the Technical Norm in Telehealth. Also, these norms were analyzed from a dynamic perspective considering the effect of politics in the time line and the effects of these laws and regulations in the projects of development (Chapter V). This research question was related to the second objective of research explaining the effect of politics in the regulation of ICTs.

The third research question inquires about the mechanisms proposed by the state for promoting equal access to health services. This question was answered in Chapter V, by identifying the effects of the political context promoting changes in the decisions of the political administration in regional and local governments in the three cases of study, and emphasizing the effect of the regulatory framework on its practical application. Also, this last question was related to the third objective of research by identifying the effects of policies in the implementation of the Telemedicine systems accomplished in Chapter V and discussed largely in Chapter VI.

Concerning the ICTs' mechanisms proposed by the government for social inclusion of rural populations, it is found that they are not integrated to the MINSA for their social programs despite the fact that most of these programs are linked with improvement of health access for women, children and groups in extreme poverty²⁶⁵. Another mechanism is the one proposed by the ONGEI, and the strategy of e-government which promotes social inclusion by extending the networks and promoting citizens' participation in the activities of their local governments. However, the mechanism is not coherent for rural areas, since the limitations of

²⁶⁵ The programs from MIDIS are targeted for specific groups. Yet, this research has not found studies about the effects of these policies in increasing the capacity of the targeted groups to have access to health services or increasing demand for health services from the targeted groups, or supporting the improvement in provision of health services from the government.

infrastructure and economic barriers put the ICTs far from the reach of rural peoples.

The hypothesis proposed for this research has been confirmed with the facts in the cases of study and the theoretical discussion. The hypothesis proposed suggested that “there are gaps between the strategies and the plans from the governmental institutions for the implementation of a regulation in ICTs which enforces compliance” and effectively, there is a gap between the proposal of the government strategies such as the ones established in the National Plan of Telehealth from 2004 and the actions implemented since then. From the results presented in the cases of study is possible to conclude that the strategies of the MINSA and MTC for spreading the use of ICTs in health do not appear as coordinated toward a common goal of establishing a National Telehealth system.

2. Effect of politics in ICTs’ policy making

About the effects of politics in the policy making processes and in the decisions of the public administration, in the three cases of study important effects were identified in practice. The characteristics of the policy making process such as informality, bureaucracy and the limited capacity of the government to enforce delivery of basic services through institutional compliance have several effects in the process of policy making for ICTs, leaving its effect to be felt in the rural areas. Also, the fact that the policy is fragmented and coming from different sectors of the public administration caused difficulties in the interpretation of the regulation by duplicating processes or confusing the instruction of the law. In the cases of study, this situation affected the processes of formulation, installation and transfer of the property of infrastructure, causing difficulties for the sustainability of projects.

2.1. Lack of inter-sectorial coordination in the policy making

The practice of Telemedicine requires technical knowledge, equipment and processes designed carefully to satisfy the needs of isolated health care facilities in rural areas. Basically, it requires the agreement of physicians and the health workers as primary users of the technology, the

acceptance from the patients and support from institutions and organizations for the development of the infrastructure and implementation of the services.

Consequently, the process of policy making involves the participation of institutions from several sectors of the government concerned such as Ministry of Health, Ministry of Transports and Communications, Ministry of Economy, Ministry of Development and Social Inclusion, and Regional and Local Governments. These institutions are expected to align their strategies and coordinate their actions in the implementation of regulation for focusing in the provision of services, avoiding duplication and enforce compliance.

This research found that each of these institutions were promulgating laws and using regulation tools for having control over pieces of the Telemedicine spectrum, but not considering the total process. Also, the mechanisms oriented toward the integration of policies are centered in the implementation of multi-sectorial commissions such as CODESI. These ad-hoc commissions have a history of following their independent agenda of requesting and producing technical consultancies and strategic plans which are disjointed from the capacity of response of the public administration, making the results of these plans questionable.

2.2. The fragmentation weakens the institutional lead and power of negotiation

This research pointed out the fact that the regulation of ICTs involves multi-sectorial participation and multiple institutions. This multilateral regulation system causes difficulties in recognizing the institutions leading the process of policy making in ICTs as sometimes the institutional roles can be duplicated or misleading. It was found that each institution creates their own rules to accomplish their governmental roles, making the institutional autonomy one of the main causes of fragmentation of the authority in ICTs policy making.

In the case of Telemedicine, the lead corresponds to the Ministry of Health, since it is the entity in charge of extension and provision of health

services. Nevertheless, the role of the Ministry of Transports and Communication is essential in the extension of the telecommunication networks for the Telemedicine systems to operate in rural areas. Thus, the primacy of the health sector is evident, but in practice one sector cannot operate without the other and both institutions lack a level of coordination level for acting articulated for the provision of Telemedicine services.

The central government is the core institution in charge of establishing the mechanisms of institutional coordination. The central government through its representatives in the executive, the regional and local government is in control of the development of physical infrastructure, ensuring the availability of basic services such as health, education, hygiene and environmental protection. In this scenario, the policy of decentralization from the central government is reflected in the deconcentrated representatives of DIRESA in every region. These representatives have the mission to incentive local and regional governments to support the local initiatives in health and push toward promoting community engagement. The DIRESA in the cases of study faced the difficulties of a fragmented administration system where the insurance system, the infrastructure provision and the medical supply provision are not articulated formally. Also, the health system encounters obstacles for the administration of resources such as bureaucracy and informality in the provision of public services. These difficulties of the system constrict the capacity of action of the regional and local governments in their jurisdictions in the lack of clear policies for enforcing the law and demanding compliance from private providers and other accountable stakeholders.

2.3. Informal processes does not lead to compliance

Under the scope of neo-institutionalism, the institutions play an important role in the administration of the public services in Peru, and also in the formulation and application of policies toward compliance. The core of a norm or regulation is to be able to work for the users. If the context makes them to act in a different way, then procedures fall into

informality and lose its power for enforcing compliance. However, accountability is an essential part of the institutional functions.

In the analysis of this research, the implications of the informality in the public administration are transcendental in terms of enforcing compliance and establishing double standards for compliance, making it difficult to establish standards for the provision of health services. Also, these informal agreements unbalance the public administration by diminishing the formal power of the governmental institutions and by establishing sideways processes in a parallel organization of unsustainable political agreements. Thus, the aspects of the informality that jeopardize the sustainability of Telemedicine systems are also related to the temporal nature of the political relations at the level of regional and local governments and the temporary appointments of politicians in the charges of responsibility²⁶⁶. These temporary arrangements appear as short term solutions established informally between the institutional representatives and the communities or providers of services, which are only lead to remain as long as they are in charge. In the long term, this fact has consequences and promotes the standardization of a parallel organization regulating the processes of the public administration.

3. Effects of policies in ICTs' implementation

Policies affect the results of the Telemedicine activity in several ways. This section provides information about the implication and limitations of the current ICTs regulation and how they affect the results of the Telemedicine projects in rural environments.

3.1. Reactionary policies do not contribute for sustainable changes

This research found that most of policies created between 2002 and 2012 in the field of ICTs in health had the common characteristic of responding to the pressure of the media, the press and the actions of discontent of the civil society instead of acting preventively toward the equal and accurate provision of public services. For example, the Law of Regional Governments in 2002 may represent for some authors a reaction

²⁶⁶ Temporary appointments may make politicians to incur into agreements without intention or resources for accomplishment

to the central government that could not attend the provinces (Saravia 2013, Hardiker and Grant 2011, Murrugarra and Gotuzzo 2010). The Law of Transparency and Access to Public Information in 2002 was promulgated in an environment where the media expressed its public rejection to corruption of functionaries and politicians in the management of public resources, and the Social Inclusion Policy implemented in 2011 was another reaction against the unequal access to opportunities for isolated population and incorporating policies and programs for social inclusion which was part of the argument of the political campaign of the elected president.

Concerning Telemedicine, these laws emerge from independent initiatives of the sectors that they correspond such as health and telecommunications. These laws partially regulate the use of ICTs in the sectors but they were formulated in the lack of inter-institutional coordination. Thus, these laws are not articulated, leaving gaps in the regulation and being part of a fragmented regulatory framework for ICTs in health.

From the point of view of this dissertation, the reactionary nature of these regulations hinders the lack of coordination and the disjointed ICTs policy making process in the formal institutions. Reactionary policies are often related with poor reinforcement processes jeopardizing policy compliance (Varghese and Scott 2004).

3.2. Insufficient capacity of the state for compliance

In the health sector of Peru, the implementation of the Law for Universal Health from 2010 was a response to the pressure of the civil sector and the media for the underserved rural areas and the lack of medical supplies coming from the central administration of the health system. In the ICTs sector, the policy for Universal Access and the regulation included the creation of FITEC as an institution in charge of the extension of the networks for facilitating connectivity nationwide. However, the government did not have either the capacity for offering

health services in equal conditions for urban and rural areas, nor a strategic plan for achieving this capacity in the long term.

From a different perspective, the government institutions as stakeholders of the policy making process for ICTs cannot provide services when there is a lack of capacity for providing the resources of the public administration such as financial, and technical capacity for delivering those services. Also, the lack of political mechanisms for achieving the function of the central government of delivering public services makes difficult for the public administration to reach efficiency in the decentralized representatives such as DIRESA and local governments.

4. Future research and pending agenda

The inclusion of Telemedicine in the proposal of Reform of the Health System in 2013 is a tremendous progress in the institutionalization of Telemedicine, and settles the basis for nationwide replica where urban and rural areas can have access to medical services in remote basis. Although the institutional inclusion of Telemedicine in the health system is a significant change in the institutional perception of Telemedicine as a tool for supporting the delivery of remote health services at institutional levels, still there is a lack of clear policies for a nationwide implementation. In this perspective, studies about the feasibility, efficiency and economy of using Telemedicine for urban and semi-urban areas in Peru may contribute with an alternative for decongest the public health services.

Complementarily, the implementation of the e-government policy and the Law of Transparency and Access to Public Information are important, but there are not clear processes of feedback for assessing the efficiency of these processes, which makes hard to measure the productivity of the public resources invested on the implementation of these policies. Certainly, the institutionalization of ICTs in health promotes the spreading of literacy in the use of ICTs and informatics for health workers and the public administration personnel to support their work and make it more efficient, but without assessment and feedback

processing is difficult to improve the use of the systems.

Furthermore, the recent implementation of the Social Inclusion Policy and the conditional cash transfer programs for supporting individuals and families in extreme poverty implemented in the administration of Humala, were not assessed for specific results and impacts in the areas of education, health and access to public services. These transfers aim to affect directly the capacity of the families to reach public services as a factor of inclusion, but the levels of efficiency of these programs were not yet assessed. In the health sector, it is difficult to establish if the programs are having an impact in the access of the beneficiaries to the health services

This dissertation provided only the first stone in the topics of politics, health policy and ICTs, but there is yet much to be done. This study depth in the effects of politics and policies in three cases of study, but much more can be achieved using this framework of analysis with a broader database for the improvement of the delivery of health services nationwide. As this dissertation provides information about the lack of mechanism of coordination and challenges of the current systems, the next step is to use this information for the design of feasible mechanisms for the articulation of the health system, the e-government system and the programs of social inclusion as part of a comprehensive strategy for providing universal health care in practice.

Limitations of the study

One of the aims of the current study is to highlight the effects of policies in the reality of Telemedicine in rural areas. Although the changes achieved by using ICTs in the cases of study have the potential to be replicated, there is a limited number of health establishments using Telemedicine systems in Peru. This study had only considered three cases of study and focused in rural areas, but is required to increase the number of cases for reflecting the nationwide panorama.

Furthermore, as more countries are implementing ICTs in their public administration, there are difficulties for obtaining private funding

for the assessment studies of projects of ICTs. Most available donations are for infrastructure and empowerment programs, but they rarely include the costs of visiting the health establishments in rural areas which makes difficult to demonstrate the effectivity of Telemedicine systems.

5. Recommendation

5.1. Concerning the organization of the policies

From the side of the difficulties for the access of ICTs in rural areas, the main problems seem to be the access to infrastructure of telecommunications, budget for maintenance and reliable technical personnel due to the high rotation which increases the costs of maintenance of the networks, and in general, the absence of a comprehensive system of regulation which organizes and covers the administrative needs of ICTs for health from the public administration.

After an exhaustive analysis of the difficulties of the health system, it is recommended to organize ICTs' policies under two strategic areas comprehended in the dimension of health service: Health service development policies oriented to the direct beneficiaries such as patients and health workers; and Health services management policies, oriented toward the design of strategies and institutional coordination of the inclusion plans.

- (i) Health Service Development Policies. Policies to ensure the feasibility of implementation of services to align with the strategy of the government. These are oriented toward improving the quality of service for the patients and to ensure effective and efficient service development for empowering the health workers and increasing the capacity of resolution of the health establishments. Here is the list of the potential policy areas for development of health services development policies:
 - a. Strategy and vision. Policies for alignment of the national strategy and extension of the services equally nationwide.
 - b. Pre-implementation analysis, planning and design. Policies that specify the character of the implementation and the relevance of such policies in order to obtain support from the other sectors of development such

as economy and education.

- c. Organizational integration. Policies that show the need to coordinate with the different sectors for attending the needs of the beneficiaries. This organizational basis will be the foundation where Telehealth sits.
 - d. Education, training and clinician engagement for ensuring empowerment and increasing the capacity of resolution of the health establishments.
 - e. Funding. Clear policies about provision of infrastructure, modeling, raising and efficiently deploying of funds and cost control.
 - f. Change management. Policies about how to address the needs of health workers during the process of adaptation to the systems and incentives for urban health workers to be working in remote areas.
 - g. Standards and clinical guidelines. Technical norms are not sufficient for ensuring compliance, but guideline policies can facilitate to accomplish the objective of engagement with the use of ICTs.
- (ii) Health services management policies. Policies to regulate the flow of implemented services and address their needs towards sustainability from the institutional strategies and national plans to ensure effective and efficient service management. Here is the list of the potential policy areas for development of service management policies:
- a. Co-ordination models. Policies oriented to standardize the existing models of coordination, or formulate their own with the purpose to promote a strategy of joint institutional effort.
 - b. Technology. Policies oriented to standardize the appropriate technologies available and affordable for the national reality toward an equal nationwide implementation.
 - c. Medico-legal issues. Policies addressed to ensure safety for the treatment of patients but also limit the level of responsibility of medical practitioners.
 - d. Sustainability. Coordinated policies from the point of view of infrastructure, maintenance and processes where the institutions assume accountability for their actions and enforce institutional

coordination for compliance.

- e. Clinical workforce management and development. Policies addressed to find and maintain the resources (financial, human, timing, infrastructure, etc.), to provide the conditions for health workers to improve their management capabilities and capacity of resolution to assume bigger challenges in the system. Also, policies that address the need for constant incentives and continuous training programs.
- f. Reporting and service improvement, metrics, review. Policies about collecting feedback and implementing it on the policy making process, in order to create a system of constant evaluation toward improvement.

5.2. Concerning the Critical Aspects of Telemedicine Projects

The experience in the field of work and the result of the cases of study shown that the right partnership at internal coordination levels is as important as partnership acting with representatives of the public health services to facilitate the implementation of progressive changes in the public administration. From the perspective of this study, finding the right partnership for development of projects in rural areas is the key factor for the sustainable deployment of telecommunication networks in Telemedicine. Partnership in the following aspects is highly recommended:

- finding the right partnership for development of a project;
- developing a participative solution with the beneficiaries;
- choosing the appropriate technologies;
- designing a training program tailored for the need of the personnel;
- developing an engaged community motivated on using the networks;
- ensuring of technological transfer; and
- finding the right partnership for infrastructure transfer.

Furthermore, in a technology-based administration, literacy in technology such as in Telemedicine is a sensitive factor. Due to the high level rotation of technical and health personnel in the rural areas, and the scarcity of specialized personnel for the maintenance of Telemedicine networks, it is essential to concentrate efforts in developing a

systematized training system such as manuals and self-instruction guides for personnel established in the rural areas.

Finally, as Telemedicine projects aim to break the barriers of access to health care services through the implementation of ICTs still the sustainability of services is a breaking point. Therefore, the challenge for ICTs in health and in the public administration in Peru is about design and compliance of a feasible normative for the maintenance of ICTs systems despite changes in the political scenario such as elections or policy changes. The clue is about developing an institutional culture of compliance and law enforcement that enhances the accomplishment of plans and strategies for achieving universal health in Peru.

Appendices

Appendix 1: The Role of ICTs on the accomplishment of MDGs

Goal	Role of ICTs
1. Eradicate extreme poverty and hunger	<ul style="list-style-type: none"> ▪ Support for the promotion of economic growth ▪ Enforcing strategic partnership for business develop. ▪ Facilitating information for agricultural markets and products development and improvement ▪ Promoting training and employment ▪ Increasing demand for ICTs products from small enterprises ▪ Pushing market price of communications lower due to increasing offer and demand
2. Achieve Universal Primary Education	<ul style="list-style-type: none"> ▪ Provision of distance learning tools for teachers and students ▪ Promoting the use of interactive techniques for teachers and students ▪ Breaking the barriers for access to learning tools ▪ Helping primary school teachers to learn and communicate ▪ Promote software sharing through remote e-learning
3. Promote Gender Equality and Empower Women	<ul style="list-style-type: none"> ▪ Promoting equity in gender for training ▪ Empowering women for development of professional/technical capacities ▪ Facilitating welcoming support from outside partners ▪ Promoting networking for women and communities
4. Reduce Child Mortality	<ul style="list-style-type: none"> ▪ Facilitating communication for policy formation ▪ Providing improved access to healthcare services ▪ Promoting immediate diagnosis and treatment administration ▪ Promoting online training for health workers ▪ Facilitating second consultation from general practitioners or health technicians toward specialists ▪ Facilitating coordination for transfer of patients, administrative issues, supplies and warehousing and avoiding unnecessary travel for patients and health workers ▪ Breaking the sensation of isolation of health workers in remote areas
5. Improve maternal health	
6. Combat HIV/AIDS, Malaria and other Diseases	
7. Ensure Environmental Sustainability	<ul style="list-style-type: none"> ▪ Promoting sustainable use of natural resources ▪ Sharing information and data about facts and effects ▪ Promoting socio-economic development ▪ Providing communication means that avoid unnecessary expense in transportation ▪ Promoting a low carbon society by spreading information about the effects in the environment ▪ Spreading policy making in developed nations as an example for developing ones.
8. Global Partnership for Development	<ul style="list-style-type: none"> ▪ Bringing a virtual environment for enforcing community networks and formation of civil society ▪ Bringing the lines for networking and creating partnership with other nations ▪ Encouraging strategic alliances for development ▪ Promoting dialogue between citizenship and policy makers ▪ Establishing mechanisms of community participation ▪ Promoting freedom of expression and democracy

Source: elaborated by author

Appendix 2: General Alignment for the Health Reform Policy in Peru 2013

Table A. Alignment no. 1: Potentiate the strategies of intervention in public health

Strategies	Proposal of policy
Modify the rules of assignation of resources	Implementation of a portfolio of health services and financing redistribution
Multisectoral and Inter-governmental articulation	Reorganization of MINSA
Strengthening of the national authority	Creation of a specialized technical organism in environmental health and food hygiene
Improvement of the quality of services and supervision of processes Implementation of processes for prevention and control	Implementation of a process of identification, innovation, development and transfer of technologies for surveillance, prevention and control of the main health problems
Redesign of processes of public health	Redesign of the sanitary intelligence system for public health decision making
Promotion of a working agenda	Consider in the agenda the management of the social determinants of health

Table B. Alignment no. 2: Protection to users and strengthening of primary attention system

Strategy: Implementation of a new attention model
Proposal of policy Modernization of the infrastructure of health services promoting itinerant assistance and remote tools for attention of isolated populations

Table C. Alignment no. 3: Improvement of efficiency, quality and access to specialized health services

Strategy: Articulation of public services and regional governments
Proposal of policy: Enforcing the inter-institutional agreements for exchange of services(targeted groups) Regulation of medical and drug supplies Establishment of a Telemedicine network with emphasis in maternal and infant health and cancer treatment especially for isolated populations in need of specialized services.

Table D. Alignment no. 4: Reform of the policy and management of human resources

Strategy: Improvement of working conditions
Proposal of policies: <ul style="list-style-type: none"> Investment in equipment and infrastructure in local and peripheral health establishments Improvement of salary and labor conditions Implementation of incentives for isolated areas Revision and improvement of the strategies and processes of attention in hospitals Organization of comprehensive health networks based in primary attention of health Implementation of a program of strengthening and modernization of hospitals Optimization of public investment for widening the capacity of resolution of the hospitals and primary attention network Implementation of a comprehensive integral policy of remuneration based on merit, performance and risk Regulation of the post-grad education for human resources Implementation of non-paid incentives for personnel in isolated areas Implementation of mechanisms for ensuring availability of medical supplies Implementation of mechanism of quality assurance for medication Implementation of a system of safety and quality control in public establishments

Table E. Alignment no. 5: Closing the divide of health insurance for poor populations

Strategy: Incorporating the mass of population in poverty and extreme poverty to the health system
Proposal of Policy Use of the system of Focalization of Homes to register users under the Comprehensive Health Insurance System (SIS)

Table F. Alignment no. 6: Extent insurance according to levels of vulnerability

Strategy: Optimization of resources by targeting groups
Proposal of Policy Emphasize attention of pregnant women, children under 3 years old, schooling children, elders over 65 years old, and populations in extreme poverty.

Table G. Alignment no. 7: Consolidation of the SIS as financial operator

Strategy: Optimization of the operative capacity of SIS
Proposal of Policy Using the SIS for the attention of insured citizens in the modality of subsidized and semi-contributive. Re-structuration of the financial system of health

Table H. Alignment no. 8: Strengthening of FISSAL (Intangible Fund for Health)

Strategy: Incremental widening of fund availability
Proposal of Policy Focalized activities for non-infectious diseases required of recuperative and palliative care Enforcement of the National Plan for Cancer attention and oncologic services.

Table I Alignment no. 9: Application of new modalities of payment

Strategy: Incentive the productivity and quality of health services
Proposal of Policy Promote productivity and quality of service in the regional and peripheral establishments.

Table J. Alignment no. 10: Strengthening the ESSALUD system

Strategy: Improve the administration, distribution and collection of resources for the contributive system
Proposal of policies: <ul style="list-style-type: none"> ▪ Redefinition of the target public for the subsidized systems (targeting inadequate affiliations) ▪ Incorporation of affiliations for natural persons without businesses and comprehended in the new simplified taxation system (billing from personal services with receipts) ▪ Enforcement of law no. 29761 about financial arrangements from the MEF ▪ Strengthening of ESSALUD financial systems for equipment and infrastructure ▪ Establishment of the SIS as financial operator for private and public health attention ▪ Assignment of FISSAL for interventions of high cost, high risk, and rare diseases ▪ Implementation of new modalities of payment and incentive for productivity and performance in orientation to users

Source: adapted by author from MINSA 2013, pp.12-65.

Appendix 3: List of Interviews

A. Assessment of the Project EHAS-ALIS

In the session of in-depth interviews, for the chapter Peru (assessment of the project in Peru only), the list of people consulted is as follows:

1. David Chávez – General Coordinator from EHAS- PUCP
2. Jamine Pozú – Executive Coordinator from EHAS-UPCH
3. Víctor Roque –IT Team from EHAS-UPCH
4. Jaime Vera – Executive Coordinator from EHAS-PUCP
5. Juan Paco – Coordinator of change management from GTR-PUCP
6. William Fabio Santos- Manager of the health center Catcca
7. Edwin Francisco Mendoza- Chief of the micronetwork Accha
8. Franz Rodriguez- Chief of training of the South Cuzco network
9. Marcela Herrera- Chief of the system of reference of patients of the South Cuzco network
10. Rolando Laurente – Chief of statistics of the South Cuzco Network
11. Arturo Janki- Director of Cooperation of MINSA
12. Edwin Cansaya- Professor of UNSAAC and collaborator of the project
13. José Aguilar- Chief of the system of reference of patients of the Cuzco Regional Hospital
14. Georgina Acurio Koki- Regional Coordinator of the DIRESA Cuzco
15. Carlos Vega – Director of Services of the DIRESA Cuzco
16. Blanca Núñez- Chief of Epidemiology in the South Cuzco network
17. Miguel Villanueva- Liaison Officer of UPCH in Cuzco

Also, for this assessment two workshops were organized for collecting information from users of the systems in the isolated facilities. The first workshop had the presence of four persons from the peripheral health establishments: Urcos (Marcos, physician), Ccatcca (Gina, obstetrician), Kcauri (Bertha, nurse) and Urcay (nurse). The second workshop was enriched with the opinion of six persons from the health establishments of Pomacanchi, Acopia, Marcaconga, Sangarara, Acomayo y Acos.

B. Assessment of the Project EHAS-Napo

In a session of in-depth interviews, eight people were interviewed in a workshop as part of the assessment review achieved between November 2008 and January 2009. The studio had followed the methodology of Fundacion EHAS for the assessment of telehealth projects starting by a technical revision of the installations and followed by 8 in depth interviews to users and beneficiaries (directives and health personnel) about their perceptions over the results of the project. The interviews were guided by a questionnaire and participant observation at the different hierarchical level of health

attention. The author of this thesis had a role in the elaboration of the survey and posterior analysis for redaction of the final report for the donors.

In the Health Center of Santa Clotilde (head of the Napo Region) a meeting with all the medical personnel of the centers was held (12). The meeting also included personnel from the IT systems (3), personnel from the statistics processing area (2) and representatives of the Municipality (headed by the Mayor, 4).

Concretely, the following interviews have taken place:

1. Dr. Carlos Manrique (Regional Director of the Loreto Health Department);
2. Dr. Yuri Alegre (Director of the Center for Control and Prevention of Diseases from DIRESA Loreto; Epidemiologist);
3. Dr. Ulises Jorge (Assessor of Social Development from the Loreto Region).
4. Dr. Rolando Frias Urbizagastegui (Chief at the Emergency and Critical Units Department of the Regional Hospital of Iquitos; Cardiologist);
5. Dr. Jack McCarty (Chief Doctor at Santa Clotilde Health Center and Chief in charge of the Micro-Network Napo to the DIRESA);
6. Dr. Jos'e Luis Rivas Lozano (Chief Doctor at Mazan Health Center);
7. Lic. Blanca Luque (Chief Nurse at Negro Urco Health Stall);
8. Royer Noriega (Health Technician in charge of the Tuta Pishco Health Stall).

C. Assessment of the Project Putumayo

List of health workers interviewed:

1. Miguel Antonio Alama Escobar, Surgeon, Chief Doctor (El Estrecho);
2. Jhenny Rebecca Rubio Robledo, Technical nurse (Ere);
3. Mariluz Machoa Peres, Technical nurse (Santa Mercedes);
4. William Curichima Risco, Technical nurse (Nueva Angusilla);
5. Darwin Maytahuayary Fuagui, IT technician (Soplin Vargas);
6. Lizardo Cirilo GimetreRoque, Technician nurse (Soplin Vargas);
7. Noemi Estela Lopez Revilla, Obstetrician (Soplin Vargas);
8. Edy Marcos Yauri Taype, Surgeon, Chief Doctor (Soplin Vargas);
9. Tomas Macanilla Leuy, Technician nurse (Bellavista);
10. Silvio Americo Perez Vilchez, Technician nurse (Nueva Esperanza);
11. Narciso Hernandez Yucuna, Health assistant (Puerto Alegria);
12. Helmer Wilfredo Cote Guaman, Health assistant (Puerto Alegria);
13. Luis Homer Ruiz, IT Engineer (Puerto Leguizamo);
14. Albeiro Villalobos Narvaez, Nurse Assistant (San Rafael);
15. Alexander Torres Ortiz, Nurse Assistant (San Rafael);
16. Juan Jose Botero Lopez, Odontologist (San Rafael);
17. Addlay Fernando Perez Gonzales, Nurse (San Rafael).

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