



Master's Thesis of Public Administration

The Health Workers' Perception of Telemedicine in Peru

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Abstract

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Telemedicine in Peru is a health tool and strategy that it is been implemented by the Ministry of Health, to face the shortage of specialist medical doctors and its unequal distribution around the country to deliver proper health services to all the citizens. So, this study aimed to know about the perception of its use, easiness and factors to improve about telemedicine.

A descriptive survey was conducted among the pediatricians in the capital of Peru, Lima, to analyze the willingness to use telemedicine, identify the factors that influence its use and identify the possible improvements applicable to telemedicine. Regarding the results, the research considers the use of Telemedicine has a positive perception by the pediatricians in Peru, based on the high willingness of recommend this electronic health tool as answer of the respondents and the advantages to its use, as Telemedicine saves time, supply the lack of specialist medical doctors in health sector, strengthen the National Health System, among others.

Keywords: telemedicine, telehealth, public health, health workers Student ID: 2019-29867

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Chapter 1. Introduction

1.1 Background of the Study

In Peru, according to the Pan American Health Organization (PAHO), the maternal mortality ratio was 93 deaths per 100 000 live births in 2011, and 68 per 100 000 live births in 2015. In 2015, 97% of pregnant women received prenatal care from skilled personnel, and 95.6% had four or more prenatal checkups, while 92.9% of deliveries were attended by qualified personnel, and 90.7% occurred in a health facility. In the same year, the leading cause of maternal mortality was bleeding (33%), followed by pregnancy-induced hypertension (31%), infection (13.3%), and abortion (9%). In the period 2007-2011, the regions with the highest maternal mortality ratios were Loreto (149.4 per 100,000 live births), Cajamarca (144.7), Piura (126.8), and Puno (109.6). Between 2011 and 2015, the percentage of pregnancies among adolescents aged 15 to 19 rose from 12.5% to 13.6%. The ratio reached 22.5% in rural areas and 24.9% in the jungle region in the latter year.

Additionally, between 2011 and 2015, the percentage of pregnancies among adolescents aged 15 to 19 were around 12.5% and 13.6%. The rate reached 22.5% in rural areas and 24.9% in the jungle region in the latter year. According to the results of the Demographic and Family Health Survey elaborated by the National Institute of Statistics and Informatics of Peru, during 2019, the highest levels of anemia in children from 6 to 35 months of age were registered in the highlands regions (48.8%), followed by rainforest regions (44.6%), Coast regions (37.5%), and in Metropolitan Lima (30.4%). Also, anemia is higher in those who live in rural areas (49%) than in urban areas (36.7%). Likewise, the highest prevalence of anemia was recorded in Puno (69.9%), Cusco (57.4%), Huancavelica (54.2%), Ucayali (53.7%), Loreto (53%), Junín (52.6%), Madre de Dios (51.4%) and Pasco (50.2%). On the contrary, a lower prevalence of anemia was observed in Cajamarca (28.7%), Lima Province (29.8%), Tacna (32.7%), Moquegua (33.2%), Arequipa (33.9%), and La Libertad (34.2%).

The PAHO also informed that in 2015 the ratio of human health resources (physicians, nurses, and obstetricians) to population was 29.6 professionals per 10 000 people in Peru, with the number ranging from 16.9 in Loreto to 46.5 in Callao. In urban areas, the ratio was 33.1 professionals per 10 000 population, compared to 17.6 in rural areas. At the national level, health professionals' availability was 12.2 physicians, 12.8 nurses, and 4.6 obstetricians per 10 000 population. There were 18 567 specialized physicians, belonging 45% to the Ministry of Health. The Rural and Urban Fringe Services provide coverage in poor and underserved areas. In 2015, a total of 7811 new professionals joined the health workforce, of whom 30% were physicians, 30% nurses, 25% obstetricians, and 15% professionals with other specialties. In 2011, the shortage of medical specialists in the country was estimated at 11 738.

In 2017, the Organization for Economic Co-operation and Development (OECD) published a study about Reviews of Health Systems and Monitoring Health System Performance in Peru, that appointed out that in 2013, Peru had 17 physicians and 22 nurses per 10,000 population, reaching the minimum workforce level estimated by the World Health Organization as being necessary to deliver the health care interventions prioritized by the Millennium Development Goals (25 physicians). Also, only 10 of Peru's 25 departments have a minimum number of physicians. And the density of physicians, nurses, and obstetricians in Peru vary significantly across regions, creating large human resources gaps in the most vulnerable regions. On average, there are 568 persons per doctor in Peru (compared to the OECD average of 303 persons per doctor in 2013), although the density of doctors across the population varies significantly. There are fewer than 350 inhabitants per doctor in Lima and Arequipa, while there are almost five times as many in Huancavelica, Huanuco, San Martin, and Cajamarca. Peru has an uneven distribution of physicians, but the country also presents the lowest physician density among OECD countries (on average 1.7 physicians per 1,000 inhabitants, compared to the OECD average of 3.3 per 1 000 inhabitants).

Consequently, a gap of some 16 000 specialists, including gynecologists and obstetricians, is reported. Physicians' and nurses' ratio to patients in Peru is reported as quite significantly different between subsystems. However, information on human resources by subsystems is not comprehensive due to the fragmented information systems. In September 2019, the Ministry of Health of Peru published the Statistical Compendium: Information on Human Resources in the Health Sector, Peru 2013- 2018, where we could have the following information.

Table 1 shows the number of physicians by 10 000 citizens from 2013 to 2018 by regions in Peru, from 11.5 in 2013 to 13.6 in 2018. Also, in 2018 some regions situated in the highlands as Cajamarca and Puno have a percentage of 6.5 and 7.2, respectively, and among the rainforest regions as Huanuco, Loreto, and Ucayali reported 6.6, 7.2, and 8.3; even Piura, a coastal region, appears with 7.2. So, in 2018, from the 25 regions, 19 have a lower number of physicians than the national, which is already lower than the region.

Table 1 Number of Physicians by 10,000 citizens from 2013 to 2018 by regions in
Peru

Region	2013	2014	2015	2016	2017	2018
PERU	11.5	11.9	12.2	12.7	12.8	13.6
Amazonas	6.2	7.0	7.3	7.6	7.9	9.1
Ancash	7.5	8.2	8.2	7.9	8.6	8.4
Apurimac	9.2	10.2	10.3	10.3	11.2	12.3
Arequipa	14.7	16.4	17.4	18.3	17.7	17.6
Ayacucho	6.8	7.1	7.0	7.7	8.0	8.5
Cajamarca	5.5	5.8	5.5	5.7	6.2	6.5
Callao	21.7	23.7	24.5	15.5	25.4	22.5
Cusco	7.9	8.6	8.4	8.0	8.6	10.0
Huancavelica	7.7	7.4	7.2	6.9	8.1	9.1
Huanuco	5.7	5.8	5.9	5.5	6.1	6.6
Ica	12.6	12.7	13.8	14.3	15.0	15.3
Junin	6.4	6.7	6.6	7.0	7.8	8.4
La Libertad	9.5	9.9	11.2	12.1	11.8	11.7

Lambayeque	10.0	10.3	10.7	10.8	10.6	11.6
Lima	17.8	17.9	18.3	20.3	18.9	20.5
Loreto	4.8	5.2	5.1	5.8	6.2	7.2
Madre de Dios	11.1	12.0	10.8	10.6	10.9	11.0
Moquegua	11.8	11.3	11.9	12.0	13.4	15.2
Pasco	8.9	7.5	7.4	7.7	8.2	10.6
Piura	6.1	6.5	6.6	6.7	7.0	7.2
Puno	5.8	6.4	6.3	6.3	6.8	7.2
San Martin	5.5	5.7	6.3	6.2	6.4	7.6
Tacna	13.7	14.2	14.6	14.6	15.8	16.2
Tumbes	9.3	10.4	11.6	12.2	11.8	12.6
Ucayali	6.8	7.2	7.3	6.9	7.8	8.3

Also, the Ministry of Health of Peru reported from 2013 to 2018 the total of specialist medical doctors in Peru (Table 2), and all the physicians that work in the urban and rural area (Table 3), as well in the case of specialist medical doctors (Table 4). Here, we could realize that concerning the physicians, more than 85% work in the urban area, and specialist medical doctors, most 98% work in the urban area, raising the 99.1 % in 2018.

Year	Number of Specialist Medical Doctors
2013	17 859
2014	18 239
2015	18 428
2016	18 618
2017	19 812
2018	20 117

Table 2: Number of Specialist Medical Doctors in Peru

Source: Ministry of Health of Peru

Year	Total No. of Physicians	Urban	Rural
2013	18,724	85.2%	14.8%
2014	22,137	86.0%	14.0%
2015	20,839	86.0%	14.0%
2016	22,797	88.3%	11.7%
2017	23,226	87.9%	12.1%
2018	26,360	88.2%	11.8%

 Table 3: Physicians of the Ministry of Health and Health Regional Directions working in an urban and rural area in Peru

Source: Ministry of Health of Peru

Year	Total No. of Physicians	Urban	Rural
2013	7,645	99.2%	0.8%
2014	8,073	99.1%	0.9%
2015	8,263	98.1%	1.9%
2016	8,486	99.1%	0.9%
2017	8,956	99.0%	1.0%
2018	9,384	99.1%	0.9%

 Table 4: Specialist Medical Doctors of the Ministry of Health and Health

 Regional Directions working in an urban and rural area in Peru

Source: Ministry of Health of Peru

In 2017, the Organization for Economic Cooperation and Development researched the Health Systems in Peru, shows that there are 13.4 medical doctors for 10,000 people in Peru. In OECD countries, the average is 33 medical doctors for 10,000 people. The medical specialists' gap is 30,000, so Telemedicine is a health policy to contribute to Peru's access to health services.

Besides, the statistical information reported by the Ministry of Health of Peru showed a critical situation of the human health resources in Peru related to the pediatric health care that works at the Ministry of Health and Health Regional Directions from 2013 to 2018. Table 5 reported the number of specialist medical doctor by pediatric specialty, working five or fewer health professionals in case of pediatric cardiology, pediatric dermatologist, gynecology of the girl and adolescent, gynecology and obstetrics of the girl and adolescent, pediatric hematology, adolescent medicine, pediatric pneumology, neurosurgery pediatric, pediatric ophthalmology, emergency and disaster pediatrics, and pediatric urology.

Pediatric	2013	2014	2015	2016	2017	2018
Specialty						
Cardiology	1	1	1	1	5	5
Surgery	123	130	131	129	138	146
Dermatologist	0	0	0	0	0	3
Endocrinologist	4	4	4	6	4	10
Gastroenterology	5	4	4	7	6	8
Gynecology	0	0	0	0	0	0
Obstetrics	1	0	0	0	0	0
Hematology	1	1	1	2	0	2
Infectology	13	12	11	9	9	7
Medicine	2	3	3	2	2	2
Intensive Medicine	6	5	5	9	16	19
Nephrology	3	3	3	5	3	6
Pneumology	5	4	4	6	5	5
Neurosurgery	6	6	1	1	1	1
Neurology	9	10	12	13	14	13
Ophtalmology	1	2	2	2	3	2
Oncology	4	6	8	9	9	9
Pediatrics	1072	1123	1140	1182	1233	1242
Emergency and	0	0	0	0	1	2
Disaster						
Urology	0	0	0	0	0	0

Table 5: Pediatric Specialist Medical Doctors of the Ministry of Health andHealth Regional Directions by Specialist in Peru from 2013 to 2018

Source: Ministry of Health of Peru

Finally, Table 6 shows the number of pediatric specialist medical doctors working at the Ministry of Health of Peru and Health Regional

Directions that goes from 1072 to 1242, in 2013 and 2018, respectively. Here, it is dramatic that five regions have less than ten pediatricians: Amazonas (1), Huancavelica (8), Huanuco (9), Madre de Dios (1), Moquegua (7), Pasco (5), and Tumbes (8).

Region	2013	2014	2015	2016	2017	2018
PERU	1072	1123	1140	1182	1233	1242
Amazonas	8	7	6	7	7	5
Ancash	30	30	30	34	33	26
Apurimac	13	12	11	11	14	14
Arequipa	48	56	47	51	53	48
Ayacucho	12	18	18	17	17	18
Cajamarca	18	19	16	21	23	23
Callao	57	57	51	54	57	57
Cusco	31	31	29	28	30	34
Huancavelica	6	4	5	7	8	8
Huanuco	8	2	6	6	10	9
Ica	48	43	51	50	56	50
Junin	16	16	17	17	19	19
La Libertad	68	61	64	65	67	74
Lambayeque	27	26	28	30	31	36
Lima	583	627	644	662	672	672
Loreto	12	16	14	12	15	19
Madre de Dios	2	1	0	0	1	1
Moquegua	5	6	5	6	6	7
Pasco	7	2	3	4	5	5
Piura	25	31	34	37	35	45
Puno	15	17	17	19	23	18
San Martin	9	13	14	15	17	16

Table 6: Pediatric Specialist Medical Doctors of the Ministry of Health andHealth Regional Directions in Peru from 2013 to 2018

Tacna	11	12	12	12	15	14
Tumbes	5	7	8	6	6	8
Ucayali	8	9	10	11	13	16

Source: Ministry of Health of Peru

There are many strategies to face the shortage of specialist medical doctors as implementing and providing telemedicine services, strengthening the medical schools, hiring foreign physicians, and hiring complementary health services from other health sectors different from the Ministry of Health.

In this way, on September 12, 2013, the Peruvian government, through Legislative Decree 1154, authorized complementary health services. This law aimed to improve health services access by reducing the gap between the supply and effective demand for health services at the national level. Therefore the health professionals of the Ministry of Health, its attached public institutions, the health centers of the Regional Governments, the Social Health Insurance, and the health services of the Armed Forces and the Police are authorized to provide complementary health services between them.

On the other hand, on April 2, 2016, Law 30421 was approved the Telehealth Framework; the purpose of this law is to establish general guidelines for the implementation and development of Telemedicine as a strategy for the provision of health services to improve its efficiency and quality and increase its coverage through the use of information technologies and of communication in the national health system. Also, the OECD (Reviews of Health Systems, 2017) presented the Telemedicine as one of the digital health information technology that the Ministry of Health is implementing, being a solution to health needs of vulnerable population groups can be achieved through remote health services, thus surpassing the limits of geographical barriers.

The OECD study also established that promoting innovative health service delivery to provide an adequate level of access with fewer physicians through Telemedicine could be a response to increasing the health workforce and leveling out a geographical imbalance in human resource distribution in the country. Due to the COVID-19 pandemic, with the Urgency Decree 090-2020, the government established exceptional and temporary measures to help close human resource gaps in health to face the COVID-19 pandemic. This law temporarily authorized, during the validity of the Health Emergency produced by COVID-19, to graduates of health science's careers abroad, to provide face to face services in public establishments of the Ministry of Health, their public bodies, regional governments, the health service of the Police, the Armed Forces and the Social Health Security, without requiring the recognition or revalidation of the degree or title and temporary authorization from the medical association, within the framework of current regulations. And, within six months from the Health Emergency culmination, the hired foreign physicians must carry out the recognition or revalidation of their degree or license and the other legal requirements to continue with the exercise of their medical activities.

In this context, this research focus on Telemedicine as a strategy to face the shortage of pediatricians in Peru, measuring their perception of it.

1.2 Purpose of the Study

According to the World Health Organization (WHO), the Human Resources in Health (RHUS) are a group of people from different professions and occupations trained and work to improve the population's health. Under this concept, and in the context of what has been sought globally since 2015 with the 2030 Agenda for Sustainable Development, they have recognized that they are the fundamental component in ensuring quality care for the population. It requires more significant investment in recruitment, improvement, training, and retention of health personnel in developing countries, setting as an indicator of the density and distribution of health workers.

At the regional level, there is an urgent need to strengthen the management and development of human resources for health, as set out in the Sustainable Health Agenda for the Americas (ASSA2030), with competent RHUS supporting comprehensive health management through consolidation of governance and leadership, development of conditions for maintenance and

health care; and building partnerships with the education sector to regulate health training to meet the needs of the population in an integrated, continuous, timely, accessible and quality manner.

Peru has set goals and objectives towards the achievement of Universal Health Coverage in the search for a universal, equitable, and solidarity system. However, like many countries in the region, it still has notorious and unfair socio-economic inequalities that affect and determine millions of people's health. Its current segmented and fragmented health system, lack of investment, and proper resource management produce ineffective services that do not respond to the population's needs by triggering a health sector crisis. Reflecting this is the dissatisfaction of users of health services and the problems in the quality of care that have been widely described in various research studies in our sector in recent years.

Lately, there have been multiple efforts from the Ministry of Health to address Peruvians' health problems. Human resources in health are the center and a critical factor in producing adequate quality services that efficiently ensure people's care. Hence, it is essential to recognize the lessons learned in recent years in addressing the human health resources in our country related to their availability in the face to face delivery service or online service through the Telemedicine, also, regulation, skills development, and endowment at the first level of care; as well as the deficiencies that may be being created in these areas that may be limiting the progress of the development of RHUS by generating a negative impact on the quality of care of the population.

These developments in the field of human resources in health mean having health personnel in adequate numbers with the technical skills necessary to solve health problems with quality and adequately distributed geographically according to the needs of health, mainly specialist medical doctors, who could have the skills or the possibility to work through Telemedicine.

Within this framework, we can notice that Telemedicine is necessary for providing health services when the country does not have many specialist medical doctors. There is no equal distribution of them in all the regions, having concentrated in the capital and some cities. So, it is vital to explain Telemedicine's use in the clinical practice by the specialist medical doctors, especially their perception of it that could influence the propensity to use the Telemedicine.

With this in mind, the purpose of the current study is to identify the pediatrician specialist medical doctors' perception in the National Health Children Institute – San Borja of Peru in the use of Telemedicine and other factors and activities that could contribute to its use.

1.3 Research Question

This study aims to carry out an empirical investigation on the perception of the use of telemedicine services by the pediatrician specialist medical doctors in Peru. To explain this research, the following research questions are formulated:

R.Q.1: What is the perception of using telemedicine services by the pediatrician specialist medical doctors in Peru?

Specific questions

R.Q.2 What are the factors that explain the use of Telemedicine by specialist medical doctors in Peru?

R.Q.3 Which are the activities to be implemented to provide telemedicine services in Peru?

1.3.1 Objective

Therefore, the objective of the thesis will be:

Ob.1: Analyze the willingness to use of the Telemedicine in children's health care in Peru.

Specific objectives

Ob.2: Identify the factors that influence the use of Telemedicine in Peru Ob.3: Identify the possible improvements applicable to Telemedicine in Peru

Chapter 2. Literature Review

2.1 Maslow Theory

The psychologist Abraham Maslow established a pyramid of needs that applies to all the people in this study called "A Theory of Human Motivation" (Maslow, 1943), been in the base the basic physiological needs, then safety and security, and then belongingness and love needs and esteem needs as third and four-level, and finally at the fifth level the del actualization.



2.2 Needs for healthcare in Peru

The Political Constitution of Peru (1993) establishes that everyone has the right to protect their health and contribute to its promotion and defense. The State determines the national health policy, and the Executive Branch regulates and supervises its application. It is also responsible for designing and conducting it in a plural and decentralized manner to facilitate equitable access to health services for all the people.

The Constitution establishes that the State guarantees free access to health benefits through public, private, or mixed entities and supervises its practical function.

Then, The General Health Law, Law 26842, determined that health is an indispensable condition for human development and a fundamental way to achieve individual and collective well-being. The protection of health is in the public interest; therefore, it is the State's responsibility to regulate, monitor, and promote it. Also, it established that all the citizens have the right to protect their health under the terms and conditions set by law, the right to health protection is inalienable, the conceived is subject of law in the field of health. And Public health is the primary responsibility of the State. Finally, the responsibility for individual health is shared by the individual, society, and the State.

Under this legal framework, we could assume that the laws prescribe the citizens' rights, and the government's duties could assure the delivery of medical services to all the Peruvians around the country. However, the Constitution determined that the State guarantees free access to health but not the right to health. Hence, the government has to look for the mechanisms to deliver healthcare services by the public, private, or mixed healthcare entities. And as we explained before, there is a shortage of physicians in Peru and a more critical situation concerning the specialist doctors that could satisfy or accomplish the population's well-being in the health area. For that, the government has to strengthen many projects, mechanisms, and formulas. One of them is the telemedicine program to avoid gaps in specialist doctors' shortage and close the geographical barriers between the capital city and the other regions of the country and even between the local and rural areas.

2.3 The Use of ICT for Health

The World Health Organization describes eHealth as the use of information and communication technologies (ICT) for health. The eHealth unit works with partners at the global, regional, and country levels to promote and strengthen the use of ICT in health development, from application in the field to global governance. The unit is based in the Department of Service Delivery and Safety in the Cluster of Health System and Innovation.

In May 2018, at the 71st World Health Assembly, the WHO recognized the potential of digital technologies to advance the Sustainable Development Goals, and in particular to support health systems in all countries

in health promotion and disease prevention, and by improving the accessibility, quality and affordability of health services; also that while technology and innovations can enhance health service capabilities, human interaction remains a key element to patients' well-being; underscoring the need to ensure that digital health solutions complement and enhance existing health service delivery models, strengthen integrated, people-centered health services and contribute to improved population health, and health equity, including gender equality, and addressing the lack of evidence on the impact of digital health in these respects. And acknowledging that the transfer of technology and knowledge on mutually agreed terms, as well as technical cooperation, aligned with Sustainable Development Goal 17 (Strengthen the means of implementation and revitalize the global partnership for sustainable development), are important in promoting digital health; acknowledging the previous experience of countries and organizations, the interconnectedness of digital technologies, the collection, management and evaluation of health data, the robustness of the enabling environment, in line with established good practices, while considering the sustainability of innovations, and their feasibility, scale-up, and inclusivity.

Also, at that Assembly, the WHO established that the member states have to assess their use of digital technologies for health, including in health information systems at the national and subnational levels, in order to identify areas of improvement, and to prioritize, as appropriate, the development, evaluation, implementation, scale-up and greater utilization of digital technologies, as a means of promoting equitable, affordable and universal access to health for all, including the special needs of groups that are vulnerable in the context of digital health; to consider, as appropriate, how digital technologies could be integrated into existing health systems infrastructures and regulation, to reinforce national and global health priorities by optimizing existing platforms and services, for the promotion of people-centered health and disease prevention and in order to reduce the burden on health systems; to optimize, in health systems development and reforms, the use of resources by developing health services alongside the application and use of digital technologies; to identify priority areas where normative guidance and technical assistance and advice on digital health would be beneficial, including, but not limited to, gaps in research, evidence- based standards, support to implementation and scale-up, financing and business models, content, evaluation, cost-effectiveness and sustainability, data security, ethical and legal issues, re-use and adaptation of existing digital health and other relevant tools; to work towards and support interoperability of digital technologies for health by, inter alia, promoting the use of international and open standards as an affordable, effective and easily adaptable solution; to disseminate, as appropriate, best practices and successful examples of digital health architecture, programs, and services, in particular effective policy design and practical implementation, with the international community, including through WHO, bilateral, regional, cross-regional and global networks, digital platforms and hubs; to strengthen public health resilience and promote opportunities, as appropriate, through the use of digital technologies, including to improve access to, and monitoring, sharing and use of, quality data, direct citizen, health worker and government engagement.

Also, to build capacity for rapid response to disease incidents and public health emergencies, leveraging the potential of digital information and communication technology to enable multidirectional communications, feedback loops and data-driven "adaptive management"; to build, especially through digital means, capacity for human resources for digital health, as appropriate, across both health and technology sectors, and to communicate areas of specific need to WHO in order to receive appropriate technical assistance; to improve the digital skills of all citizens, including through working with civil society to build public trust and support for digital health solutions, and to promote the application of digital health technology in the provision of, and access to, everyday health services; to develop, as appropriate, legislation and/or data protection policies around issues such as data access, sharing, consent, security, privacy, interoperability and inclusivity consistent with international human rights obligations and to communicate these on a voluntary basis to WHO; to develop, as appropriate, and in coordination with existing and emerging regional hubs and support mechanisms, effective partnerships with stakeholders from across all sectors in the use of digital health.

The OECD, in is Guide to Measuring ICTs in the Health Sector, established that there is substantial interest across countries in fostering the availability and effective use of ICTs to improve the functioning of their healthcare systems and the health of their population. In 2010, an OECD survey of countries identified four core objectives for ICT implementation: increase the quality and efficiency of care, reduce the operating costs of clinical services, reduce the administrative costs of running the healthcare system, and enable entirely new healthcare delivery models.

The areas covered by this guide include four categories of ICTs support delivery, such as:

Provider-centric Electronic Records: often referred to as Electronic Medical Records, Electronic Health Records, or Electronic Patient Records, provider-centric electronic records include systems that are used by healthcare professionals to store and manage patient health information and data and have functionalities that directly support the care delivery process.

Patient-centric Electronic Records: Personal Health Records, Patient Portals, and other Patient-centric Electronic Records, patients and their families typically use these systems to access and manage their health information and organize their health care.

Health Information Exchange refers to the process of electronically transferring or aggregating and enabling access to patient health information and data across provider organizations. The exchange may occur between different types of entities – for example, e-transfer of patient data between ambulatory care providers or e-transfer of data at the regional level.

Telehealth encompasses a broad set of technologies that support care between patients and providers, or among providers, who are not co-located. Also include applications such as remote home monitoring of patients, tele-ICUs, and teleradiology.

The OECD Reviews of Health System in Peru (2017) showed the digital health information technologies developed by the government, such as

Online registration of birth, directly after delivery, the health professional attending a new birth would go online to enter the id of the mother, necessary birth information such as the newborn's weight, as well as its fingerprint, immediate registration, the id of the newborn will be generated faster, thus allowing for immediate affiliation into health insurance and other benefit programs; *GeoMinsa*, that is a platform based on Google Maps to show users the location, as well as the services offered by all health care providers in Peru, also allows the user to find all the contact details, as well as the fastest way to access the facilities.

Cuida tu Salud Móvil, is a campaign consisting of sending text messages to registered users to promote healthy lifestyles, containing recommendations to prevent cancer, information about the importance of physical activity, nutrition, and the dangers of tobacco, alcohol, and other substances; Telemedicine, using information and communication technologies to build up a telehealth system, a health professional can gain greater accessibility to offer consultation, education and disease diagnosis of patients in rural and isolated areas; Online medical appointment that is a service provided to patients who already have a medical record within Ministry of Health's establishments and who needs another meeting, where the patients can then schedule a new appointment easier, avoiding long waiting times at the facilities.

The OECD also made recommendations to the Ministry of Health of Peru that the government has to focus on using health system information to drive quality of care. Also, Peru has to expand the health data infrastructure, collecting and reporting health care quality indicators, which will help show the variation between the regions and between the health subsystems. Besides that, the health system's fragmentation is one of the factors limiting the information system's capacity.

The OECD pointed out that Peru should combine data from the separate insurer/provider entities into a common platform to facilitate comparisons and policy planning. The involvement of a national agency could further support the collection, processing, and use of information. Finally, other OECD Council recommendation highlights the importance of building public trust and confidence in health data and strong safeguards that govern the transparent use and transmission of personal health. It involves bringing down barriers to utilizing and sharing data and ensuring that the public is fully involved in data collection and use decisions.

The monitoring of adequate standards in privacy and utilization should be a top priority. The OECD recommended that Peru addresses these aspects in its further development of the health information system. Detailed analysis and recommendations to strengthen Peru's health system information infrastructure can be found in the accompanying publication OECD Reviews of Health Systems: Monitoring Health System Performance in Peru: Data and Statistics (2017).

The Ministry of Health of Peru emitted the Ministerial Resolution 816-2020/MINSA approved the Digital Agenda of the Health Sector 2020-2025, that allows the articulation and management of the health sector, promoting health promotion, disease prevention, recovery and rehabilitation in health, with the intensive use of information and communication technologies, to contribute to improving the quality of health services of the population, maximizing the benefits of the digital economy in the information and knowledge society.

Among its specific objectives include strengthening the digital health ecosystem and its governance, deploying the electronic medical record and Telemedicine at the national level, improving the reliability and availability of information for use in analysis and decision-making in different levels of the health system, promote maturation, development and technological innovation in health.

2.4 Telemedicine

The World Health Organization (WHO) defines Telemedicine as: "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 the 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." ¹

The American Telemedicine Association defines it as the use of medical information exchanged from one site to another via electronic communication for the patient or practitioner's health and education and to improve patient care².

The term telehealth encompasses all care models that use electronic transmission of health care data. Synchronous telehealth involves real-time data transfer (e.g., live video conferencing). In contrast, asynchronous or store-and-forward telehealth relies on non–real-time data transfer (e.g., photo sharing or e-mail). Telemedicine is the subset of telehealth that refers to direct patient care³.

Telehealth has historically had a broader definition, encompassing Telemedicine's clinical care for patients and tele-education, teleresearch, and disaster response. Telemedicine and telehealth, as commonly used today, can be considered synonymous⁴.

On May 2005, the ministers and ministers of Health of the 192 member countries of the United Nations Organization met in Switzerland on the occasion of the 58th Assembly of the World Health Organization (WHO) approved the resolution on e-Health, where for the first time the WHO recognized the contribution that for the health and the management of the health systems supposes the incorporation of the TIC, understanding it like a unique

¹ WHO. A health telematics policy in support of WHO's Health-For-All strategy for global health development: report of the WHO group consultation on health telematics, 11–16 December, Geneva, 1997. Geneva, World Health Organization, 1998.

² Linkous JD. *Toward A Rapidly Evolving Definition of Telemedicine*. Washington, DC: American Telemedicine Association; 2001.

³ Olson CA, McSwain SD, Curfman AL, et al. The Current Pediatric Telehealth Landscape. *Pediatrics*. 2018.

⁴ American Telemedicine Association. What is Telemedicine? Available at: www.americantelemed.org/learn/what-is-telemedicine.

opportunity for the development of the public health. The document defines eHealth as "the cost-effective and safe use of Information and Communication Technologies in support of health and health-related fields, including health care services, health surveillance, literature and education, knowledge and research" and affirms that the strengthening of health systems through eHealth "reinforces fundamental human rights by increasing and improving equity, solidarity, quality of life and quality of care"⁵. With it, WHO provided a global strategy in eHealth, urging member states to establish long-term strategic plans to develop and implement eHealth services.

Telehealth and Telemedicine: direct or indirect interaction with other health care providers (for a second opinion or expert opinion), sick patients, or citizens. For example, teleconsultation and social networks. While the term telemedicine is limited to direct health care services, telehealth denotes a broader definition⁶.

The strategic orientation of the Pan American Health Organization is established, based on the collective priorities of the Member States and countrycentered attention, and the results to be achieved during the 2014-2019 period are established. Health information is considered a fundamental right of people. That is why it is committed to developing and using Information and Communications Technologies, the expansion of digital literacy, and increased access to scientific knowledge and training. It makes a particular reference to the development and use of mobile devices (mHealth) and eHealth applications as an option to change the way health services are provided⁷.

One study that researched 104 definitions of Telemedicine (Sood, S. et al., 2007) obtained four benefits represented by the definitions: Improved access, enhance efficacy, quality, delivery, the efficiency of healthcare services, equality of distribution of healthcare services, and lowering of costs of treatment.

⁵ World Health Organization eHealth. Report by the Secretariat, EB115/39.

 ⁶ National Academy of Sciences. The role of telehealth in an evolving health care environment -Workshop Summary. Washington, DC: The National Academies; 2015.
 ⁷ 65th Session of the WHO Regional Committee for the Americas, 2014. PAHO Strategic Plan, 2014-2019: For health: Sustainable development and equity.

We have the following concepts of Telemedicine: First, according to Bashshur RL, Reardon TG, Shannon GW. Telemedicine: A new health care delivery system. Telemedicine is a system of care composed of six elements, geographic separation between provider and recipient of information, use of information technology as a substitute for personal or face-to-face interaction, staffing to perform necessary functions (including physicians, assistants, and technicians), an organizational structure suitable for system or network development and implementation, clinical protocols for treating and triaging patients, and normative standards of behavior in terms of physician and administrator regard for the quality of care, confidentiality, and the like.

Second, according to Gupta S, Kant S (2000), telemedicine is a communication system, a network of electronic travel that connects primary care physicians, specialists, and patients. As a system, it challenges the leaders of hospitals, clinics, nursing homes, mental health facilities, and medical schools to rethink how they provide a complex array of health services, functioning less as isolated entities and more as part of a greater whole.

Third, according to Miller EA (2001), telemedicine delivers health services when there is a geographical separation between the healthcare provider and patient or between healthcare professionals.

Fourth, according to Spooner S, Gotlieb EM (2004), telemedicine in pediatrics is defined as the use of electronic communications technology to provide and support healthcare for infants, children, adolescents, and young adults when distance separates the practitioner from the patient, parent, guardian, or referring practitioner. This definition specifically excludes from discussing the use of ordinary telephone communication between practitioners and patients and communications technology for practitioners' education.

Fifth, according to Hung K, Zhang YT (2006), telemedicine delivers medical diagnosis, treatment, and patient care through telecommunication, information technologies, and electronic technologies with medical expertise.

Sixth, according to the National Telecommunications and Information Administration, new uses of information and technologies that are emerging and the ability to move the caregiver and information to where the patient is rather than moving the patient to centralized places to deliver health services information. Today's telemedicine model is evolving to "teleconsultation," where a physician consults with other specialists or a patient, using high-quality videoconferencing, with that consultation enabled by online information access.

Seventh, according to WHO (1997), telemedicine is the delivery of healthcare services, where distance is a critical factor, by all healthcare professionals using information and communication technologies for the exchange of valid information for the diagnosis, treatment, and prevention of disease and injuries, research, and evaluation, and for the continuing education of healthcare providers, all in the interests of advancing the health of individuals and their communities.

Eight, according to NSH-UK (1998), telemedicine is any healthcarerelated activity (including diagnosis, advice, treatment, and monitoring) that normally involves a professional and a patient (or one professional) and another who is separated in space (and possibly also in time) and is facilitated through the use of information and communications technologies.

Ninth, according to the Agency for Healthcare Research and Quality (2001), telemedicine uses telecommunications technology for medical diagnostic, monitoring, and therapeutic purposes when distance separates the users. Because modern computer and communications technology can capture and quickly transmit textual, audio, and video information, many have advocated its use to improve healthcare in rural areas, in the home, and in other places where medical personnel are not readily available.

2.5 Telemedicine in Peru

The historical evolution of Telehealth in Peru started with the Creation of the National Telesanity Commission created with Law 009-2003-MTC; that Commission belonged to the Ministry of Transport and Communications. Then, Law 028-2005-MTC approved The National Telehealth Plan, and then Law 365-2008-MINSA, the Technical Standard of Health in Telemedicine, is approved. In 2013, was published Law 1153 regulates the Comprehensive Compensation Policy and Economic Deliveries of Health Staff at the State's Service. And at this, article 15 ordered the assignment for compliance with institutional goals, performance indicators, and commitments to improve services. It is the economic delivery granted once a year to the personnel of the health establishments, networks, and micro-networks of the Ministry of Health, its public bodies, and Regional Governments to fulfill the institutional goals and performance indicators and commitments of improvement of services. These goals, indicators, and commitments should be written in simple terms to understand and be quantifiable for their evaluation and control properly.

The publication and dissemination of the information indicated in the preceding paragraph should be made no later than December 31 of the year before the budget year to which they correspond. Supreme Decree approves the technical criteria, application, and implementation with the Minister of Economic and Finance's endorsement and the Minister of Health, at the latter's proposal. The economy is not pensionable, is not subject to social charges, nor is it part of the calculation basis for determining compensation for the time of services. It affects the income tax. The application of this article does not incur additional expenses to the public budget.

In 2016, Law 30421 established the Telehealth Framework Law, and in 2017 the Law 231-2017-SIS approved the regulation of the benefits provided to insured persons within the framework of Telemedicine in hospitals. In 2019, Law 072-2019-SIS regulated Law 003-2019-SA established the supervision and monitoring of Health Insurance's financial transfers and the Approval of the Regulation of the Telehealth Framework Law.

The Telehealth Framework Law ruled the Telehealth Development Perspectives as Medical Consultation, Medical Board, and Medical Diagnostic. There are 8248 Health Centers, of which 1300 belong to the health centers using Telemedicine in Peru. Besides, 1142 health centers are attached to the primary health net, 126 works as a reference, and 32 are national hospitals.

Then in November 2019 was published the Ministerial Resolution No. 1048-2019-MINSA that approves Administrative Directive 728-MINSA-2019-

DGOS "Administrative Directive that regulates the methodological aspects for the evaluation of compliance with institutional goals, performance indicators, and service improvement commitments in health, reached in the year 2019, for the economic delivery established in article 15 of Law 1153, which is an integral part of this Ministerial Resolution.

This administrative directive was established as a commitment to improving services the strengthening of the implementation of Telemedicine for the Specialized Institutes, among others. In this regard, the Telemedicine is a health service delivery strategy to improve the efficiency and quality of increasing its coverage through the use of information and communication technologies in the national health system; therefore, it is a policy of the Ministry of Health-promoting its development. Telemedicine includes tele managing, tele training, tele information. The incorporation of Telemedicine is changing the way health systems work throughout the world and especially in Peru, where the development of Telemedicine is imperative for geography.

Telemedicine is one of the axes of the development of Telemedicine; it allows the provision of distance health services in the components of promotion, prevention, diagnosis, recovery, or rehabilitation provided by health personnel who use the information technologies, with the purpose to facilitate access to health for the population.

The technological advances, constant innovation, and application of scientific knowledge to different elements or issues related to health have contributed to significant changes in the diagnoses, treatments, and recovery of patients affected by a disease. It has also helped prevent more people in different parts of the world from deteriorating their health.

The use of information and communication technologies in the health sector is concatenated with the state management modernization process proposed in Law 27658, the State Management Modernization Framework Law, which establishes as its fundamental purpose the obtaining of higher levels of efficiency of the state apparatus, so that better attention to the citizenship is achieved, prioritizing and optimizing the use of public resources, compliance that is made with the enhancement of health services through Telemedicine services, expanding not only the coverage of these services with the diffusion factor of geographic barriers offered by information and communication technologies but also by decentralizing services virtually thanks to the instantaneous attribute offered by these technologies in the applications of different public services such as health.

In compliance with the Telehealth Framework Law, Law 30241 and its Regulations approved by Supreme Decree 003-2019-SA establishes Telemedicine as a strategy to reduce the access gap to health services, mainly in health centers located in a geographical area with limitations of geographical access, communications or resolving capacity.

The provision of health services, Telemedicine, applies to all areas of action in which case the teleconsultant and the teleconsultant intervene. Therefore, it is necessary that the development of Telemedicine be promoted at the national level for the benefit of the population, so one of the commitments to improve management agreements 2019 has been included.

In Telemedicine, we have two main actors, the Consulting Center and the Consultant Center. The Consulting Center, is an establishment of health or medical support service located in an area with limitations of access or resolving capacity and that has information and communication technologies that allow you to send and receive information to be supported by another institution of greater complexity to yours, in the solution of health needs, both management, information, education and communication, and the provision of health services to the population it serves.

Consultant Center is an establishment of health or medical support service that has specialized assistance resources, and sufficient and necessary information and communication technologies to provide distance support in the components of management, information, education and communication and the provision of health services, required by one or more Consulting Centers in conditions of opportunity and safety.

In recent years, telehealth has become the focus of increasing attention in clinical practice research. Understood as the use of information and communication technologies (ICTs) to enable the transfer of medical information for diagnostic, therapeutic, and educational purposes, it has created rising healthcare services expectations. These include better management and increased quality, effectiveness, and clinical practice efficiency (Chaudhry B., Wang J., Wu S., 2006).

However, available evidence suggests that telemedicine use is relatively limited (Broens T. et al., 2007). There is consensus that its slow, arduous implementation can be attributed to the lack of definitive scientific evidence supporting its positive impact on clinical practice (improved quality and effectiveness) and economic outcomes (improved cost-benefit) (Roig F., Saigi F., 2009).

2.6 Telemedicine in Pediatrics

Telemedicine in pediatrics uses electronic communications technology to support health care for infants, children, adolescents, and young adults when distance separates the practitioner from the patient, parent, guardian, or referring practitioner.

There are healthcare services that are admirably adapted to Telemedicine as the following:

Radiology, the medical profession, has developed extensive standards for how images should be stored and displayed to ensure accurate representations. The reports are forwarded easily by using secure, lowbandwidth messaging systems. The electronic transmission of images to meet the needs of pediatric care has been professionally researched.

Mental Health evidence suggests that patients are delighted with psychiatric counseling delivered via Telemedicine, and this is true also for children with a rural telepsychiatry clinic for children and adolescents. Dermatology, the remote teledermatology consultations have become commonplace at many medical centers. Cardiology, echocardiograms, ultrasonographic images, electrocardiograms, and other images can be transmitted electronically and evaluated accurately as part of established telecardiology programs. Emergency and Transport Services, this teleconferencing provides a way by which practitioners in a remote area can receive real-time emergency consultations with acceptable diagnostic sensitivity and specificity. Telemedicine's most immediately visible cost savings is the decreased need to transport patients to pediatric centers for critical care.

Hospital Care and Family Communication, the Infant Carelink Program initially developed at Beth Israel Deaconess Medical Center (Boston, MA), allows families separated from their infants to keep updated on their infants' condition and view their infants' images they are in the neonatal intensive care unit.

Pathology, like dermatology and radiology, this visually intensive discipline is readily amenable to telemedicine consultation, especially in developing or rural areas.

Child Abuse, expertise in child abuse and neglect, and the interdisciplinary communication that often must occur for an adequate childmaltreatment investigation present challenges that Telemedicine could address. Regarding Patient Education and Chronic Disease, Telemedicine's efficacy in patient education via teleconferencing to teach the proper use of asthma medications has been demonstrated, as has patient satisfaction.

Concerning the School Health, some school systems experiment with telemedicine links to extend the range of services in school-based clinics and decrease absenteeism for illness or disease-management encounters. Likewise, some data suggest that Home Health telemedicine-mediated home care of children with chronic diseases can save money while preserving care quality.

2.7 Telemedicine Studies

Langarizadeh (2015) looked to compare the comprehension and the insights about Telemedicine among different health workers. The research method was a survey made to 532 participants (494 clinicians working in public hospitals and 38 in the clinics, 306 of them completed the survey). The data

were collected using the five-point Likert-scale questionnaire. The questions made were related to the advantages and disadvantages, the security, the necessity, and easy use of Telemedicine. The researchers wanted to explore users' views about the Telemedicine, that should have been considered to implement the Telemedicine, and their perception could influence the telemedicine success, having more confidence in its use and a better attitude.

The results revealed that most of the clinicians had little knowledge about Telemedicine, a moderate level of the advantages and disadvantages at a low level. And among the health workers, the dentists' perception about the Telemedicine was less than the other health workers, and less favorable respect the other clinicians. Research has made visible that the lack of comprehension, skills, training, and technical expertise are barriers to applying the Telemedicine.

The main conclusion about the study was that the limited apprehension of the clinicians of the Telemedicine influenced their perception about it. Among the advantages, the reduction of unnecessary transportation costs got the highest mean value, respect the disadvantages, increased malpractice by using Telemedicine, and the American Medical Association considered it a barrier to its use. Respect the necessity of using Telemedicine, the highest factor was related to the use of Telemedicine to provide health care services to remote areas. Also, regarding the ease of use as a characteristic of the telemedicine system, its use, and the security highlighted the necessity of data confidentiality.

Wheeler et al. (2018) established that pediatric surgery is highly specialized healthcare delivered by a small number of physicians to patients that have to travel a long distance to seek expertise by pediatric transport, and even in the US, there is an adequate number of pediatric surgeons, due to the unequal distribution in the country, implies that exist a geographical and time barrier to access to this health service, so Telemedicine is a successful way to change it, having high levels of user and parent satisfaction. One of these research objectives was delineated barriers to telemedicine use, and among their barriers mentioned the change management and technological support. The method used was a pre and post telemedicine experience survey Likert-like scale from 1 to 5 rating to measure the attitudes respect the Telemedicine and perceive its barriers, considering telemedicine familiarity, previous use of Telemedicine, and expected usefulness and expected burden. As a result, physicians mentioned feeling uncomfortable being on a video call, especially if they receive calls from home.

Also, they showed more concern about having more equipment and dealing with connectivity issues as poor connection, mobile app difficulty, desktop station difficulty, and environmental background noise, being considerate connectivity as the most significant barrier to success with 91%. On the other hand, 58% considered that Telemedicine was useful. It concluded that all the efforts to implement new technology as Telemedicine and succeed need to identify medical areas, strong communication with stakeholders, and investment in infrastructure.

Pooni, Sandbord & Lee (2020) indicates that the Arthritis Foundation estimated that approximately 300 000 children in the United Sated have arthritis. Still, there are fewer than 400 pediatric rheumatologists, existing nine states (Alaska, Idaho, Montana, New Hampshire, Oklahoma, South Dakota, Wyoming, and West Virginia) without a fulltime pediatric rheumatology and in others having less than three rheumatologists as in Kansas, Oregon, Arkansas, Mississippi, Maine, Vermont, Delaware, and Hawaii. The patients have to travel around 92 km to get healthcare by a. pediatric rheumatology compared with 40 km for other pediatric subspecialists, representing a gap to access to healthcare. And the barriers to implement Telemedicine were in-person visit experience as the rheumatologic physical examination, the vital signs, modes of communication between the physician and the patient, the need for immediate laboratory work or imaging, and the need for nursing or social work support.

The method used was a survey about the necessary clinical components for pediatric rheumatology visits considering the in-person healthcare and comparing the clinical practices that could be developed by a video visit against an in person. The study aimed to help establish solutions to examination limitations, a framework to standardize video visits, the education for patients
and physicians about Telemedicine, and policies or insurance practice related to the reimbursement by the use of Telemedicine. As a result, pediatric rheumatologists should understand the difference between an in-person or not medical visit and their limitations in the use of Telemedicine to increase the accessibility and improve the decision in applying the Telemedicine.

Curfam et al. (2020) started they study base on that many children suffer limits to pediatric healthcare, including geographic barriers as the challenges of the families that live in rural areas and the shortage and maldistribution of general pediatricians and pediatric subspecialists, besides the social and economic difficulties to travel to receive pediatric health care services, so the research look for analyzing the Telemedicine at the transportation of children before the arrival to the health centers. This research aimed to implement the Telemedicine by the health workers at the transport of patients, delimitate in the use of Telemedicine, and identify the perception by telemedicine users.

The method used was a survey with a Likert-like scale from 1 to 5 to measure the telemedicine familiarity, previous use of Telemedicine, expected usefulness, expected burden about it. Concerning the perception of the barriers to applying Telemedicine, the survey results were poor connection, mobile app difficulty, desktop station difficulty, and environmental background. The research concluded that the barriers to implementation of Telemedicine are not unique for one applied to health care transport. Instead, other telemedicine programs have to be considered, being necessary for identifying health areas, communication with the stakeholders, and investment in infrastructure to succeed.

Chapter 3. Methodology

3.1 Determinants of the study

As stated in chapter number one, the main objective of the present thesis is to analyze the willingness to use Telemedicine in children's health care in Peru. Thus, the current investigation has the following determinants: identify the perception and factors that influence Telemedicine's use in Peru by the pediatricians and identify the possible improvements applicable to Telemedicine in Peru.

3.2 Hypothesis

Consequently, due to the scope and the determinants presented in the previous paragraphs, there are three main hypotheses to be assessed by the present thesis. It is important to mark that the development of current hypotheses responds to the bibliography reviewed.

H.1: The use of telemedicine services has a positive perception by pediatrician medical doctors in Peru.

H.2 The perceived usefulness of ICTs in clinical practice by pediatrician medical doctors in Peru explains the telemedicine use.

H.3 The perceived easiness of ICTs in clinical practice by pediatrician medical doctors in Peru explains telemedicine use.

3.3 Research Method

The most important aspect of the development of one investigation is the definition of the research methodology. However, which method will be suitable for this kind of study? or which method will give us better and more robust results? Quoting to Bosch and Card (2012). "...the advancement of scientific knowledge is based on the systematic building of one study on top of a foundation of prior studies, the accumulation of which takes our understanding to ever-increasing heights".

Therefore, to develop this thesis's research methodology, the present author will use previous experiences with telemedicine research. From the literature review done by the present author, most of the earlier researchers utilized the survey as an essential tool. Thus, the current student decided to employ this tool also.

According to Marczyk, DeMatteo, and Festinger (2005), there are two main research categories in an investigation: quantitative and qualitative. Quantitative research frequently involves statistical tools and the development of statistical analysis to attach its goals. On the other hand, qualitative research involves investigations that will not quantify the results obtained into statistical data. Even if the present thesis analyzes the main factors regarding the willingness to use Telemedicine in children's health care in Peru, this data will not be part of a statistical model. Therefore, this data will only give descriptive information about the use of Telemedicine.

The methodology design of the present thesis will have the following characteristics: non-experimental, cross-sectional, exploratory/descriptive, and inferential. As it was mentioned before, the main objective is to understand which current willingness is to use Telemedicine in children's health care; therefore, this study will analyze the current perception of medical workers. This kind of investigation is regarded as non-experimental research because there is no simulated or controlled study environment. Furthermore, two comparison groups are not established. The choice of using a non-experimental design is following the advice of the reviewed literature (case of Iran, Canada, and the USA). Also, the present thesis has a cross-sectional side since the data was collected at an estimated timeframe.

The exploratory method used by Marczyk, DeMatteo, and Festinger (2005) states that exploratory research is useful in situations where there is no significant knowledge about one topic. As noted in the literature review chapter, in the revision of possible studies and investigations about Telemedicine in Peru,

the present student could not find relevant information about the perception of Telemedicine in Peru. There is not enough data about the problems, pitfalls, or other factors that affect Telemedicine's willingness in the Peruvian system of health care. Moreover, there is no investigation related to the use of Telemedicine in pediatrists in Peru. Even if Peru has been using the telemedicine modality for health care since the late'80s; in the literature review, the present student couldn't find enough and robust data about the current factors that influence the willingness to employ Telemedicine in the Peruvian health sector.

This research has an inferential nature because, based on the surveys' results, the present author will infer a positive or negative willingness to use Telemedicine in children's health care of Peruvian medical staff. This practice has concordance with the inferential research perception of Marczyk, DeMatteo, and Festinger, who in 2005 mentioned that this kind of study allows the researcher to examine causals relationships.

3.4 Data Collection and Sample

The information and data will be collected from secondary and primary sources. The primary data will be collected from the surveys applied to the Peruvian medical staff. The surveys will be conducted to specialist medical doctors that employ Telemedicine in Peru. The secondary source of information is confirmed by the literature and statistical information about Telemedicine in Peru and worldwide.

As Perez stated in 2005, the most relevant aspect for investigations that deal with a survey is the sample choosing. Reinforcing the previous statement, according to Lohr (2005), sampling is the process in which a group of individuals is chosen to represent significatively to a determined population. According to both authors, there are two main kinds of sampling probabilistic sampling and non-probabilistic sampling.

The present study's main goal is to analyze the willingness to use Telemedicine in children's health care. The present thesis's objective reveals that this study's possible population will be the doctors that work with Telemedicine in the Ministry of Health of Peru. According to MINSA, in the last five years, the average number of doctors that work will Telemedicine in Peru is around 320. According to Cochran (1963), the formula of the sample size is:

Sample size =
$$\frac{\frac{z^2 \times p(1-p)}{e^2}}{1 + (\frac{z^2 \times p(1-p)}{e^2N})}$$

Wh

Variable	Meaning and consideration	Value
e	Significance level	10%
	Most of the investigations utilize a sample of 5% as a point of	
	reference for the significance level. However, due to the	
	present conjuncture (COVID-19 pandemic), there is a bias for	
	the impossibility of collecting enough information from the	
	doctors in Peru. Therefore, the present student decided to	
	utilize a significance level of 10%. Which means that the	
	present study has a margin of error of 10%	
Z	Confidence level	1.65
	Due to the significance level, the confidence level, in this	
	case, will change from 1.96 to 1.65	
р	Probability of detecting significant result	0.5
	As stated in the introduction part of the present thesis, there is	
	no relevant information about telemedicine's perception in	
	children's health care in Peru. Therefore, the present student	
	decided to assume that there is a 50% possibility to have a	
	positive perception of the use of Telemedicine in the	
	conducting survey process.	
N	Total Population	320
	As it was mentioned before, in the last five years of the use of	
	Telemedicine, the number of doctors that utilize this tool was	
	320	

Therefore, after applying the formula and the present student's assumptions, the sample to be utilized will be 57 surveys, obtaining 78 surveys in total.

3.6 Survey design

If we remember what Bosch and Card mentioned in 2012, the knowledge in one specific field strongly depends on the previous investigations. Therefore, the present student replied with the following experiences:

Doc	Article	Author	Year
1	Clinicians' Knowledge and	Ayatollahi, Langarizadeh	2015
	Perception of Telemedicine		
	Technology		
2	Telemedicine in pediatric surgery	Harting, Wheeler, Nwomeh,	2018
		Snyder, Bruns, Pandya,	
		Dickie, Shah	
3	Building a Viable Telemedicine	Pooni, Sandborg, Lee	2020
	Presence in Pediatric		
	Rheumatology		
4	Developing a pediatric	Kapoor, Eldib	2020
	ophthalmology telemedicine		
	program in the COVID-19 crisis		
5	Implementation of Telemedicine in	Curfman, Groenendyk,	2020
	Pediatric and Neonatal Transport	Markham, Quayle,	
		Turmelle, Tieken, Brancato,	
		Saunders.	

Table 7: Likert scale proposed

Source: Compiled by the author, from the literature revised.

After the analysis of the previous experience, the present student decided to dive the survey into three main parts: (1) basic information of the interviewed, (2) experience in use and management of Telemedicine, and (3) other aspects related to the use of Telemedicine (See all the survey in appendix 8). In the first part of Telemedicine, the questions will collect necessary information of the doctor such as age, gender, years of experience as a doctor, years of experience using Telemedicine.

The second part of the survey will collect information about the experience of the doctor using Telemedicine. For that purpose, the doctor responded to the following questions: according to your experience, would you recommend other doctors to use Telemedicine?; Are you familiar with the use of Telemedicine?; Do you know the medical applications for telemedicine use?; In your opinion, to what extent is Telemedicine necessary for the healthcare of patients?; On a scale of 1 to 5, what do you think is the main advantage of using Telemedicine?

(1) Cost savings, (2) Saving time, (3) Supplements the lack of specialists in health facilities in the interior of the country, (4) Quick and easy access to specialized health services (5) Provide a better health service, (6) Reduce medical hospitalizations, (7) Facilitates training of general practitioners, (8) Decreases referrals of patients to the National Institute of Child Health San Borja, (9) Strengthens the employment relationship with other doctors in the country, (10) Consolidate the National Health System, (11) Easy use of Telemedicine.

What are the telemedicine services provided at your health center?; How many telemedicine services do you perform monthly?; On a scale of 1 to 5, what do you think is the main disadvantage to the use of Telemedicine? (1) Dehumanizes patient care, (2) telemedicine neglects face to face patients, (3) Reduces effectiveness in patient care, (4) Endangers patient privacy, (5) Difficulty in using technology, (6) It is expensive.

On a scale of 1 to 5, what is the scale that corresponds to problems in the use of Telemedicine? (1) Medical protocols are missing, (2) There is no Electronic Medical Record, (3) Limited internet access, (4) Auscultate the patient, (5) Difficulty of using technology, web platform, etc., (6) Lack of technological equipment, (7) Refusal of the patient to use the telemedicine service, (8) Non-recognition of fees when providing telemedicine service, (9) An appropriate legal framework is lacking.

Do you consider that the use of Telemedicine should be mandatory in all health facilities?; Do you consider that the Ministry of Health encourages the use of Telemedicine?; By providing a telemedicine service, has the patient been dissatisfied with being treated through this health service?

The third part of the survey aims to analyze other important aspects related to the use of Telemedicine.

This section of the survey considers the following questions: Due to the government's quarantine due to the COVID-19 pandemic, do you think Telemedicine is an optimal tool to provide health services?; Does the use of Telemedicine require the support of the medical community?; Do you consider that the use of Telemedicine from the beginning of your professional practice

would have been positive for your professional performance?; Do you think that telemedicine services could be expanded to other medical specialties?; If you could not provide telemedicine services, would you be willing to move to another city to work?; Would you agree to receive telemedicine services from abroad?; Do you consider that Telemedicine should be a course dictated in the professional career of Medicine?; To what extent is continuous training in the use of Telemedicine necessary for physicians?

However, how can we measure the perceptions of the use of Telemedicine? Following the previous experiences in this investigation, the most useful tool will be the Likert scale to measure the advantages, disadvantages, and problems of importance. Nevertheless, according to the literature, there are two main Likert scale analysis: The Likert symmetric scale and the Likert asymmetric scale. According to Joshi, Kale, Chandel, and Pal (2015), in the case of Likert symmetrical scale, it provides an easier procedure for the participant to choose any response in the right balance and symmetric set of outputs, in the case of asymmetric order of the scales, this kind of scales does not show fairness for the respondent. In the following chart, the proposed scale is presented:

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	2	3	4	5

 Table 8: Likert scale proposed

Source:	Subeai ((2010)

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Statistical Methods	Likert Items Data	Likert Scale Data
Internal consistency	Ordinal alpha	Cronbach's alpha
Central Tendency	Median or mode	Mean
Variability	Frequency	Standard deviation
Associations	Kendal tau B or C, Spearman's Rho, polychoric correlations	Pearson's r
Other statistics	Chi-square, Mann-Whitney U-test	ANOVA, t - test, regression
	Source and elaboration: Prasad 2	016

The software to analyze the descriptive information collected for the present student will be the Statistical Analysis System (SAS). It is necessary to

mention that this tool has the following benefits, easy to debug, data security, thoroughly evaluated algorithms, and accurate output.

Chapter 4. Research Findings

4.1 Results survey

The following section of the present thesis will present the results obtained from the surveys sent. This section is divided into three parts. Which will analyze each section of the survey.

4.1.1 Results first part of the survey

This part of the survey will analyze the main characteristic of the doctors interviewed.



Source: Compiled by the author

Regarding the results of the Survey in Figure 1 (where 0 is women and 1 is men), 37% of the respondents are female, and 63% are male. Regarding the results of the Survey in Figure 2, 23% of the respondents have less than 10 of experience as a medical doctor (1), 19% between 10 and 20 years (2), 26% between 20 and 30 years (3), and 32% more than 30 years of experience (4). Regarding the results of the Survey in Figure 3, 23% of the respondents have less than five years of experience using telemedicine (1), 32% between 5 and

10 years (2), 23% between 10 and 15 years (3), and 22% have been using telemedicine for over 15 years (4).

4.1.2 Results second part of the survey

After presenting the results that describe the doctors' main characteristics that have applied telemedicine, the next section of this chapter will show the central answers of the thesis that will lead to a response to the hypothesis established in chapter three. Regarding the survey results in Figure 4, 24% of the respondents replied that they would not recommend other medical doctors to use telemedicine (0), while 76% answered positively (1).

Figure 4 : Would you recommend use telemedicine to other medical doctors?



Regarding the survey results in Figure 5, concerning to be familiar with telemedicine, 6% of the respondents are very low (1), 8% low (2), 24% average (3), 36% high (4), and 26% answered have a very high familiarity with the telemedicine (5). Regarding the results of the Survey in Figure 6, 23% of the respondents replied no been familiar with the medical applications of telemedicine (0), while 77% answered positively (1).



Source: Compiled by the author

Regarding the survey results in Figure 7, concerning if telemedicine is necessary for patient healthcare, 14% of the respondents said that it is not important (1), 15% slightly important (2), 18% moderately important (3), 30% important (4), and 23% replied that it is very important (5).



Regarding the results of the Survey in Figure 8, considering that telemedicine supplied the lack of specialist medical doctors in health centers in other regions of the country as the main benefit for its use, 16% of the respondents replied that is not important (1), 8% slightly important (2), 9% moderately important (3), 27% important (4), and 40% that supplied the lack of specialist medical doctors is very important to use telemedicine as the main benefit (5).

Regarding the results of the Survey in Figure 9, considering that telemedicine is useful for training medical doctors as the main benefit for its use, 10% of the respondents replied that is not important (1), 13% slightly important (2), 15% moderately important (3), 40% important (4), and 22% that usefulness for training medical doctors is very important to use telemedicine as the main benefit (5).

Regarding the results of the Survey in Figure 10, considering that telemedicine saves time as main benefit for its use, 14% of the respondents replied that is not important (1), 14% slightly important (2), 19% moderately important (3), 14% important (4), and 35% that save time is very important to use telemedicine as main benefit (5).

Figure 11: Telemedicine provides quick and easy access to specialized health services Figure 12: Telemedicine reduces the reference of patients to the National Health Children Institute – San Borja



Source: Compiled by the author

Regarding the results of the Survey in Figure 11, considering that telemedicine provides quick and easy access to specialized health services as the main benefit for its use, 9% of the respondents replied that is not important (1), 14% slightly important (2), 31% moderately important (3), 19% important (4), and 27% that provides quick and easy access to specialized health services is very important for the use of telemedicine as the main benefit (5).

Regarding the results of the Survey in Figure 12, considering that telemedicine reduces the references of patients to the National Health Children Institute – San Borja of Peru as the main benefit for its use, 15% of the respondents replied that is not important (1), 18% slightly important (2), 10% moderately important (3), 26% important (4), and 31% that the reduction of the references of patients to the National Health Children Institute – San Borja of Peru is very important to use telemedicine as the main benefit (5).





Source: Compiled by the author

Regarding the results of the Survey in Figure 13, 19% of the respondents said that provide from 1 to 3 telemedicine services monthly (1), 12% from 3 to 6 (2), 27% from 6 to 10 (3), 28% from 10 to 15 (4), and 14% provide more than 15 telemedicine services per month (5).



Source: Compiled by the author

Regarding the results of the Survey in Figure 14, considering that telemedicine endangers patient privacy as the main disadvantage for its use, 13% of the respondents replied that is not important (1), 14% slightly important (2), 17% moderately important (3), 33% important (4), and 23% that the endangerment of the patient privacy is very important as the main disadvantage to using telemedicine (5).

Regarding the results of the Survey in Figure 15, considering that high cost as the main disadvantage for using telemedicine, 13% of the respondents replied that is not important (1), 12% slightly important (2), 24% moderately important (3), 29% important (4), and 22% considered the high costs is very important as the main disadvantage to using telemedicine (5).

Regarding the results of the Survey in Figure 16, considering that telemedicine dehumanizes the patient care as the main disadvantage for its use, 9% of the respondents replied that is not important (1), 24% slightly important (2), 26% moderately important (3), 17% important (4), and 24% that the dehumanization of the patient care is very important as main disadvantage to using telemedicine (5).



Source: Compiled by the author

Regarding the results of the Survey in Figure 17, considering that non auscultate in person the patient as the main problem for the use of telemedicine, 10% of the respondents replied that is not important (1), 17% slightly important (2), 18% moderately important (3), 24% important (4), and 31% considered that non auscultate in person the patient is very important as the main problem to use telemedicine (5). Regarding the results of the Survey in Figure 18, considering the lack of technological equipment as the main problem for the use of telemedicine, 5% of the respondents replied that is not important (1), 24% slightly important (2), 17% moderately important (3), 31% important (4), and 23% considered the lack of technological equipment is very important as the main problem to use telemedicine (5).

Regarding the results of the Survey in Figure 19, considering that there is no electronic medical record as the main problem for the use of telemedicine, 19% of the respondents replied that is not important (1), 23% slightly important (2), 10% moderately important (3), 14% important (4), and 34% considered that the lack of electronic medical record is very important as the main problem to use telemedicine (5).



Source: Compiled by the author

Regarding the survey results in Figure 20, 28% of the respondents replied that telemedicine has not to be mandatory in all the health centers (0), while 72% answered positively (1). Regarding the survey results in Figure 21, 29% of the respondents considered that the Ministry of Health of Peru does not encourage the use of telemedicine (1), while 71% answered positively (2). Regarding the survey results in Figure 22, 77% of the respondents replied have not the dissatisfaction of a patient by being treated through telemedicine (0), while the 77% answered positively (1).

4.1.3 Results third part of the survey

In the present section of the chapter, the present student will present the doctors' responses regarding several essential topics about telemedicine and its current situation in the Ministry of Health of Peru.



Source: Compiled by the author

Regarding the survey results in Figure 23, 13% of the respondents replied that telemedicine is not an optimal tool to provide health services during the COVID-19 pandemic (0), while 87% answered positively (1). Regarding the survey results in Figure 24, 14% of the respondents replied that using telemedicine is not necessary for the support of the medical community (0), while 86% answered positively (1). Regarding the survey results in Figure 25, 53% of the respondents replied that would not be positive for their professional performance the use of telemedicine since the beginning of their career (0), while 47% answered positively (1).



Source: Compiled by the author

Regarding the survey results in Figure 26, 17% of the respondents replied that telemedicine would not expand to other medical specialties (0), while 83% answered positively (1). Regarding the survey results in Figure 27, 53% of the respondents replied that they would not move to another city to work if they could not provide telemedicine services (0), while 47% answered positively (1). Regarding the survey results in Figure 28, 45% of the respondents replied that they would agree to receive telemedicine services from abroad (0), while the 55% answered positively (1).

Figure 29: Does Telemedicine should be taught in the major of medicine?

Figure 30: Does the training in Telemedicine important for the physicians?



Source: Compiled by the author

Regarding the survey results in Figure 29, 31% of the respondents replied that telemedicine should not be a course dictated in the major of medicine (0), while 69% answered positively (1). Regarding the results of the Survey in Figure 30, considering that the training in telemedicine is necessary for the physicians, 14% of the respondents replied that is not important (1), 19% slightly important (2), 16% moderately important (3), 24% important (4), and 27% that the training in Telemedicine is very important for the physicians (5).

4.2 Data analysis

The main hypothesis of the present thesis was that telemedicine services have a positive perception of pediatric medical staff in Peru. The second part of the survey's answers, such as if the doctor considers the mandatory use of telemedicine if he or she can recommend its use, tell us that there is a positive perception of its use. Even if there are several problems with its application, 76% of doctors mentioned its willingness to use it, and 72% strongly recommend its mandatory use in all the health facilities of Peru. Also, reinforcing this idea, near to 71% of the specialist interviewed consider necessary the use of telemedicine for the proper care of its patients. As it can be appreciated in Figure 8, the significant advantage that is related to the use of telemedicine is the supply of the lack of specialist medical doctors in the health sector.



Figure 31: Average answer for the advantages

Source: Compiled by the author

The average answer is 3.65, been considered as the most important advantage of the use of telemedicine. As mentioned in the introduction of the present thesis, according to official information of the Ministry of Health of Peru in 2018, there were 1242 pediatricians, of which 672 were in Lima (this number represents more than half of pediatricians). Realizing that critical situation, the specialists in telemedicine in Peru strongly consider that the significant advantage of using this tool is the power to reach families that could come to the capital for adequate medical services. The second most important advantage is the time saving due to the use of this health tool. The geographical situation of Peru unable to provide the service massively. In a different way of developed countries, the Peruvian population has a considerable proportion of rural areas. To provide this service to families in rural areas or small cities, the medical staff would have to travel to those cities. In the other case, families should travel to Lima to get some medical attention.





Source: Compiled by the author

Telemedicine breaks the distance barrier because doctors can attend to people who live in different areas or regions. Thus, there is no necessity of travel, saving the time of the doctor and the patient. According to the specialist through telemedicine, the last high ranked advantage is that people can access health services, and it is more convenient for the medical staff that applies this kind of tool. Regarding the more important disadvantages of the use of telemedicine, the physicians ranked the endanger of patient privacy as the most important disadvantage. In Peru, the traditional medical service was delivered by a doctor on which the families strongly rely. Therefore, traditional doctors using the telemedicne as a second tool strongly consider that the endage of the patients' privacy is one of the significant problems they face while using telemedicine.

The second more critical disadvantage of the use of telemedicine is the high costs for its implementation. The implementation of telemedicine in national hospitals in Peru must be after the performance of several technological devices that can assure the proper connectivity between the health facility from where the doctor will conduct the session and the doctor's health facility that will receive the advisement. Also, it is necessary to mention that in the case of telemedicine, the hospitals have to pay two doctors, duplicating the cost of treatment of the patient.

The last high disadvantage of the use of telemedicine considered by the specialists is the possible dehumanization of the medical service. Even if the use of telemedicine can help to the provision of health services, the doctors do not have contact with the patients. Therefore, the medical staff of hospitals considered that one of the main problems of the use of telemedicine is the possible dehumanization of the medical service.

Regarding to the main problems identified in the survey, the medical staff state that the most critical problem that they face while using the telemedicine is the auscultation for the patients. Regarding them, there are several illnesses that need corporal interaction to acknowledge it better. Consequently, due to the lack of physical contact between the doctors and their patients, it is considered a very critical problem.

The second more critical problem is the enormous gap in the hospitals' infrastructure (technological equipment) that enables telemedicine's proper use. As mentioned before, in both facilities, the medical staff has to have reliable technological staff; however, there is a lack of technical equipment in the Peruvian health facilities.

Figure 33: Average answer for the problems



Source: Compiled by the author

The third most critical problem of the use of telemedicine in the absence of the electronic medical record of the patients. Before the use of telemedicine, the administrative staff has to send the patients' documents by courier or other channels to make sure that the other doctor has the patient's record. This is a critical problem because in some cases, there are some localities in which deliver medical documents is extremely difficult.

The last critical problem of telemedicine's use is the absence of proper medical protocols of the use of telemedicine. In Peru, even if there are some protocols for the use of telemedicine, those protocols are focused only on some type of interventions. If the public sector would aim to implement this kind of procedure in all the health sectors, they should develop protocols of every type of intervention. The standardization of processes can significantly improve the health service.

4.3 Main Findings

This research's objective analyzed the willingness to use Telemedicine in children's health care, focusing on pediatricians due to the lack of these physicians around the country. As the main finding, based on the survey's response that 76% of the respondents would recommend the use of telemedicine to other medical doctors, we could assume the doctors' positive perceptions about the use of this health technology. Also, 72% of the respondents considered telemedicine to be mandatory in all the health centers, and 71% thought that the Ministry of Health of Peru encouraged Telemedicine.

A specific objective of this study was identifying the factors that influence the use of Telemedicine in Peru, and 40% of the respondents answered as very important that telemedicine supply the shortage of specialist medical doctors is, 40% responded as important that Telemedicine strengths the training of general doctors and 35% answered that saves time. These factors declared by the pediatricians were selected with the highest-ranked between the other factors developed by the survey.

On the other hand, the other objective of the research was identifying the possible improvements applicable to Telemedicine in Peru, so in the survey, we tried to identify the main disadvantages and problems to use Telemedicine by the pediatricians, to have a framework where we have to focus to work on it and put improve this technological medical tool. The results indicated that the main disadvantages of Telemedicine imply high costs, dehumanized patient care, and endanger patient privacy. The respondents indicated the following factors concerning the problems: non auscultate of the patients, lack of technological equipment, and no electronic medical record. As we can notice, the physicians determined the dehumanization of the patient and the patients' non-auscultate as barriers to use of telemedicine, being both factors co-related that the Ministry of Health could deeply consider or be a study of future researches. Also, to lack of technological equipment were perceived relevant joint to the high cost that implies using telemedicine, that is related to the public budget and the investment addressed to the health sector, being the 5% of the national budget for the health sector of 2020, according to the Ministry of Economy and Finance of Peru. Finally, one crucial aspect found is the problem perceived by the physicians to use the Telemedicine, that there is no electronic medical record. According to it, the Ministry of Health initiated in 2013 a process to implement the Electronic Medical Record with the Law 30024 that created the National Electronic Medical Record Register. The Plan of Implementation of this Register approved by the Ministerial Resolution 618-2019/MINSA, but according to the Ministerial Resolution 1344-2018/MINSA, this implementation is in process in the primary health centers, but still not mandatory in the health centers of second or third level as the national hospitals.

Chapter 5. Conclusions and Policy Implications

This study had objectives to analyze the willingness to use telemedicine, identify the factors that influence its use, and identify the possible improvements applicable to telemedicine. Regarding them, and then the data analysis in the precedent chapter, the first hypothesis was confirmed considering the use of Telemedicine has a positive perception by the pediatricians in Peru, based on the high willingness of recommending this electronic health tool as the answer of the respondents and the advantages to its use, as Telemedicine saves time, supply the lack of specialist medical doctors in the health sector, strengthen the National Health System, among others. Besides, the second hypothesis referred to the perception of the usefulness of ICTs in clinical practice by pediatricians that explains the use of Telemedicine was confirmed, considering the results of high perception about this electronic health tool is useful for training medical doctors, reduce the references of patients, and based on the lowest-ranked disadvantage factor about its use reduces the effectiveness of patient care. Also, concerning the third hypothesis about the perception of easiness of ICTs in clinical practice by pediatricians that explains the use of Telemedicine, the factor of easy use of this health tool receive the lowest rank as an advantage and considering the disadvantages the respondents highly regarded the difficulty of use of technology.

Additionally, Telemedicine has to be managed as a unit with other essential health tools as the implementation of the electronic medical record that would facilitate and strengthen Telemedicine, which was identified by the respondents. So, the health authorities must follow up the Health Digital Agenda 2020-2025 (October 2020) implementation approved by Ministerial Resolution 816-2020/MINSA, which objective 2 is the National Implementation of the Electronic Medical Record and Telemedicine.

Besides that, it is necessary to train the health workers in Telemedicine, because most of them have to develop the technical skills related to the use of the Information and Communications Technology, in this case, Telemedicine, so the Ministry of Health and the Ministry of Education have to focus on reviewing the courses taught in the health schools at the universities.

Also, the Telemedicine's importance as a way to provide health service as a response of the shortage of physicians and its unequal distribution around the country. The high authorities of the government have to work with the Medical Community to training the health workers, spread the necessity of use Telemedicine, and reconsider in the future receive telemedicine health services from abroad when there is not a medical specialization in the country, for example, considering it as an opportunity of receiving training from experts, and not as a decrease of their professional practice. Nowadays, the current COVID-19 pandemic has shown that is necessary the digitalization of the public services, including the important health services, so this pandemic has to be an opportunity for a quick development the digital services, especially the related to health.

According to the health service provision process, the health service providers must be defined in the process, in addition to the Ministry of Health, which could complement with other public and private providers to expand the supply of medical specialists. Likewise, complement the provision of the telemedicine service among all public and private providers to strengthen the national health system, avoiding its fragmentation. On the other hand, the General Office of Telemedicine of the Ministry of Health must establish an agreement with the National Telemedicine Center of Essalud to carry out joint efforts in the study and analysis of the implementation and improvement of Telemedicine in Peru.

Another important challenge is the implementation of the internet service in our country, under the responsibility of the Ministry of Transport and Communications, to expand the coverage of the Telemedicine service. In this sense, the digitization of the medical record is very important, so that it is accessible to both the consulting health center and the consultant. Also, the economic analysis of the service provision so that the patient or their insurer knows to whom to make the payment of the benefit, whether total or proportional to each health center, within the framework of universal health insurance. Finally, after the diagnosis of the patient, the provision of the medicine to the patient must be established to ensure that they complete their treatment if they have been diagnosed and complement the process of the health service to citizens effectively, and if it is not covered by public health centers, let the private offer be involved as well.

5.1 Recommendations for Future Studies

This study was conducted for pediatricians that provide telemedicine services to general medical doctors, non-considering a direct telemedicine service between the medical doctor and the patient, not focusing on other specialties, other health workers, and the patients in the capital and around the country. Further research should consider extending the study's scope to other health workers, specialties, and patients or even include public and private health workers to have a national and complete telemedicine framework in the country.

Subsequently, to the above, further studies should capture a larger sample size than the one used for this study to increase the validity of results. Moreover, researchers should look at other factors which can explain Telemedicine health workers' perception, and also explore profoundly different medical specialty that are providing telemedicine services in aim to promote Telemedicine in more medical areas, as mental health care that other countries are implementing or studying the causes of non-acceptance of receive telemedicine services from abroad.

5.2 Limitation of the study

Regarding the main findings and conclusions of this study, several difficulties were faced during the research period. First, due to the study's geographical scope, results reflected only a view of the pediatricians from the capital of Peru, Lima, not including other regions of the country. Also, concerning the medical specialties, this research only focused on pediatricians

that provide telemedicine services, not considering other specialties and even general physicians that receive the service of telemedicine, or other health professionals, and the patients as one of the main actors of the telemedicine health care provision.

Secondly, due to the COVID-19 pandemic, unfortunately, Peru is one of the countries more affected with 904 911 positive cases and 34 529 deaths, according to a report by the Ministry of Health of Peru on October 31, 2020, including the deaths of 166 physicians, reported by the Medical Association of Peru at September 4, 2020. Regarding this pandemic, all the medical doctors worked overtime in many cases, so collecting data with the survey was not easy due to the health emergency set in the country. Finally, the current research could not obtain an interview with the highest authorities, considering three changes of the Minister of Health in the last year due to the pandemic and presidential political decisions.

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Appendices

8.1 Survey

The health workers' perception of telemedicine in Peru.

First of all, kind regards, I am Richard Frank Leon Vargas, a Master of Public Administration student at Seoul National University. On this occasion, I am cordially writing to you to provide me valuable information regarding the experience you have in telemedicine services. The responses to this survey will be purely for academic purposes and do not represent any value judgment on the respondent's part. Thank you very much for your kind collaboration.

The first part of the survey: basic information of the respondent

- 1- How old are you?
 - Under 30 years old
 - Between 30 and 35 years old
 - Between 35 and 40 years old
 - Between 40 and 45 years old
 - Over 45 years old
 - 3- How many years of experience do you have as a medical doctor?
 - Less than 10 years
 - Between 10 and 20 years
 - Between 20 and 30 years
 - Older than 30 years
- 4- How many years of experience do you have using telemedicine?
- Less than 5 years
- Between 5 and 10 years
- Between 10 and 15 years
- Over 15 years

The second part of the survey: basic information of the respondent

5- To what extent are you familiar with telemedicine?

1 very low 2 low 3 average 4 high 5 very high

- 6- To what extent are you familiar with the medical applications of telemedicine?
 - Yes
 - No
- 7- In your opinion, to what extent is telemedicine is necessary for patient healthcare?

1 not important	2 slightly important	3 moderately important
4 important	5 very important	

- 2- Gender
- Female
- Male

	1 not	2 slightly	3	4	5 very
	important	important	moderately	important	important
	-	-	important	-	-
It saves costs					
It saves time					
Supply the lack					
of specialist					
medical					
doctors in					
health centers					
in other regions					
of the country					
Quick and easy					
access to					
specialized					
health services					
Provide better					
medical care					
Reduce					
medical					
hospitalizations					
Useful for					
training					
medical					
doctors					
Reduce the					
references of					
patients to the					
National					
Health					
Children					
Institute – San					
Borja of Peru					
Strengthen the					
networking					
with other					
doctors in the					
country					
Strengthen the					
National					
Health System					
Easy Use of					
Telemedicine					

8- What do you think is the main benefit of using telemedicine?

Other			

- 9- If your answer was other, what other are you referring to?
 - 10- What are the telemedicine services provided at your health center?
 - Teleconsultation
 - Telediagnosis
 - Teletraining
 - Teletreatment

- 11- How many telemedicine services do you perform monthly?
 - From 1 to 3
 - From 3 to 6
 - From 6 to 10
 - From 10 to 15
 - More than 15
- 12- What do you think is the main disadvantage of using telemedicine?

	1 not	2 slightly	3	4	5 very
	important	important	moderately	important	important
			important		
Dehumanizes					
patient care					
Neglect your					
face-to-face					
patients					
Reduce the					
effectiveness					
of patient					
care					
Endanger					
patient					
privacy					
Difficult use					
of technology					
High costs					
Other					

13- If your answer was other, what other are you referring to?
	1 not	2 slightly	3	4	5 very
	important	important	moderately	important	important
	-	-	important	-	-
			-		
The medical					
protocol is					
missing					
There is no					
Electronic					
Medical					
Record					
Limited					
internet					
access					
Auscultate					
the patient					
Difficulty in					
using					
technology,					
web					
platform, etc					
Lack of					
technological					
equipment					
Refusal of					
the patient to					
use the					
telemedicine					
service					
Non-					
recognition					
of fees when					
providing					
telemedicine					
service					
An					
appropriate					
legal					
framework is					
lacking					
Other					

14- Do you think there is a problem in the use of telemedicine?

15- If your answer was other, what other are you referring to?

- 16- Would you recommend other medical doctors to use telemedicine?
 - •Yes
 - •No
- 18- Do you consider that the Ministry of Health of Peru encourages the use of telemedicine?
 - •Yes
 - •No

- 17- Do you consider that the use of telemedicine should be mandatory in all health centers?
 - Yes
 - No
- 19- By providing a telemedicine service, has the patient been dissatisfied with being treated through this service?
 - Yes
 - No

The third part of the survey: other aspects related to the use of telemedicine

- 20- Due to the quarantine ordered by the government due to COVID-19 pandemic, do you think that telemedicine is an optimal tool to provide health services?
 - •Yes
 - •No
- 22- Do you consider that the use of telemedicine from the beginning of your professional practice would have been positive for your professional performance?
 - •Yes
 - •No
- 24- If you couldn't provide telemedicine services, would you be willing to move to another city to work?
 - •Yes
 - •No

- 21- To what extent does telemedicine need to be supported by the medical community?
 - Yes
 - No
- 23- Do you think telemedicine services will expand to other medical specialties?
 - Yes
 - No
- 25- Would you agree to receive telemedicine services from abroad?
 - Yes
 - No

- 26- Do you consider that telemedicine should be a course dictated in the major of medicine?
 - •Yes
 - •No

- 27- To what extent is continuous training in the use of telemedicine necessary for doctors?
 - 1 not important
 - 2 slightly important
 - 3 moderately important
 - 4 important
 - 5 very important

국문초록

페루의 원격 의료에 대한 보건 종사자들의 인식에 관한 연구

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글로벌행정전공

페루 보건부는 전문 의료인력 부족, 지역간 의료 불평등 문제를 해결하고 모든 국민에게 제대로 된 의료서비스를 제공하기 위한 보건 정책 수단 및 전략으로써 원격 의료를 시행하고 있다. 이에 본 연구는 원격 의료 활용 및 수월성에 대한 인식 및 원격의료 향상 요인을 파악하는 것을 목적으로 한다.

원격 의료 사용에 대한 인식을 분석하고 원격 의료 사용에 영향을 미치는 요인을 파악하여 원격 의료에 적용될 수 있는 개선 방안을 제시하고자 페루의 수도인 리마의 소아과 의사를 대상으로 설문조사를 실시하였다. 페루 소아과 의사들이 원격 의료 장비를 추천할 의사가 있으며 원격 의료는 의료 시간 절감, 전문 의사 부족 문제 해결, 국민건강시스템 강화 등의 이점이 있다고 응답하였다는 점을 고려할 때 페루의 소아과 의사들은 원격 의료의 사용에 대하여 긍정적인 인식을 갖고 있는 것으로 나타났다.

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