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Telecommunications And Virtualization In Times Of Pandemic

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Abstract

The connectivity offered by telecommunications in times of pandemic is essential such as electricity, gas and water, currently the information has a basic service range Without its use during COVID-19, education would have collapsed and the economy was in greater danger of collapse. The use of virtual platforms helped to flatten the epidemiological curve, thanks to the follow-ups that could be done in real time through some applications. The objective of this work is to analyze the impact that telecommunications have in times of pandemic, for this an observational investigation was carried out, in addition to interviewing a retail group of the Abdón Calderón parish, on the use of portable devices and smartphones, such as The result was that most people have a mobile phone; But not everyone has the same access to the internet and in certain places the bandwidth is very low or null.

Keywords: communications, health, virtuality, telephones, bandwidth.

Introduction

The year 2020 has been one of the most tragic times for humanity, since its first months very moving events occurred, including the approach of a pandemic, which emerged in China in November 2019. Its expansion was very rapid and it has had negative effects on society, the environment and the economy, but unlike other viruses, such as the "Spanish flu" that did not have a high fatality rate (Lüthy, Ritacco, & Kantor, 2018).

However, it is not the first time that the world has been going through a pandemic, the difference is that today there is an era of interconnection, which allows a person to connect from anywhere, knowing what is happening in the rest of the world. In this way humanity can have information in real time, being able to be informed of the news that happens is an advantage.

It is undeniable that telecommunications throughout life have always deserved praise, the need to communicate has always been present in all ages and seasons of the universe, especially in this last century where it has developed by giant steps shortening distances in space. and the time and being able to know the advances that the society is obtaining. Telecommunications are a way of being able to communicate electronically at a distance, satisfying the needs of fast link that the world requires for the solution of its infinite problems and the timely delivery of knowledge of science and development.

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After the decree of the health emergency and the mandatory social isolation that occurred in most countries by governments, as an urgent measure to avoid the massive spread of the Covid-19 virus, most citizens were affected in their activities daily, such as going to work or going to school, conducting business, this is where telecommunications have played a fundamental role in the face of the virus crisis, being as essential as water and gas.

Due to the pandemic, in Ecuador the Ministry of Telecommunications and Information Society (MINTEL) promoted digitization to mitigate and prevent coronavirus infections, in turn reactivating the economy, giving priority to teleworking, telemedicine and the return of classes virtually, where education has not stopped (Navarrete, and others, 2020). Higher education also migrated to the new styles of virtuality (Mendoza, Rodríguez, & San Andrés, 2020).

As of June 2020, 95.5% of cantons could connect to the network, and parishes could have internet access. There is mobile infrastructure on a national scale, many of them have radio bases (Ministry of Telecommunications and the Information Society, 2020). However, not all citizens have access to the Internet, especially people living in remote areas.

In addition, the large traffic on the internet has brought with it a greater cybersecurity risk, such as malware infection, unauthorized access, among others, that is why, a good investment of those companies in charge of the development of digital platforms, will help to increase security against attacks and to maximize privacy, availability and reliability for users.

Materials and methods

For the research, the desk research method was used, based on current data available from the internet, from reliable sources such as the Ministry of Telecommunications of Ecuador and the Information Society (Ministry of Telecommunications and Information Society, 2020), in addition to obtaining information from books and data collection from the parish communities and educational institutions. Qualitative and quantitative analyzes were also carried out.

A simple, randomized prospective study was designed evaluating a population sample equivalent to 25 people over 18 years of age, excluding minors and older adults, since most older adults do not handle technology and children are supervised by their parents. An interview was conducted in the rural parish Abdón Calderón, located 8 km from the Portoviejo canton on the Manta-Quevedo road. Analytical questions were asked about telecommunications and its use as a tool for classes and teleworking. The applied procedures allowed obtaining information or opinions from various sources based on social circle, lifestyle and socioeconomic position.

Analysis and discussion of the results

Telecommunications are essential for the development of a nation and even in times of pandemic, it is evidenced that data network traffic increased rapidly during social isolation, because broadband is a possibility of entertainment family, to be aware of what is happening in the world, through the news, to study and carry out activities remotely in a home office regime; but it also served to misinform, in many cases false information was transmitted (Arroyo, Cabrejo, & Cruzado, 2020).

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For those who do not have broadband service in their homes, smartphones can provide the opportunity for a digital interface, even receive help from the government, reinforcing the importance of the telecommunications sector and services.

For many families, virtual education means leaving the comfort zone, there are more vulnerable groups, which are usually found in remote places, where for them studying virtually is totally impossible, due to the total impossibility of accessing them. classes because they do not have a computer or internet, others do not have a television, a radio or a telephone, but they look for alternatives so that the children can continue with the classes.

Abdón Calderón Parish is a rural area, the neighborhood roads have very low or no electricity service and telecommunications are covered by conventional radios and cell phones, so not all have internet, as they do not have money to pay for the service, but in some cases, it is accessible through *cybers*. According to direct observation and the criteria set by the interviewees, it is evident that many people will not be able to have access to virtuality, or to communication systems.

Etymological reason for communication

From the etymological point of view, the word "communication" originates from the Latin root "communicare"; that is to say, "to make something common", on the other hand, "information" has its origin in the words "in" and "formare", that is to say "to instruct inwards". From these two meanings, and due to the importance, that they have gained in recent times, a number of variants have been generated, each one with a meaning applicable to specific situations (León, 2017).

On the other hand, the International Telecommunications Union (ITU) provides a broader definition for telecommunications, stating: *"All transmission, emission or reception of signs, signals, writings, images, sounds or information of any nature, by wires conductors, radio electricity, optical media or other electromagnetic systems"* (ITU, 1999).

Evolution of the communication media

The telephone line networks had as their predecessors the routes of electrical telegraphy, these in turn following their predecessor's optical telegraphy and they the paths traced by the couriers with horse posts. followed first by the services of the racing pigeons. Telegraphy led to the telephone, this to the radio, she to television, and from cellular wireless telephony, we reached the mobile Internet. (Szymanczyk, 2013)

Confronting COVID-19 with governments

Governments are responsible for responding to the COVID-19 crisis, by playing a decision-making role to guarantee the protection of rights through the provision of public services. Technology has proven to be a useful and necessary tool for governments to continue to provide essential public services during the crisis.

So far, some governments have chosen some strategies to flatten the epidemiological curve in order to avoid the collapse of a health system. For this, drastic measures have been taken of a social distancing of two meters, the mandatory use of a mask, the restriction of the operation of services, supported by the World Health Organization (WHO) (WHO, 2020). In this context, telecommunications have a profound effect on people's daily lives, allowing access to health services, information and communication with the competent authorities. That is why governments

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turn to digital technologies to monitor, anticipate and influence the spread of the virus, and in turn provide education.

Use of telecommunications in times of pandemic

Faced with the extreme situation that the world is experiencing, the integration of digital technology has helped to flatten the incidence curve and has helped to maintain low mortality rates. Countries such as South Korea have used the digital technology in government-coordinated containment and mitigation processes, including surveillance, testing, contact tracing, and strict quarantine. Although South Korea has suffered only 0.5 COVID-19 deaths per 100,000 people, the US, with triple the number of beds in intensive care units per 100,000 people and ranked number one in pandemic preparedness, in the face of the COVID-19 pandemic, it has suffered ten times more deaths per capita (BasqueTrade & Investment, 2020).

Big data and artificial intelligence (AI) have helped make it easier to prepare and track people, the spread of the infection, in several countries. Tools such as migration maps, which use mobile phones, mobile payment applications, and social media to collect real-time data on people's location, enabled Chinese authorities to track the movement of people who had visited the Wuhan market, the epicenter of the pandemic. With this data, machine learning models were developed to forecast the regional transmission dynamics of SARS-CoV-2 and guide border controls and surveillance (IntraMed, 2020).

This integration allowed healthcare facilities to access patients' travel histories and identify individuals for SARS-CoV-2 testing and follow-up. The low number of cases and deaths is attributed to this efficient use of Big Data (Whitelaw, Topol, & vanSpall, 2020).

In some countries, authorities have developed a platform for healthcare workers to report real-time data on COVID-19 patient volumes, personal protective equipment, ventilator use, and other resources. This information has been shared nationwide with healthcare authorities to track facility status, allocate healthcare resources, and increase hospital bed capacity.

China uses free, web-based and cloud-based tools to select and direct people to appropriate resources. High-performance infrared thermal cameras installed in Taiwanese airports are used to capture thermal images of people in real time, quickly detecting people with fever (World, 2020).

In Singapore, people's temperatures are measured at the entrances to workplaces, schools and public transport. Data from thermometers is tracked and used to identify hotspots and infection groups where testing can be initiated.

Unlike most other countries, Iceland has launched widespread testing of asymptomatic individuals. Using mobile technology, Iceland collects data on patient-reported symptoms and combines this data with other data sets, such as genomic and clinical sequencing data, to reveal information on the pathology and spread of the virus.

This approach has been added to the knowledge base on the prevalence and transmission of asymptomatic COVID-19. To date, Iceland has had the highest per capita testing rate and one of the lowest per capita death rates from COVID-19. Other countries that conduct widespread testing include Germany and South Korea (Intramed, 2020).

Most used applications during the quarantine in Latin America

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The quarantine that almost all Latin American governments adopted due to COVID-19, detected a large increase in the use of some messaging applications and other telecommunication services. In the digital age, the obligation of having to stay indoors does not exclude the possibility of socializing through the media. This is reflected in the huge number of downloads that the Tik Tok application has experienced, which was launched by ByteDance in China in September 2016. It now has more than 104.7 million installations on mobile devices. This represents an increase of 46% compared to January 2019 (infobae, 2020).

Followed by Tik Tok is Zoom Cloud Meetings, a platform developed in the United States that allows video calls and virtual meetings to be held.

As the following figure 1 shows, Zoom has registered around 1.4 million downloads in the Google Play Store in Brazil from March 25 to April 1, 2020. According to estimates from the Priori Data database, this video application has been installed 81.6 times in Ecuador in the last seven days of March through the Google platform (Pasquali, 2020).
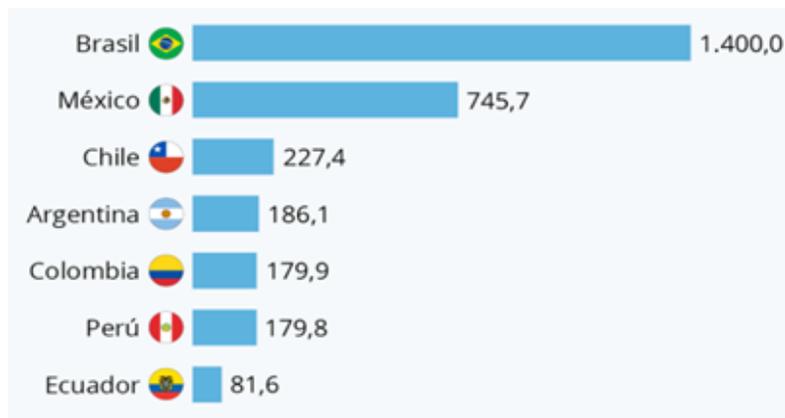

Figure 1. Data from March 25 to April 1, 2020. Selected countries.

Source: Priori Data (Pasquali, 2020)

Virtual education in times of pandemic in Ecuador

Studying virtually presents a great challenge and challenge for those who are used to receiving face-to-face classes. Due to the pandemic, public and private colleges and universities were forced to continue with their learning processes in a virtual way, thus showing the country's progress with respect to telecommunications.

Ecuador is a country that has large digital gaps in territories further away from national capitals, lack of access to computers and no internet connection, structural shortcomings to which is added the lack of digital literacy of a large part of the teachers. In addition to the human cost that this change in scenario means for many teachers and heads of household, who must reconcile the pressures of the professional world with the family one (Red Experimento Latam, s.f).

The fact that not all students have access to the internet, made the classes develop asynchronously, not all coincide at the same time and this implies that the teacher has to record their class so that students who could not connect in real time have the opportunity to view it at any other time. In turn, teachers have to have didactic resources so that their classes are attractive and not cause

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fatigue to students, for example the use of mobile computers (Suryasa, Zambrano, Mendoza, Moya, & Rodriguez, 2020).

It was also decided to disseminate the school classes through the radio and newspapers, so that in this way there is a greater reach and that students who do not have a mobile phone or a computer to see asynchronous classes or synchronous can listen to or read them and thus not a child misses receiving an education during the duration of the pandemic. There are teachers who have voluntarily and generously approached their students' homes to give them classes in person since they are families with very low resources or they live far from the city where it is not possible to find broadband signal or they do not have with smartphones or portable telephony, mainly in rural areas (Zambrano, Calle, & Rodríguez, 2020).

The Ministry of Education works developing and disseminating academic training spaces through traditional media, which are presented in the different media at specific times.

EDUCA is a space that seeks a joint relationship between the educational community and the media, in addition to seeking to address topics of interest that accompany the teaching and learning process in the classroom (LINE, 2020).

Programs such as VeoVeo, Papo's Workshop, I am made in Ecuador, Tell and tell you and Chao Pereza are part of Educa, and are presented on television in 160 channels with local, regional and national coverage, it is broadcast from Monday to Friday from 3 pm to 4 pm without commercial breaks. In turn, it has a digital channel, which is active 24 hours a day.

In radio stations and radio with national, regional and community coverage, approximately one thousand will broadcast educational programs, as follows.

- Radio Broadcasters: Monday to Sunday at rotating transmission times from: 6:00 a.m. to 9:00 a.m. / 12:00 p.m. to 3:00 p.m. / 6:00 p.m. to 9:00 p.m.

In figure 2, the distribution of the programs is shown educational programs in 3 segments of 20 minutes, with national, local and community coverage (Ministry of Education, 2020).
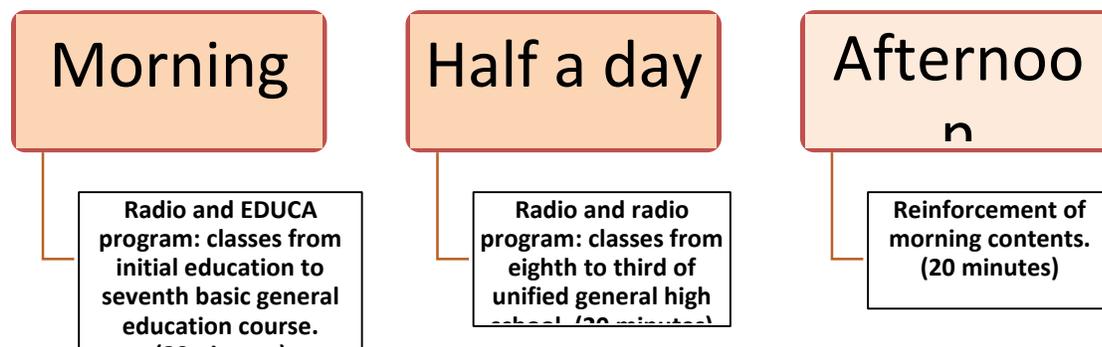

Morning

Radio and EDUCA program: classes from initial education to seventh basic general education course.

Half a day

Radio and radio program: classes from eighth to third of unified general high

Afternoon

Reinforcement of morning contents. (20 minutes)

Figure 2. Distribution of educational programs.

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Source**:** (Ministry of Education, 2020).

Also, EDUCA has an online channel that is active 24 hours a day and is linked to the respective social media platforms. Through these spaces, the contents that are part of the platform are made available to the entire educational community (Ministry of Education, 2020).

There are many subjects that cannot be taught virtually, which is why the Technical University of Manabí (UTM) together with other universities in Ecuador are analyzing the possibility that certain careers that require internships in laboratories, as is the case careers in the health and engineering area, can be given in person with the corresponding student capacity. But it is a planning that depends on the evolution of the disease in the country.

Internet connection during the pandemic in Ecuador

According to data from the Telecommunications Regulation and Control Agency (Arcotel), fixed Internet access barely increased 0.61% in the last year, which includes the period of the pandemic by Covid-19. Currently, this type of services has a national penetration of 12.73%, that is to say, around 2,214,180 active accounts (The truth, 2020).

In the case of households, this access only rose 2.33% in the previous six months. This means that less than half of families have the basic connectivity to access information or, in the current circumstances, so that children and adolescents can study online.

This minimal increase, however, does not represent an improvement in the quality of digital life in the country, because there was no progress in the most neglected areas. Thus, seven provinces continue with coverage of less than 1%, which are shown in figure 3.
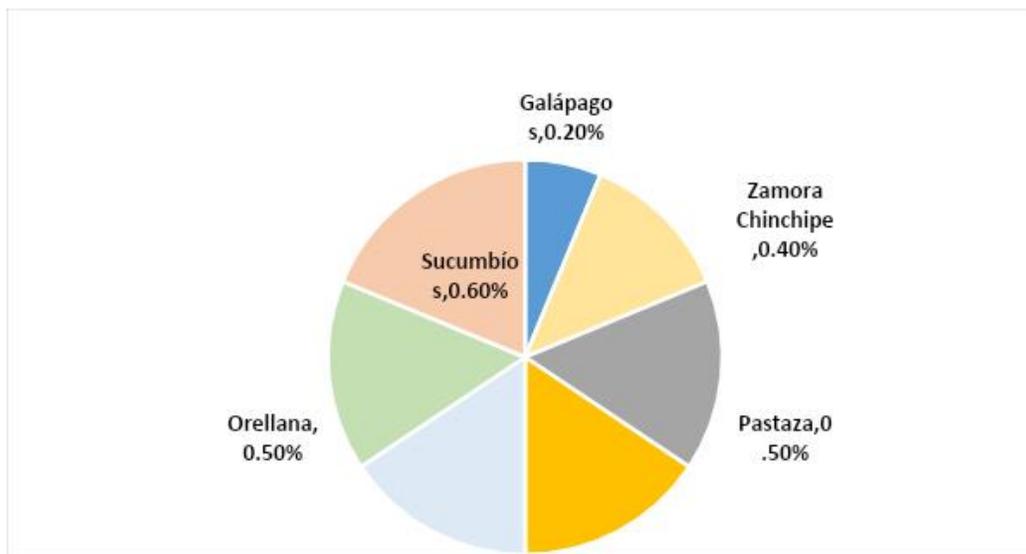

Figure 3**.** Provinces with less than 1% coverage in the country.

Source**:** (La Hora, 2020)

Last year, within the global index of digital quality of life, Ecuador was the sixth worst country, out of a total of 65 analyzed, on issues such as internet access, quality of services, infrastructure

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and security technology and electronic government. For the 2020 edition, the sample was expanded to 85 countries, representing 81% of the world's population. However, Ecuador does not even appear in the ranking (Ecuador Today, 2020).

According to information from the Ministry of Telecommunications, between March and June of this year, 232,379 mobile internet accounts were closed, which adds to the complex situation of connectivity.

According to the Government, several decisions have been taken to improve connectivity. The last of them, on August 13, 2020, was the signing of the Inter-institutional Cooperation Framework Agreement between the Ministry of Telecommunications and the Technical Secretariat of the Special Amazon Territorial Circumscription, with the aim of promoting projects that improve infrastructure and networks. in the provinces of Morona Santiago, Napo, Orellana, Pastaza, Sucumbíos and Zamora Chinchipe.

Within digital Ecuador, the authorities have established that, by 2021, more than 80% of the state procedures would be simplified and online (La Hora, 2020).

Risks due to the increase in Internet traffic

According to the Association of Telecommunications Companies of Ecuador (Asetel) and the Association of Internet, Value Added, Carrier and Information Technology Providers (Aeprovi), a growth of 30% was observed in Ecuador in the demand for internet services in recent months.

Likewise, according to statistics from the report "Digital State Ecuador 2020" presented in January, the country has 80% of users with internet access, 33% are concentrated in Quito and Guayaquil and 63% of the total are older than 24 years old, who register 92% of income and interaction in social networks, of which Facebook, Instagram, WhatsApp and Messenger maintain the leadership with 13 million integrated users (Datta Business Innovation, 2020).

92.3% of digital users in the country consume content 24/7 accessing average maximum connection speeds of 3.8 Megabytes per second, this content is focused on entertainment (social consumption, consumption of videos and photos), communication (email and messaging), research (search and inquiries), purchases ("classifieds" portals) and public services (management of inquiries and online procedures) (Smart environment, 2020).

All this demand can have its consequences, even if the telephone and internet operators have infrastructure with sufficient capacity such as bandwidth, some sites may experience high traffic, due to the demand. Similar to what happens when a high number of cars want to use a highway and the roads are saturated (García, 2020).

With many people working remotely due to the coronavirus outbreak, the number of cyber incidents is growing as hackers and scammers *seek to* exploit vulnerabilities in an attempt to steal valuable information, triggering the types of attacks shown in the figure 4.
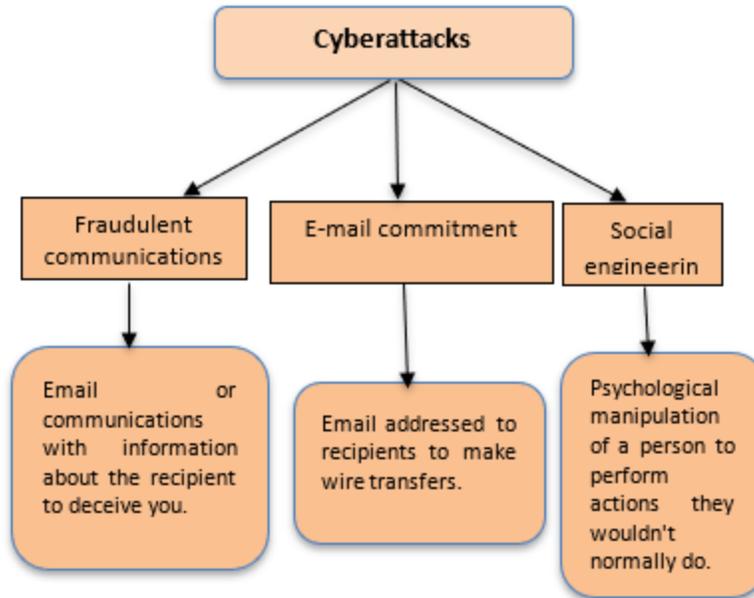
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Figure 4. Cyber attacks

Source**:** (García, 2020).

These events can lead to an increased risk of suffering from ransomware that can not only infect and block the computer networks of companies and their customers, but also encrypt or destroy data. Knowing that some forms of cyberattack can lie dormant for days, months, or even years, actions taken today could have a significant impact on a company's revenue and reputation in the future. Fortunately, there are preventive measures that both companies and employees can take to avoid these events and maintain a safe and secure digital environment (Zurich Seguro, 2020).

The suggested measures to take into account to reinforce the security of the technologies are highlighted in figure 5.
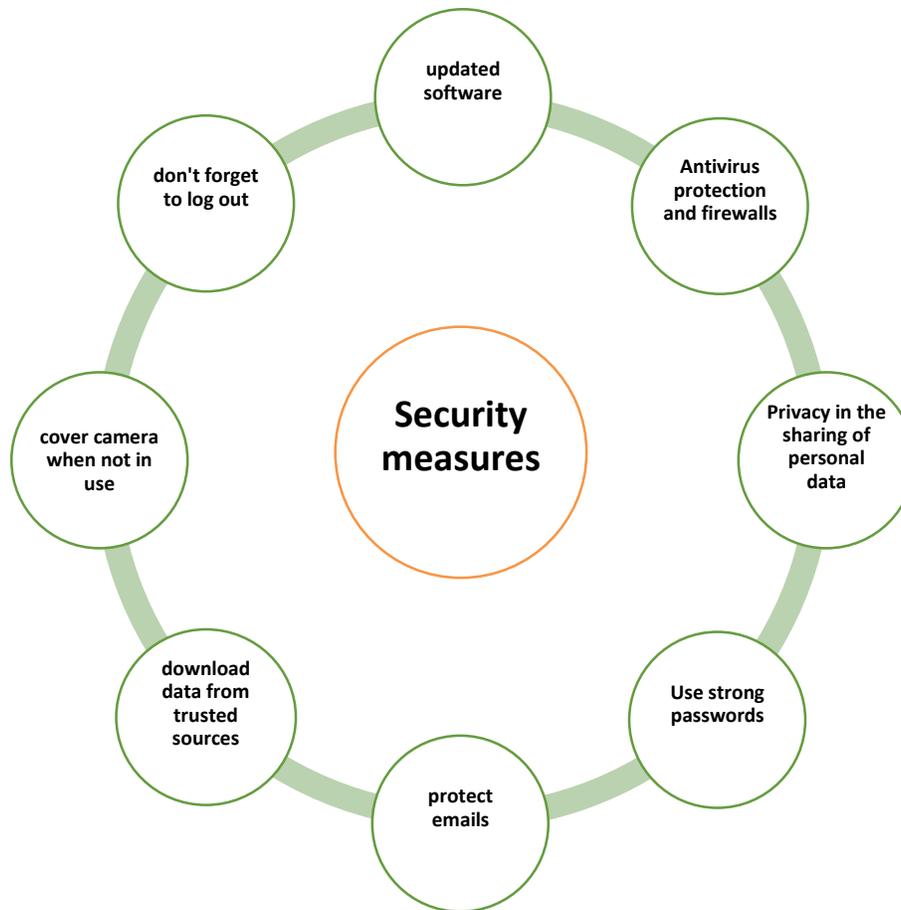
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Figure 5. Security measures against cyber attacks

Source**:** (Zurich Seguro, 2020).

Analysis of Abdón Calderón

parish The Abdón Calderón parish is A rural parish in the Portoviejo canton, it is made up of several communities, including: Naranjal, Bijahual, Miguelillo, Pimpiguasí and Potrerillo. The electric power service of the parish has a coverage of 90%, the remaining value corresponds to the dispersed communities. However, the quality is poor: voltage variations and cuts in the electrical fluid are permanently present (GAD Calderón, 2015).

Connectivity in the parish is deficient, especially in communities that have insufficient or no bandwidth, such as the Cañales site, which is located at the end of the entrance to the Bihajual community, where their education is a bit low and Most of the inhabitants choose to invest in crops that, in buying a smartphone or a portable device, presenting a slight decrease in illiteracy. The highest levels of instruction in the parish is primary followed by secondary, the highest level of instruction is low. At the rural parish level of Portoviejo, Calderón has the highest level of schooling.

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Unlike the residents of the center of the parish, they have a more current knowledge of technology and most families have a desktop computer or a smart mobile phone. Although, not everyone has Internet, it is possible thanks to the Decentralized Autonomous Government (GAD Calderón, 2015), to connect through Wi-Fi in the central park for free and go to the infocentres located in the fire department, which helps Many students and workers to carry out their inquiries and research, but due to the mandatory isolation many families for the continuity of their children's studies were forced to hire an affordable Internet plan so that they could have access to their virtual classes.

Due to the great demand for the sale of electronic devices, one of the inhabitants set up a store to sell cell phones and computers. As there was no public transport circulation and not everyone had their own vehicle, it was not easy to get to the city, so residents of nearby communities and parishes such as Alajuela, San Plácido and Pueblo Nuevo, came to buy to the center of the parish since it has the implementation of one of the best markets nationwide and has the best fairs in the city of Portoviejo (Zavala, 2017).

A survey was applied in the parish to find out the knowledge that the inhabitants had regarding the use of smartphones, one of the first results obtained as shown in figure 5, highlights that 67% of the people surveyed have a cell phones, while 33% have landlines and have no interest in the advancement of technology. In general terms, it can be stated that the telephone service does not fully cover the population's demand.
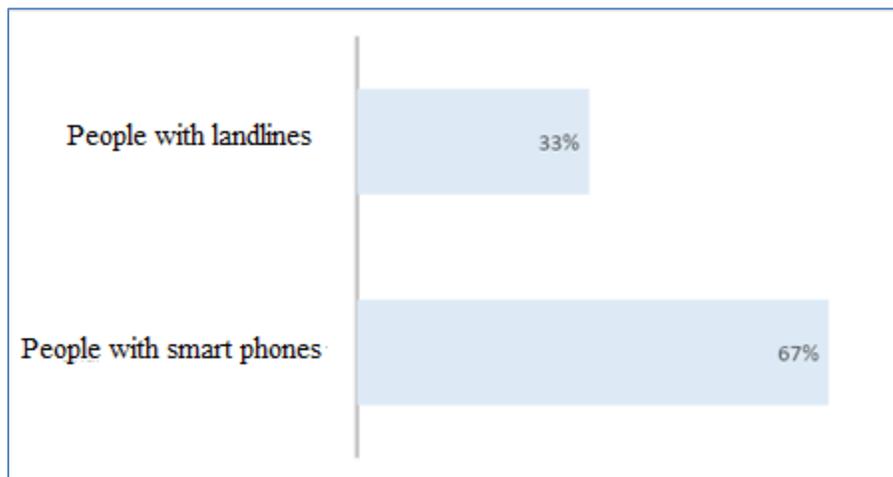

Figure 5. Percentage of the population that uses smartphones and landlines.

Another question asked in the survey was how many mobile phones and computers were in their homes. As can be seen in figure 6, 38% had more than one electrical device, 57% had only one computer, making it difficult for families with more than two children since they had to take turns to be able to use it. and 5% did not have a computer or telephone and this generated additional expenses to be able to print materials and go to a cyber.
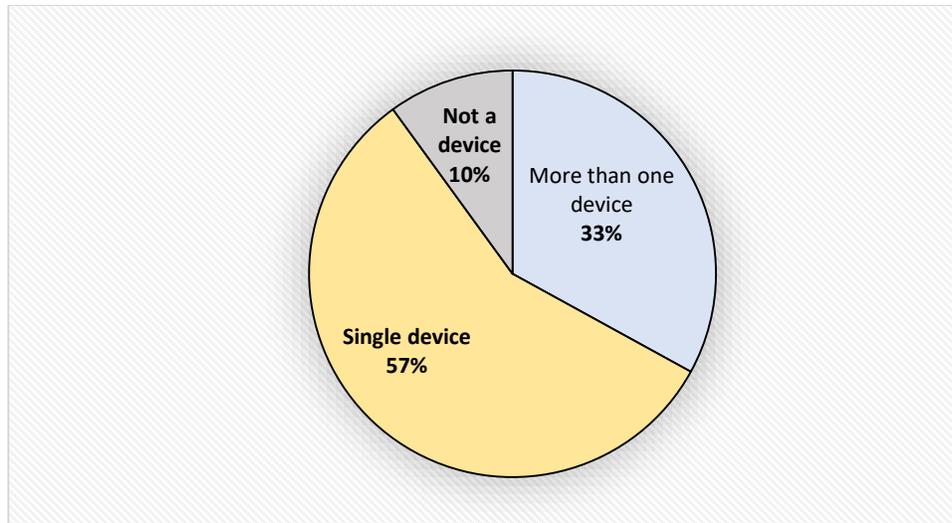
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Figure 6**.** Percentage of number of telephones and computers in households.

The parish has a high degree of illiteracy so a greater effort is required by teachers, which implies an increase in the gap of inequalities in education, since not all advance at the same level as in the classroom. In terms of public policies, the government should dedicate efforts to democratize access to technology and allow digital solutions for teaching.

Despite the fact that classes have continued virtually, most students prefer to return to the classroom, because the learning is not the same, especially for children who are easily distracted, which causes a greater effort of part of the teachers.

Conclusions

The use of technology has been necessary in the pandemic that the world is currently experiencing, despite the fact that most countries were paralyzed, schools closed, social networks and virtual platforms helped to resume these activities of virtual way, to avoid the spread of the virus. Incluso algunos países las autoridades han desarrollado una plataforma para que los trabajadores de la salud reporten datos en tiempo real sobre los volúmenes de pacientes con COVID-19, equipo de protección personal, uso de ventiladores y otros recursos. The high traffic of the Internet has caused many people to be victims of theft by being easily manipulated through social networks, downloading applications that are not secure or going to links that seek to damage devices or leak personal information.

For the students who live in the communities of the Abdón Calderón parish, virtual education presents a series of challenges and challenges, because the connectivity in these sites is not as good and not all have internet access.

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