

Challenges faced by telemedicine in Africa: Case study from Cameroon.



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TLM-3902
Master's Thesis in Telemedicine and E-health
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DEDICATION

It is with great honour, respect and sympathy that I dedicate this piece of study to my late uncle; late 1st Lieutenant Alobwede Marcus Njikang, from whom what I am today greatly depended on. I thank him for telling and teaching me that great things and persons are born from tiny sparks of inspiration.

May his soul rest in perfect peace.

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The writing of this report has been one of the most noteworthy academic challenges I have ever had to face. Without the support, tolerance and leadership of the following people, this study would not have reached its end. It is to them that I owe my intimate appreciation.

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Special thanks go to Gunnar Elingsen, who undertook to act as my supervisor despite his many other academic and professional commitments. His wisdom, knowledge and commitment to the highest standards inspired and motivated me.

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Immense thanks goes to all those who participated in this research project with interest and enthusiasm.

I will like to give a special thank you to my parents, who have always sustained my educational efforts, encouraged and believed in me, in all my activities and who so loving and generously cared for me and my kid brothers and sisters.

Lastly, I will like to thank my beloved one; Pauline N, for the care, courage and perseverant during all this difficult moment of my life.

ABSTRACT

Telemedicine implementation in Africa is increasingly becoming an important topic of discussion; in and out of Africa, investigated, and implemented, yet the term lacks conceptual clarity and definition to health workers within the African continent itself. The primary purpose was to examine perceived susceptibility, some common barriers, and self-efficacy associated with the implementation put in place.

Furthermore, the components, process, and outcomes of telemedicine as it is delivered in the African health structure have not been clearly expressed. This report provides an exemplary analysis concept, through available literature; even though very insufficient.

During the study, a qualitative finding method was employed. Whereby the interpretative research method has been the key method to interpret all phenomena, it provides a useful tool with which to analyze existing literature on the development, scope and the extent to which telemedicine is used within Africa and other low income countries.

From the finding, it was basically identified that the high cost of telemedicine infrastructure tools is so far the greatest challenge African have in the effort put in place to sustain the implementation of telemedicine. This is compared to the economic situation of the nation. Other related factors are technical and organisational challenges, infrastructural difficulties, cost distribution and cost recovery policies put in place, the direct benefit of telemedicine, African health policies and educational challenges.

Despite the successes as well as failures within the African nations, telemedicine programs are still working to achieve the results needed to propel this new approach of health care forward, telemedicine today is outstandingly from many other studies very promising due to the great value that can be brought by its implementation.

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LIST OF ABBREVIATIONS

- AIDS: Acquired immune deficiency syndrome
- ANT: Actor network theory
- CME: Continued medical education
- CRTV: Cameroon radio and television
- CP: Community participation
- DS: Dialogue structure
- ENT: Ear Nose and Throat
- EPR: Electronic patient record
- GTC: Genesis telecare centre
- GDP: Gross domestic product
- GTZ: German agency for development co-operation.
- HD: High definition
- HIV: Human immunodeficiency virus
- ICT: Information communication technologie
- IFC: International finance cooperation
- II: Information infrastructure
- IMF: International monetary fund
- IS: Information system
- MDG: Millennium development goal
- NGO: Non-governmental organization
- NST: Norwegian centre for telemedicine
- PHC: Primary health care
- Sq km: Square kilometre
- TB: Tubercle bacillus
- TV: Television

UN: United nation

UNICEF: United Nations International Children's Emergency Fund

UNESCO: United Nations Educational, Scientific, and Cultural Organization

Via: Through

WHO: World health organisation

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CHAPTER -1

INTRODUCTION

{In this section of my thesis, I give a very short historical background of telemedicine from an African perspective. I provide little ideas to the topic. It helps us to understand perfectly the challenges faced by medical workers; as users of the telemedical applications, the infrastructures and the technology put in place to help provide. If not equal health within Africa, then should be able to provide better health to low income countries like Cameroon, by the use of telemedical applications.

This section gives an account of the research objectives and questions guiding me to find the possible answers to the question under investigation; that of finding out the challenges faced by some African countries in the implementation of telemedicine. It provides a study context and methodology, giving studies of where the research was carried out, as well as the research method used. }

1-Introduction

The so called today telemedicine was discovered and put in to use long before it appellation. In its early manifestations, some African villagers used smoke signals to warn people to stay away from the village in case of serious disease (Mishra,et al,2006; ISBN,1990). In the early 1900s, people living in remote areas of Australia used a two-way radio, powered by a dynamo driven by a set of bicycle pedals, to communicate with the Royal Flying Service of Australia. But today due to stylish thought, a very beautiful name was created for that, which today is known as telemedicine.

The first documents of the implementation of telemedicine see the practice to have had its origin in April 1924, when the issue of Radio News magazine include a drawing of a physician viewing his patient over the radio which includes a television (TV) screen; TV was not invented until 1929. First cross state demonstration of telemedicine probably occurred in 1951 New York World's Fair. In 1957 Albert Jutras started doing teleradiology in Montreal and in 1959 Cecil Wittson started at the Nebraska Psychiatric Institute a tele-education and telepsychiatry program (R.Wootton,et al,1998).

Telemedicine can be defined broadly as the use of telecommunications technology to provide medical information and services (Allen, 1995). The prefix, comes from the Greek word *telos*; implying distance.

Telemedicine allows doctors to make a diagnosis for patients when they are separated by distance. It is the ability to provide interactive healthcare, utilizing modern technology and telecommunications. Telemedicine has been around since healthcare providers have been able to talk to each other on the telephone. Not surprisingly, the burgeoning spread of sophisticated communication technology is cutting an even broader swath in the healthcare field today; one that has the promise of saving on costs without sacrificing quality of care.

According to the Telemedicine Research Centre, a non profit public service research organization based in Portland, Ore, states that most of today's telemedicine applications are made up of two basic types of technology: store-and-forward and two-way interactive television. Store-and-forward technology, in which a digital image is created (stored) and then transmitted (forwarded), often by e-mail, to another location, is useful as part of a consultation among providers. Obviously, the process can occur in as close proximity as

between providers in the same building, or between two locations anywhere in the world (Gillette, 2003).

Basically, Telemedicine allows patients to visit with physicians live over video for immediate care or capture video and or still images and patient data that are stored and sent to physicians for diagnosis and follow-up treatment at a later time.

Here is an example of how Telemedicine works. Say you have a horrible ear pain and visit your healthcare provider ;could be a general practice physician, nurse practitioner, or unlicensed health worker in one of the darkest village in the far North region of a certain country Cameroon, who does an examination and is concerned with what he sees. Your provider recommends a referral to an Ear, Nose and Throat (ENT) specialist for a follow up diagnosis and treatment plan. Well, instead of travelling to the nearest specialist, which depending where you live could be anywhere from a 30 minutes' walk to a three days drive by car, but with the coming of telemedicine, your provider connects you directly to the ENT specialist with the used of any Telemedicine application device.

1.1-Research objective

Currently, there are telemedicine projects using medical and communication technology in various stages of development or implementation in at least a great majority of the developed nations. While all of these projects include clinical care as a part of the mission, other activities, such as continuing education, absorb much of the network time.

With healthcare provider shortages; minimal distribution of specialists in urban areas; an ageing population and soaring costs, telemedicine promises to play a key role in addressing the equity of care and cost issues which are brought on by geographic location. High digital (HD) video solutions are interoperable with all standards-based medical peripheral devices. A clinician can not only see and hear a patient from a distance, but can use digital equipments to help in general exam. All of this is best known to function well in developed countries.

This study will help me to understand the difficulties and challenges face by the African nations and other low income countries; especially the Genesis Telecare Centre in the republic of Cameroon.

Despite all the advantages of telemedicine advanced earlier, the failures are the result of a lack of coordination and leadership, inadequate budgets and inefficient use of available funds. Here are some of the factors that have crippled approximately half of the African centres running telemedicine application.

Very weak information and communications technology (ICT) infrastructure; inadequate and unreliable connectivity; and problems with the coordination and management of work have been added to the challenges faced by majority of African countries.

We should put in mind that one needs to be cautious when using telemedicine in developing countries; appropriate policies for telemedicine use need to draw up and access to adequate bandwidth should be assured. Related legal and ethical issues, such as security and confidentiality of patient data and responsibility in cases of medical error, are greatly needed to be addressed.

Many factors should also be taken into account such as human factors; government and international policy issues; training of health care providers; and the level of the economy at which telemedicine can be successfully implemented and sustained in Africa and Cameroon in particular.

1.2- Research Questions:

Getting the telemedical applications is good and easy to achieve, but they are lots of other questions we have to study and try to get some answers to. All the questions will help as focus on the challenges ahead and to see how we can try to overcome some of them.

-Why is it important for a low income African country like Cameroon to have a telemedicine centre?

-What was the challenge faced during the attempt to implement telemedical technology in Cameroon?

-What is the present challenge faced by the telemedical technology within Africa and Cameroon in particular and how is the challenge being addresses?

-How do we sustain telemedical applications and the technology in a low income African country like Cameroon?

-Why is telemedicine in Africa still in the hands of the private sector?

1.3-Study context and methodology

This case was carried out from two main perspectives; first at the Genesis Telecare Centre. Which is the only and main office that uses telemedical application for health promotion in Cameroon and secondly, at the Yagoua regional hospital which is shortlisted as one of the six health institution to run the telemedical application as a means of providing better health to the underdeveloped regions, areas and health zones of Cameroon.

In order to understand the contextual nature of medical innovative technology, I see it very necessary to adopt an appropriate research methodology. To my perspective, qualitative research method is the best technique I can use in finding out the challenges, as well as getting hidden minded solutions that can possibly help to sustain the telemedical applications as well as the technology.

Qualitative research is a method of inquiry used in many educational studies to analyse unstructured information, traditionally, it has been used in the social sciences, but it is used today by many different academic disciplines. Qualitative researchers aim to gather an in-depth understanding of human behaviour and the reasons that govern such behaviour. The qualitative method investigates the 'why' and 'how' of decision making; especially within the health domain, not just 'what', 'where', 'when'. Hence, smaller but focused samples are more often needed, rather than large samples. This research method can and does involve a number of different approaches to measurement, words and phrases such as: 'a lot', 'a little', 'many', 'most' are some time very important; as it helps to avoid specificity (Jennie Popay and Gareth Williams, 1998).

1.4-Motivation for thesis

Knowing the responsibility I have as a health worker, my best interest has been to help in providing better health to the most needed group of persons, especially those of Africa and my home country; Cameroon. I have been motivated by my supervisor to carry out this study in my country Cameroon, to meet and face most, if not all the challenges African countries face as an effort to implementing telemedicine application in to its health sectors. Telemedicine in Africa is a very new concept which is still on its developmental phase, like the case of the Genesis Telecare Centre that opened its doors in 2009 in Cameroon. The word of motivation I had nursed in mind is that a successful telemedicine program does not require a lot of expensive equipment. The most important element is having committed people that have all seen telemedicine as the best method to provide equal health to all.

1.5-Expected Contribution:

Telemedicine being a combination of technology and medical knowledge, African countries still find it very difficult to accept the program as the means of improving health needs for it continent. The problem of acceptability we all now face in trying to implement these applications. This thesis is a reflection to the current scenario of how telecommunications technology (ICT) is being incorporated in to the health sector in Africa; most especially Cameroon and as a result describes telemedicine application as a promoter for better health.

The expected resulting contribution is to encourage stakeholders of the health and ICT sectors to couple and find out how both could help Africa become free of some diseases and infections, developing concepts that will make programs of telemedical application acceptable and accessible to all, at affordable cost. This case study is aimed at being a mind opening concept to all health worker and ICT workers in Africa, especially Cameroon.

1.6- Thesis's Structure and outline:

This study is made up of eight chapters, all presented in a sequential manner:

Chapter 1, which is made up of the introduction gives an insight into research problems regarding telemedicine and its use, as well as major hindrances to technological development

in Africa .It gives some basic information on the research objective, the study context and the methodology used within the study.

Chapter 2 is made up of the theory and it gives a brief account on concepts and definition of telemedicine and its types and applications. It pays attention to the implementation of telemedicine in Africa and to what extent it is used especially in Cameroon. This chapter makes use of two important theories in information systems, namely; Actor Network Theory (ANT) and Information Infrastructures (II).They are obvious evidence of the difficulties face by telemedicine in African countries.

Chapter 3 talks of the methodology used, which is the research approach and design used throughout the study. This chapter as well gives details on the method of data collection, the tools and strategies put in use to collect information from telemedicine users.

Chapter 4 provides information on the case study, by linking the genesis telemedicine centre in Yaoundé-Cameroon and the Yagoua regional hospital. This chapter will provide an insight into the telemedicine centre as well as its objective, as well as the role it is aimed at playing for the Cameroon health sector. Then look at empirical evidences gathered from the case study.

Chapter 5 is the discussion that gives information on the impression of users and other spectators.

Chapter 6 is the conclusion as well as the recommendation for some African countries, as an aim of implementing sustainable telemedical applications.

Chapter 7 is the reference list from literatures and websites used for writing the study, as well as some books.

Chapter 8 gives the list of the appendices.

CHAPTER 2

THEORY

{In this chapter, we shall be able to see definitions and some concepts of telemedicine and its applications. The chapter speaks and mentions information on the quality health within African countries; specifically Cameroon and the participant involve in the struggle.

It gives information on telemedicine in developing counties as well as the use of Information Technology (IT) as a means to improve quality health care within an African country context.

Furthermore, this chapter mentions two very important theories for the implementation of telemedical applications within the IT system; namely the Information Infrastructure (II) and the actor network (ANT) theories. Both theories greatly show the socio-technical aspect in involve in telemedical implementation }

2. Theory

In this chapter, the main aim is to give some information on the definition and put some light in the concept of telemedicine in general; the specifically to the African countries and specifically Cameroon. Moreover, the chapter aims at getting some light on the quality of health care and the community participation. In this chapter, two main theories are considered very important; namely the Information infrastructure and the Actor Network theory .Their importance is base on the fact that they are both related in one way or other in the sense that both the theories highlight socio-technological approach and heterogeneity in common. Both theories help analyze the Information technology and the healthcare professional's behaviour toward changes in the health system.

2.1-Defination and Concept of Telemedicine

The prefix “Tele”, comes from the Greek word “telos”; implying distance and the word medicine is derived from Latin “ars medicina”, meaning “the art of healing” (Etymology dictionary). Medicine is the science and art of healing. It encompasses a variety of health care practices evolved to maintain and restore health by the prevention and treatment of illness, but in the case of telemedicine, the same medical act are carried out at distances. Meaning the client is at a distance to his health provider.

Many book authors, organisations and researchers have given various definitions to telemedicine. One of such definition is that written by the medicine net.com which says telemedicine is:

Definition- 1:

“The use of medical information exchanged from one site to another through electronic communications for the health and education of the patient or healthcare provider and for the purpose of improving patient care” (Medicinenet.com)

This definition shows the method used as a probable means to improve client care and to educate other health worker to be current on their finding with the use of information technology.

Definition -2: Comes from Rashid Bashshur who says that

“Telemedicine is conceived of here as an integrated and complete system of healthcare delivery and education that is positioned to exploit the available technological, organizational, and systemic capabilities” (Rashid, 1995).

Definition -3: A.C Norris in his part tries to explain what telemedicine uses by saying that

“Telemedicine utilizes information and communication technology to transfer medical information for diagnosis, therapy and education” (Norris, 2002)

Definition -4: In a report produced by the World Health Organisation, the WHO sees 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 diagnosis, treatment and prevention of disease and injuries, research and evaluation, and for the continuing education of health care providers, all in the interests of advancing the health of individuals and their communities” (WHO, 2010)

Definition -5: The Norwegian Centre Telemedicine in its own terms says

“Telemedicine is the use of ICT for collaboration on health purposes. It is about moving or exchanging patient information instead of the patient. Telemedicine can also give patients the opportunity to have direct contact with health professionals from their own home via computer, mobile phone or TV” (NST)

Definition -6 Richard Wootton as an effort to bring out what the National Health Service (NHS) has to say about telemedicine, said

“Telemedicine is more than simply diagnosis at a distance, and encompasses the whole spectrum of medical and nursing activities. Telemedicine is medicine practised at a distance and as such is a technique and not a technology” (Wootton, 1998).

Looking closely at all six definitions, produced differently by different persons, and organisation at different times, we can see common words, phrases and ideas. This show that all definitions of telemedicine if well made will intersect at a common point. Words like information technology, distance, diagnosis, treatment and education run through all the definition.

From the definition of telemedicine, there is a general notion or idea that runs through all the meaning. This makes telemedicine have a common concept, that is globally accepted and recognised by its users. Like the terms "medicine" and "health care", telemedicine often refers only to the provision of clinical services while the term tele health can refer to clinical and non-clinical services involving medical education, administration, and research.

The concept makes use of other expressions similar to telemedicine, which could be terms like "tele health" and "e Health", which are frequently used to denote broader definitions of remote healthcare not always involving active clinical treatments. Tele health and e Health are at times incorrectly interchanged with telemedicine. Tele health is well understood to mean the amalgamation and the integration of telecommunications systems into the practice of protecting and promoting health, while telemedicine is the incorporation of these systems into curative medicine (William and Ann, 2000). Likewise, e health refers to all forms of electronic health care delivered over the internet, ranging from informational, educational and commercial products to the direct services offered by professionals, non professionals, businesses or consumers themselves (Marlene et al, 2001). E health services encompasses the five C's which are context, connectivity, commerce, community and clinical care (Lee et al, 2000), to which have been added the sixth called computer application (Savas et al 1999).

2.2 Quality of health system in Africa.

During the past three decades, health professionals from the world have aimed at increasing the quality of health care globally. This is first because everyone wants quality services, whether it is for auto service, repairs or health care. Quality health care is a measurement of the health care received at your doctor or dentist's office, your local emergency room or during a hospital stay. Quality health care goes way beyond the manners or attitude of health care providers. Quality health care encompasses all aspects of both traditional therapies and protocols to Human Resources development. Quality of health care as described by Harteloh *"is the degree to which health services for individuals and populations increase the likelihood of desired health outcomes and are consistent with current professional knowledge"* (Hartlop, 2003).

Quality health care can be more exactly described as striving for and reaching excellent standards of care. It involves assessing the appropriateness of medical tests and treatments

and measures to continually improve personal health care in all fields of medicine, from the aides that help you eat to the surgeon who removes a tumour from a brain.

Many countries in other parts of the world have done much to achieve the best quality of health care. Although with the Bamako Initiative which took place in 1987, a controversial attempt to strengthen Primary Health Care using community financing and community participation and management was launched at a meeting of African Ministers of Health, and to provide information on how to upgrade health care facilities in Africa. Unfortunately, these gains have by no means been universal. The health gaps within and between countries have widened, perhaps due to inequality in the absorption of new technology as well as unequal distribution of new and re-emerging health problems due to difference in geographical locations (Von-Schirnding, 2002). Several reasons have been pointed out to be the causes of poor health quality in some parts of Africa.

One of them is the low health worker performance which has been a key obstacle to achieving the health-related Millennium Development Goals numbers:

- Eradicate extreme poverty and hunger,
- Achieve universal primary education,
- Promote gender equality and empower women,
- Reduce child mortality,
- Improve maternal health, and,
- Combat HIV and AIDS, malaria and other diseases (The Millennium Development Goals Report, 2010).

Poverty has been identified by the United Nations (UN), in its report of the MDG to be a key factor to health infrastructural development in Africa. The lack of economic and social opportunities has become a serious plague in low income countries. But they are nothing compared to the most pressing issue facing the majority of Africans: The nonexistence of a basic and humane health care system. Africans are facing death daily on multiple fronts and for multiple reasons (Peters et al, 2008). Moving further down the MDG, the Cameroon government in its attempt to provide primary education to its growing school age children decided to provide free primary education to all the public primary schools within Cameroon (Cameroon Tribune, 25/02/2011).

With all the steps taken, Africans still lack professional knowledge, equipment and medicine have been seen as the major challenges, a recent study pinpoints poorly motivated health workers as an important contributing factor to poor quality health care in low-income settings like in the case of Cameroon (Mathauer and Imhoff, 2006).

2.3 Telemedicine in developing countries

A great promise of telemedicine has been to help isolated or scattered populations gain access to health services, as an effort to promoting better health to the needy (Field, 1996). In industrialized countries like Norway, Canada and Australia, telemedicine has proven to be a good tool for enabling access to knowledge and allowing information exchange; between health worker and between health worker and clients, and showing that it is possible to bring good quality healthcare to isolated communities (Kyedar, 2003).

Telemedicine which is the latest health technological method to achieve better health for all can also be used to deliver healthcare to poor areas in countries with scarce infrastructure and to developing countries like Cameroon and others (Wootton,1997), (Wright,1997). But while information and communication technologies have tremendous potential for improving healthcare, we have to bear in mind that in rural areas of many developing countries, telephone networks and computers are scarce and not even available at all. This is especially true in the Cameroonian health sector. Another barrier to the implementation of telemedicine in rural areas of developing countries is limited access to electricity (Einterz, 2001). Yet another important factor is the deficient transportation infrastructure (Boris et al, 2009), resulting in a lack of appropriate maintenance and control systems, limited ability to afford expensive telecommunication infrastructure, and poorly trained health personnel. Due to these restrictions, the rural populations of developing countries and already a highly underserved group of persons are far from enjoying the advantages of the so-called “Global Information Society” or in other terms “globalization”. Information and communication technologies and services can improve the work conditions of isolated health worker only if those technologies are selected, developed, adapted, and carefully deployed to suit the population’s real needs in their real environment (Emage Josephine, 2006). These facts highlight important differences between developed and developing countries that condition any telemedicine project. Moreover, there is a technology gap between urban and rural zones within developing countries themselves. While in the main towns of developing countries

most modern communication networks are accessible, there are many rural areas without even a basic telephone network; a very good example is that of Kolofata in the Far North of Cameroon (Einterz, 2001). Therefore, while the telemedicine experiences of urban areas, mostly inter-hospital projects, are very similar anywhere, rural telemedicine projects seeking to improve the efficiency of primary care result in quite different implementations, depending on whether we are dealing with rural areas of industrialized countries or isolated rural areas of developing countries.

The needs and priorities of health institutions within some parts of Africa are completely different from each other. Some are still very in need of basic needs like water, better hospital beds, and good hygienic condition within the hospital. Most importantly, the lack of communication infrastructure and financial limitations condition enormously both the appropriate technology and the services required.

The Genesis telecare centre's initiative is a viable proposal to deploy telemedicine systems and services in rural areas of developing countries, most especially in Cameroon.

2.4 The use of IT to improve Quality health care services in Africa.

Health as per say is a complex interaction of biomedical, social, economic, and political determinant in individuals; this could be observed in the definition of health produced by the WHO which states that "*Health is a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity*"(WHO,1946). It places the argument of health firmly in the poverty and development debates and pays particular attention to how ICTs should and can best be used to move towards achievement of the Millennium Development Goals (MDGs), as part of poverty reduction strategies and in order to improve the health of the most poor and vulnerable people mostly present in rural areas of African countries.

There has so far been considerable international discussion about the potential of ICTs to make major impacts in improving the health and well being of poor and marginalized populations, combating poverty, and encouraging sustainable development and governance. Used effectively, ICTs have enormous potential as tools to increase information flows and the dissemination of evidence-based knowledge, and to empower citizens so that Africans should have good information about their own health. However, despite all its potential, a major

challenge is that ICTs have not been widely used as tools that advance equitable healthcare access in all parts of the world and most especially in most parts of Africa.

A critical and well collected mass of professional and community users of ICTs in health has not yet been reached in developing countries, especially in countries with very low daily income like countries of the sup-Saharan Africa. Many of the approaches being used are still at a relatively new stage of implementation, with insufficient studies to establish their relevance, applicability or cost effectiveness. This makes it difficult for governments of developing countries to determine their investment priorities (Chandrasekhar and Ghosh, 2001). However, there are a number of pilot projects that have demonstrated improvements such as a 50% reduction in mortality or 25-50% increases in productivity within the healthcare system (Greenberg, 2005).

It is well shown by Greenberg in his paper that ICTs have clearly made an impact on health care.

They have:

- Enhanced distribution of public health information and facilitated public dialogue and dialogue around major public health threats

- Facilitated remote consultation, diagnosis and treatment through telemedicine and its applications

- Made easy collaboration and cooperation among health workers, including sharing of learning and training approaches within the telecommunication and health field

- Maintained more effective health research and the diffusion and access to research findings

- Strengthened the ability to monitor the incidence of public health intimidation and respond in a more timely and effective method

- More importantly, advances the efficiency of administrative systems in health care facilities.

This translates into savings in lives and resources and direct improvements in people's health. In Nigeria, Egypt and Uganda, effective use of ICTs within the health sector has prevented avoidable maternal deaths. With an example being that in Nigeria, instead of building

hospitals in royal villages without health workers, the country's ministry of health, assisted by the national space research and development agency(NASRDA),has established a telemedicine programme(R.Normandi,2008). In South Africa, the use of mobile phones has enabled TB patients to receive timely reminders to take their medication. In Cambodia, Rwanda, South Africa and Nicaragua, multimedia communication programmes are increasing awareness of how to strengthen community responses to HIV and AIDS; not only is the program important, it also helps in solving confidentiality preambles between health workers and patients. In Bangladesh and India, global satellite technology is helping to track outbreaks of epidemics and ensure effective prevention and treatment can reach people in time. All these were and are still efforts to reduce mortality rate even with cases of deathly diseases and infections.

Experience demonstrates that there is no single solution that will work in all settings. The complexity of choices of technologies and the complexity of needs and demands of health systems within the globe suggests that the gradual introduction, testing and refining of new technologies, in those areas of health care where there is a reasonable expectation that ICTs can be effectively and efficiently used, is more likely to be the successful way forward.

The administrators of some countries are trying to encourage some innovative leads which may also be possible to provide better health, as technology is evolving rapidly. Wireless applications, increased use of mobile telephone and combinations of technology working together are some of the trends identified and that suggest new opportunities.

I will like to mention here that opportunities do exist for the use of ICTs in the health sector of developing countries; however a number of issues must be carefully considered in each intervention and setting:

We Africans have to come together as ask some of the pertinent questions as to what degree is the health sector structure and the national regulatory framework conducive to problem-oriented, interdisciplinary, rapid-response collaborative technical work and to implementing the political, regulatory, and managerial tasks required to address multifaceted and complex technological problems?

It will be great to find out from health workers and the telecommunication sector if they all have a vision, goals, action plan and potential outcomes and benefits been clearly defined?

It will be great to know if there mechanisms for coordinating action led by the public sector, but in a way that links public, private and social efforts and engages with diverse stakeholders to speed the development and use of priority ICT solutions for health purpose?

Will they be any incentives for the health sector and the telecommunication sector reform processes?

Do we have data-related standards and a regulatory and legal framework in place?

Will they be mechanisms for developing the capacity of health workers, other intermediaries and community members to make the most effective use of the ICTs available and to develop content that is pertinent, applicable and culturally appropriate and acceptable, affordable by all users?

Can we standardise options exist to ensure continuity and sustainability of ICT projects and programmes in terms of finance flows, public-private partnerships and building on existing information and communication channels and resources, all in an aim to promote health for all?

Some main methods could be of help to African countries that can be drawn about the use of ICTs in the health sector. These methods should be applicable at all levels, and although they are expressed simply here, the complexity of putting them into practice is one of the biggest challenges that has to be faced in ensuring health system benefit; health workers benefit; the people who make use of the health system ; the patients and citizens , benefit and their health improves. These methods should be that:

We Africans should keep the technology uncomplicated, applicable and local, so that even the very less educated group of the society should be able to make use of it.

It will be very good to build on what is there and are being used; this will help to reduce cost.

Active participation should be the form of approach used, involving users in the design by demonstrating benefits and the advantages of the project.

Reinforce aptitude to use, work with and develop effective ICTs for the health sector.

Set up greater monitoring and evaluation, particularly participatory approaches.

The embrace communication strategies in the design of ICT projects.

They should be a constant research and share learning about what works, what fails to work well, and what does not work at all.

Within this construction process, several issues have to be highlighted. Several major areas that are not enough are to be known and where further experimentation, research and analysis are needed, together with:

When, how and with what can we to move from proof of concept to large-scale implementation in a range of different settings?

Knowing how to evaluate systematically and coherently the impact of the use of ICTs on health and the users?

What should be done to share information and experience and coordinate efforts at national, regional and international levels, around the use of ICTs in the health sector?

What should and can be done to strengthen the role of and build the capacity of intermediaries within the medical domain?

How do we African do to develop local content that is relevant, appropriate and practical?

We should look for a way to strengthen organisational and national human resources, awareness skills within Africans and leadership to champion the further development of ICT use in the health sector?

In some parts of Africa, method should be put in place on how to enable the voices of those most affected by poor health to be heard?

We should think on how to implement the range of standards and a regulatory and legal framework that is conducive to the development of a vibrant ICT sector that responds to and supports social development processes?

Here are some very few questions that could possibly help to set out a schedule for future accomplishment to enable ICTs to donate to efforts that could be used to improve health and to achieve the health-related Millennium Development Goals (MDGs) as stated in the 2010 report.

2.5 Information Infrastructure.

The term information infrastructure (II) has so far been greatly used to refer to the communications networks and associated software that support interaction among people and organisations (Hanseth and Monteiro, 1998). The Internet is the phenomenon that has driven the debate till date on the minds of users. The term Information Infrastructure (II) is helpful as a joint term for present networks like the Internet being used for health purposes and others; and likely future facilities like the health sector and communication technology sectors.

From an online dictionary, *“information infrastructure is the computers, systems, software, etc, that are used to send and receive information electronically, considered as a whole”* (Online dictionary). Another online dictionary describes information infrastructure as

“The basic facilities, services, and installations needed for the functioning of a community or society, such as transportation and communications systems, water and power lines, and public institutions including schools, post offices, and prisons” (online dictionary).

According to Hanseth and Monteiro, II is much more than that. For them:

“Information infrastructure covers all kinds of technologies, all kinds of use and use areas...and involves lots of political, social, organization, human aspects and issues – all these issues interact, they are interdependent and intertwined,” – (Hanseth and Monteiro, 1998).

Information infrastructure offers innovative solutions that can help researchers capitalize on the growing volume, variety and velocity of data; without adding complexity to what is exiting (ibid).

These modified solutions can help us select the right mix or couple of technology, services, and financing for newly developed important health projects. Whether you need to improve storage efficiency or data protection, the information infrastructure solutions offer outstanding values that have been identified by some country leaders; like the Bush administration to be the best method in improving technological output.

The information infrastructure solutions are designed to help health workers and other field professionals to keep up with big data and address challenges around storage efficiency or data protection. This will lead health Company toward improved productivity, service delivery and reduced risk while streamlining costs. These are just the main aims behind the

II. We should note that II provides good-practice guidance on the design of IT services, processes, and other aspects of the service management effort. Significantly, design within II is understood to encompass all elements relevant to technology service delivery, rather than focusing solely on design of the technology itself. The II is aimed at:

Ensuring that the agreed IT services are delivered when and where they are supposed to be, that means that professions that best need the services should be given the priority. Liaising with availability management, capacity management, incident management and problem management to ensure that the required levels and quality of service are achieved within the resources agreed with financial management. All African stakeholders should make it a point of focus

Producing and maintaining a service catalog (a list of standard IT service options and agreements made available to customers).The sustainability of the applications will greatly depend on the administration of each country.

Making sure that appropriate IT service continuity plans exist to support the business and its continuity requirements.

The service-level manager relies on the other areas of the service delivery process to provide the necessary support which ensures the agreed services are provided in a cost-effective, secure and efficient manner.

2.4.1 The concept within Information Infrastructure (II)

As mentioned by Hanseth & Monteiro (1998), the II has its characteristics and explanations to the II. They mentioned that II should be:

II have a supporting and **enabling** function, the primary principle for enabling as one of the function of II is the fact that attempts are made for the expansion of the previously intraorganizational information system and a group of multidivisional domains are all coupled together to support not just one activity but a wide range of activities.

Moving from the interorganizational method to the intraorganisational method of the II, the enabling property is a set of standards which guarantee their accomplishment by permitting and facilitating interconnection and interoperation between networks (Bowker & Star, 1999).

II is **shared** by a larger community, even as it appears to be difficult. II is greatly used by a collection of users or a group of users. This is made possible in the sense that a large number of users can easily have access to the infrastructure (Hanseth and Monteiro, 1998).The infrastructures may be separated into disconnected units for investigative or devise purposes, and each fragments are linked to each other in a way. It shows that technology and services developed are serving as a shared infrastructure. A good example is the medical sector coupling with the telecommunication sector in an effort to provide better health in the name of telemedicine.

II should be **open**; this gives no limitation to number of users. There are no boundaries in Infrastructure for the number of users, stakeholders, application areas or network operators, thus generating an open mode configuration. For instance, in a hospital infrastructure information is being used among other institutions, social insurance offices, even in other countries like those of Africa and other low income countries.

II is a combination of human and technological aspects. They are more than “pure” technology; they are rather **socio-technical networks** (Hanseth and Monteiro, 1998).with a general conception that technology is made by man; it implies also that technology needs made to function perfectly, as well as solve and eradicate small mistakes.From this opinion, we can remember Coiera’s four rules for the reinvention of health care: *“Technical systems have social consequences; Social systems have technical consequences; we don’t design technology, we design socio-technical systems; To design sociotechnical systems, we must understand how people and technologies interact”* (Coiera 2004).Within the II,both human and technology cannot function well without each other.

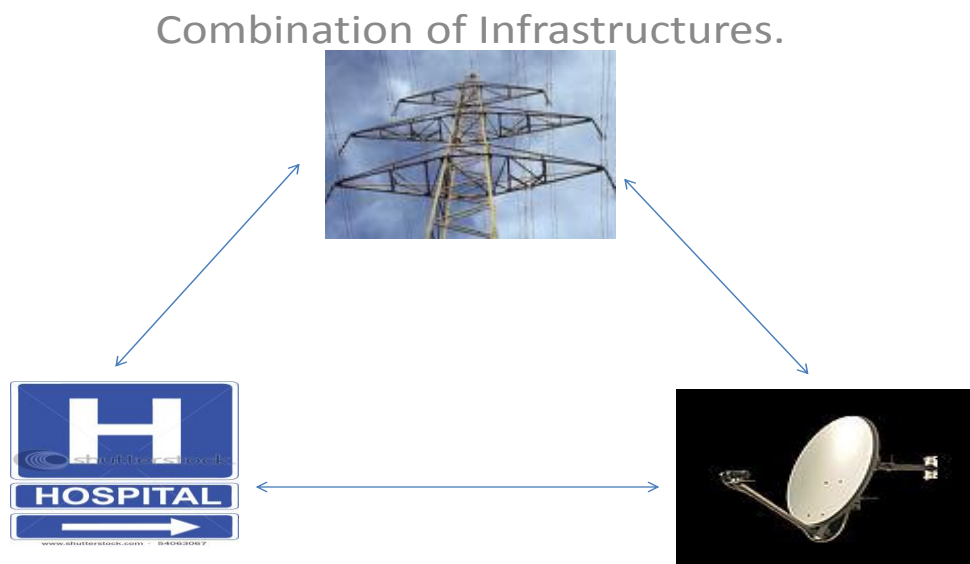
II are **connected and interrelated**; constituting ecology of networks (Hanseth and Monteiro, 1998).It implies that within the II, when at one step of any level a technology malfunction, all the rest of the infrastructure will develop lots of other problems.

II develops through extending and improving the **installed base**; this means that the infrastructures used within the implementation process are never started from the very start. The present technology has been taken from an already existing, well know technology. This is not only less costly but also gives an assurance, as well as reduces error chances.

Looking at an African country like the Republic of Cameroon, three immense structures have to couple themselves together in order to successfully run some telemedicine

application. These gigantic structures are administratively under three different ministries, namely; telecommunication from the ministry of communication, health sector from the ministry of public health, and The Cameroon national electricity company which is under the ministry of energy and water resources.

These structures have to develop solutions which have to be enabling; since it helps to improve quality of health. It has to be shared to a greater range of the community, has to be open so that if not everyone, a majority of the community makes use of it. The coupled structure will have to involve human and non human working together, and all these structures have to be connected to each other.



Picture1: Combining infrastructures for Telemedicine in Cameroon.

2.6 Actor network Theory

The Actor network theory, often abbreviated as ANT, is a distinctive approach to societal theory and research which originated in the field of science studies. Although it is best known for its notorious insistence on the agency of nonhumans, ANT is also associated with forceful critiques of conventional and critical sociology.

Developed by science and technology studies scholars Michel Callon (1986) and Bruno Latour (1987) the sociologist John Law (1992), and others, it can more technically be described as a material-semiotic method. This means that it maps relations that are simultaneously material; that is between things and semiotic; meaning between concepts. The theory supposes that many relations are both material and semiotic. For example, the interactions in a school involving school children, teachers, their ideas, and technologies such as tables, chairs, computers and stationery. Together these form a single network.

The Actor network theory tries to explain how material and semiotic networks come together to act as a whole ;for example, a school is both a network and an actor that hangs together, and for certain purposes acts as a single entity. As a part of this it may look at explicit strategies for relating different elements together into a network so that they form an apparently rational whole that is acceptable to all.

According to actor network theory, such actor networks are potentially transient, existing in a constant making and re-making. This means that relations need to be repeatedly performed or the network will dissolve. A good example is that of a class room teacher. The teachers need to come to work each day, and the computers need to keep on running. They also assume that networks of relations are not intrinsically coherent, and may indeed contain a conflict; which means that there may be adversarial relations between teachers and children, or computer software may be incompatible. Social relations, in other words, are only ever in process, and must be performed continuously.

Although it is called a theory, ANT does not usually explain why a network takes the form that it does. It is much more interested in exploring *how* actor-networks get formed, hold themselves together, or fall apart. It is not, in other words, a theory of anything, but rather a methodological stance that researchers can take in their analysis, especially when it comes to the case of telemedicine applications. One common example is to note the very important part played by ANT-informed approach in health care settings, which can be beneficial to both conceptually and practically (Cresswell, et al, 2010), that is, ANT can be useful in exploring changing power relationships in relation to work practices, health care reforms, and IT introduction (McLean and Hassard, 2004).

It can also be seen as a way of being faithful to the insights of ethno methodology and its detailed descriptions of how common activities, habits and procedures sustain themselves, with or without the help of users.

Concept of ANT

Two main important concepts run through the ANT which are inscription (Akrich 1992; Akrich and Latour 1992) and translation (Callon 1991, 1994; Latour 1987). But we shall talk of other concepts that also play a great part within the actor Network Theory. Some of those concepts are:

2.6.1 Inscription: Is the method of generating technical artifacts that would ensure the protection of an actor's interests (Latour, 1992).

2.6.2 Translation: Is generally known in ICT as the creation of an actor-network. This process consists of three major stages: problematization, interessment, and enrolment. Several actors within an organization may be involved in a different process of translation, each with its own unique characteristics and outcomes. For purposes of clarity, it is useful to focus on a single actor, from whose vantage point we wish to see the process of translation.

2.6.3 Probematization: The first moment of translation during which a focal actor defines, identities and interests of other actors that are consistent with its own interests, and establishes itself as an obligatory passage point (OPP), thus rendering itself indispensable (Callon, 1986).

2.6.4 Obligatory passage point (OPP): The obligatory passage point, generally used to a condition that has to take place in order for all the actors to satisfy the interests that have been attributed to them by the focal actor.

2.6.5 Interesment: The second moment of translation which involves a process of convincing other actors to accept definition of the focal actor (Callon, 1986).

2.6.6 Enrollment: The moment that another actor accepts the interests defined by the focal actor.

2.6.7 Actor Network: A heterogeneous network of aligned interests.

2.6.8 Actor: This is any element which bends space around itself and makes other elements dependent upon itself and translate their determination into the language of its own. Common examples of actors include humans, collectives of humans, texts, graphical representations, and technical artifacts. Actors, all of which have interests, try to convince other actors so as to create an arrangement of the other actors' interests with their own interests. When this persuasive process becomes effective, it results in the creation of an actor-network.

2.6.9 Irreversibility: The degree to which it is subsequently impossible to return to a point where alternative possibilities exist (Walsham, 1997).

2.7 Community Participation

Community participation is the active involvement of people from communities preparing for, or reacting to, the implementation of new infrastructures within the community. True participation means the involvement of the people concerned in analysis, decision-making, planning, and programme implementation, as well as in all the activities, from research and to evaluation.

While the opportunities for community participation may vary greatly from place to place and at different points in the implementation-management cycle, it is extremely important that a participatory approach should be promoted to achieve sustainable development.

Community participation has been identified as one of the key ingredients of an empowered community. Participation is the heart that pumps the community's life blood, its citizens, into the community's health promotion programme. It is a principle which is so important that some African health institution has made active citizen involvement in all aspects of strategic plan development and implementation a condition for continued participation in its Empowerment Programs. This goes a long way to explain the Alma Ata declaration of 1978 which states in article IV that: "*The people have the right and duty to participate individually and collectively in the planning and implementation of their health care*" (Alma Ata declaration, 1978). Because of this article, came the birth of the Dialogue Structure (D.S). The D.S base on the Cameroonian health structure is a group of democratically elected members of a given community, appointed with members of the health institution to run the affairs of the community.

After a good knowledge to the African health setting, I will like to joint Norman in his words that says "*Community participation..... is critical to community success*"(Norman,2000)

For any telemedical implementation to be fully accepted within African, the participating community, power and responsibility should be decentralized (ibid)

However community participation approach, has so far been identified as a cost effective way to extend a health care system to the geographical and social periphery of a country; it is

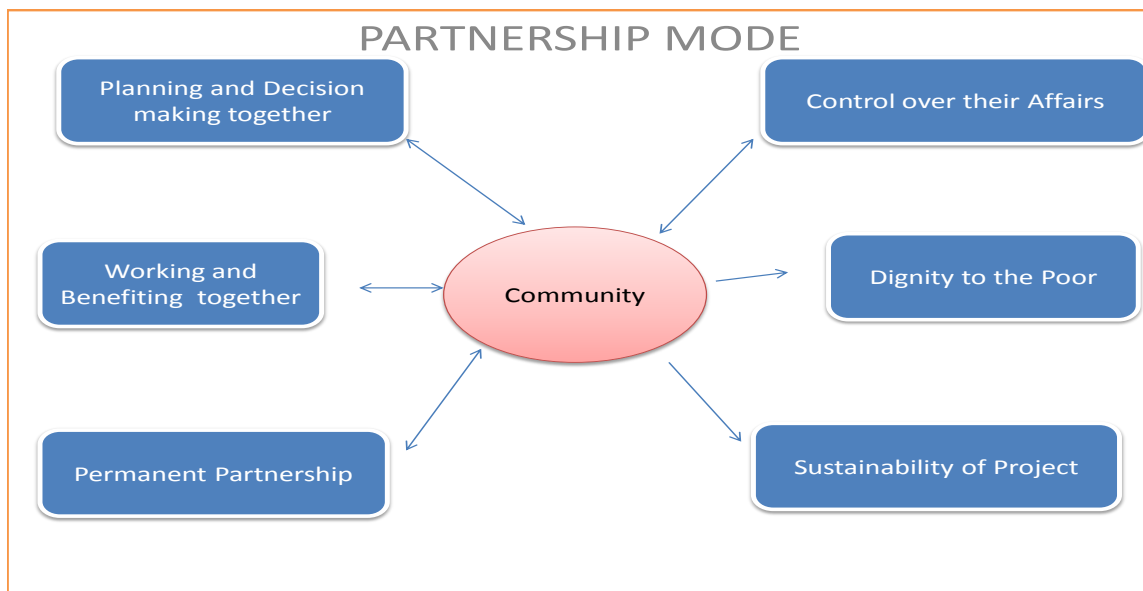
however important to note that communities that begin to understand their health status objectively rather than fatalistically may be moved to take a series of preventive measures; communities that invest labor, time, money, and materials in health promoting activities are more committed to the use and maintenance of the things they produce, such as water supplies; health education is most effective in the context of village activities; and community health workers (MacCormark 1983).

Most if not all of medical research programs use Passive community participation, which is made of: Implementation and Evaluation.

Implementation will greatly need the help from the community, as they will best know what their community members love best.

Evaluation, help the technical team easily identify the difficulties that has existed. By so doing, they shall together develop better means of achieving better, less expensive and effective health to all and for all with the use of telemedical applications.

One of the best methods used for community participation is the partnership model introduced by Narayana in 2002. The model shows how the communities and stakeholders take part in solving their problems.



Picture 2: community participation model

CHAPTER 3

METHOD

{This chapter has to deal greatly with the research method and the approach used during the study period. The research strategy is depended upon the objectives and aims of study, it had assisted me as a researcher to find the most appropriate answers to the research question for which the study was initiated. A highlight of the purpose of the research is followed by two very important research methods, namely; the qualitative research and the quantitative research. In a short light, will be followed by a presentation of the interpretive research approach, which is the approach used during the research. Subsequently, in this chapter is found the method used in data collection and interpretation. }

3.1 Research Purpose

The purpose of this study is to examine the challenges faced after the implementation of telemedicine applications within some countries in Africa and to some extent, to better understand the effect of the challenges on the health of a greater majority of Africans like is the case in Cameroon. During the study, we shall be able to find or give some answers to some very pertinent question within the implementation of telemedicine in Africa.

Why should African countries adopt telemedicine technology within their health structures?

What should be done to make telemedicine infrastructures sustainable?

What are the challenges faced by the implementation of telemedicine within Africa, and how can they be resolved?

What factors influence the sustainability of telemedicine in some African countries?

How do we provide telemedicine and its applications to African at the most affordable rate?

These and other questions are what researchers of the health and telecommunication sectors are so much interested in.

3.2 Research Design

Throughout my studies, I have had great interest on the qualitative research method, and from which this study is constructed. This is because the design of qualitative research is probably the most flexible of the various experimental techniques, encompassing a variety of accepted methods and structures.

From an individual case study to an extensive interview, this type of study still needs to be carefully constructed and designed, but there is no standardized structure. For researcher to go deep in to the challenges they face; Case study, interviews and survey designs should be the most commonly used methods. Not like other research methods, this section is dedicated to qualitative research in Information Systems (IS). Which should involves the use of qualitative data, such as interviews, documents, and participant observation data, to understand and explain social phenomena (Lee and Liebenua, 1997). Qualitative researchers can be found in many disciplines and fields, using a variety of approaches, methods and techniques. In Information Systems, there has been a general shift in IS research away from technological to managerial and organizational issues, which has given an increasing interest in the application of qualitative research methods. Considering that this method of investigation is the best, what cannot be investigated using this approach, cannot be investigated at all scientifically (Galliers and Land, 1987).

A Research is a process of investigation. It is an examination of a subject from different points of view. It is not just a trip to the library to pick up a stack of resources, or picking the first five hits from a computer search. Research is a pursue for the truth. It is getting to know a subject by reading up on it, reflecting, playing with the ideas, choosing the areas that interest you and following up on them. Research is the way you educate yourself. In other terms, a research is all about addressing an issue or asking and answering a question or solving a problem (Hopkins WG, 2002).

In summary, research is just all about:

To search or investigate in detail, especially when it involves humans and the activities they carry out,

Reflective inquiry or examination; especially: investigation or experimentation aimed at the discovery and interpretation of facts, revision of accepted theories or laws in the light of new facts, or practical application of such new or revised theories or laws

The collecting of information about a particular subject of study interest or scientific research.

Within the Information system (IS), two main research types are greatly in use (Robson, 2002), namely: Qualitative and Interpretative research methods, and in a very short light, Quantitative research.

a. Quantitative Research method

Quantitative research refers to the systematic empirical investigation of societal phenomena by means of statistical, mathematical or computational techniques. The purpose of quantitative research is to develop and utilize mathematical representations, theories and, or hypotheses pertaining to phenomena.

This method of finding has as advantage that:

Quantitative methodologies are appropriate to measure overt behaviour.

They are also strong in measuring descriptive aspects, such as the composition of the community, sports crowd, and large scale findings where individual opinion is of importance.

Quantitative methodologies allow comparison and replication.

Reliability and validity may be determined more objectively than qualitative techniques.

No matter it has lots of other advantages, it has lots of weaknesses as well. Quantitative research designs lie mainly in their failure to ascertain deeper underlying meanings and explanations of the characteristic of each member within the research community, even when significant, reliable and valid. The quantitative assumption regarding large group of persons is that people can be reduced to a set of variables which are somehow equivalent across persons and across situations (Reason & Rowan, 1981, p. xiv)

b. Interpretive Research approach

Any research within the interpretive paradigm spans a range from some qualitative projects prearranged in ways that make them rather comparable to the positivist social science work, to phenomenological work that is more comparable to a humanistic interpretation of literature, except for the fact that the texts are drawn from the lives of human beings. To a degree that varies significantly across this range, a premise of this perspective is that the researcher is not and cannot be separated from the people and processes that they study. The goal is not as often objectivity like other research types; rather, it is philosophical and self-reflexive engagement with the phenomena. This engagement itself takes time and effort, to form trusting relationships with participants, for example, in order to understand the details of their life experiences and perceptions of the participant who are human. Because the objective of this kind of research is deep analysis rather than statistical comparison and generalization, the number of cases which are often people, events, settings; that are examined in a given study may be quite small. Given the importance of connection between researchers and the people they study, there is often resistance within this perspective to the term subjects (as in “human subjects’ research”). These are not subjects; they are human beings who have agreed to participate in research. . Interpretive researchers thus attempt to understand phenomena through accessing the meanings participants assign to them (Walsham, 1993).

c. Qualitative Research Method

Qualitative research is a method of inquiry used in many educational studies to analyse unstructured information, traditionally, it has been used in the social sciences, but it is used today by many different academic disciplines. Qualitative researchers aim to gather an

in-depth understanding of human behaviour and as well as the reasons that govern such behaviour. The qualitative method is mint to investigates the ‘why’ and ‘how’ questions of decision making procedures; not just ‘what’, ‘where’, ‘when’. Hence, smaller but focused data samples are more often needed, rather than large samples. This research method can and does involve a number of different approaches to measurement, words and phrases such as: ‘a lot’, ‘a little’, ‘many’, ‘most’ (Jennie Popay and Gareth Williams, 1998).

Qualitative research starts from the position that our knowledge of reality, including the domain of human action, is a social construction by human actors and that this applies equally to researchers. Thus, there is no objective reality which can be discovered by the assumptions of positivist science (G Walsham, 1993).Most of the literature produced is concentrated on the substantive case studies themselves and on the conclusions which can be drawn from the study (ibid).

From both explanations, it is seen that qualitative findings is not a synonym for interpretive judgment. Qualitative research may or may not be interpretive, depending upon the underlying philosophical assumptions of the researcher. Qualitative research can be positivist, interpretive, or critical. The table below shows what Michael explains as a vital point difference between qualitative findings and interpretive research.



Picture 3: Diagrammatic representation of qualitative findings and others

From the table above all three; Positivist, interpretive and critical are guides to qualitative research (Myers,1997).

The key foundation of qualitative research is the basis on which this type of research is grounded; and it is seen as a framework for research design. Colin Robson says the framework suggests some directionality about the whole process, and helps the researcher to plan his work better (Robson, 2002). Some key foundation issues suggested taken in to account by this type of research method are:

The researcher should decide on a focus; knowing his participants, their culture, and the purpose(s) of the research, having in mind what the study is trying to achieve, why the study is being done, and if the researcher hopes to change something from the result of the study. All researchers especially those from the IS section, should collaborate with the in-company personnel and should create an atmosphere of confidentiality within researcher and participants especially when it contains medical information like with the case of telemedicine (Walsham, 1995).

The development of the research questions is the next plan researchers will have in mind. The development of research questions involves establishing research questions that are clear, open-ended, and researchable. The questions must also allow for the emergence of new hypotheses and additional questions as participants tell their story (Bufkin, 2006).

The research strategy used by researchers is of great importance in qualitative research. Qualitative research is exemplified by the approach put forward by Kleining (1982; 1995). Kleining has stressed on the importance of the heuristic moment in qualitative research; he also assumes that all research methods are based on everyday methods, and he has advanced four rules for conducting better qualitative research in general. With strategies put in place, researchers should be able to answer questions ranging from what are the research objectives. How potential respondents or participants would be recruited within the study plan. A well-defined sampling strategy that utilizes an unbiased and robust frame can provide unbiased results (Amanda Wilmon, 2005).

The method of data collection is of great importance. Qualitative researchers may use different approaches in collecting data, such as the grounded theory practice, narratology, storytelling, classical ethnography, or shadowing (Norman and Yvonna, 2000).

Arranging the data is another important part of qualitative research. Researchers are often required to summarize and condense large quantities of data for public distribution. For example data collected by health district from a number of young females from the ages of 18

to 25 years in a given locality on the use of contraceptive pills as a method of contraception; must be carefully condensed and packaged in a way that makes it understandable by the general public. In the same way when we collect data in our research projects we must summarize it and package it in a way that is easy to understand for other researchers.

Analyzing the data collected. All qualitative research studies are unique and thus demand unique strategies for analysis. Qualitative data analysis consists of identifying, coding, and categorizing patterns found in the data. The clarity and applicability of the findings, however, depend on the analytic intellect of the researcher.

After all the data have been collected and the analysis has been completed, the next major task for qualitative researchers is to re-present the study in the form of a paper or a lecture. This is the report that gives a result to your findings.

Some situations where qualitative research is often used depend on the aim of the team of researchers, sometimes findings are carried out base on:

New product, suggestion generation and development, like in the implementation of telemedical applications within the medical field and must especially as with the case of the implementation of telemedicine within some African countries

Strengths and weaknesses of products, a good example was when telemedicine was implemented. Many users judged it from different points of views. Today we are looking for the challenges faced by some African counties that have gotten telemedicine applications in their health system.

Investigating current or potential product, the services it provides to the public and the marketing strategy put in place. An example is the electronic patient record (EPR), on which researchers have carried out lot of studies; from the efficiency to the safety of the medical device.

Studying reactions of users in the community, to know what new technology should be added or removed, from that which is existing.

Exploring market segments, such as demographic and customer groups.

Studying emotions and attitudes on societal and public affairs issues.

Understanding perceptions of members of hospital.

Determining user language as a preliminary step to develop a quantitative survey.

Open-ended questions are used in order to get as many detail information as possible. It allow for informants to answer from their own frame of reference rather than being confined by the structure of pre-arranged questions. These types of questions allow researchers to go into more depth or clean up misunderstandings (Colin Robson, CH 9, and Page 269-291). Informants express their thoughts more freely. Open-ended questions typically begin with words such as 'Why' and 'How', or phrases such as 'Tell me about telemedicine in Cameroon.....', How has telemedicine improved the health of Africans? Often they are not technically a question, but a statement which implicitly asks for a response. An open-ended question is designed to encourage a full, meaningful answer using the subject's own knowledge and or feelings. An example of an open ended question could be:

What do you think about the use of an electronic patient record by doctors of the Yagoua Regional Hospital?

How should the electronic patient record (EPR) be integrated within the referral systems among GPs and the university teaching hospitals in Cameroon, as well as the integration of the services provided by the genesis telecare centre and the daily routine consultation of GPs?

Not like closed-ended questions which encourage a short or single-word answer. On these types of questions, the research will not be able to have as many information as possible for his field work.

3.3 Interpretive field work and the principles

Interpretive research sites the meaning making practices of human actors at the centre of scientific and other academic explanation. It is wildly called qualitative research in some disciplines; it is conducted from an experience near viewpoint in that the researcher does not start with concepts determined a priori but rather seeks to allow these to emerge from encounters in the research field. Orlikowski and Baroudi, 1991 described this method of finding as: *'studies which assumes that people create and associate their own subjective and*

intersubjective meanings as they interact with the world around them. Interpretive researchers thus attempt to understand phenomena through accessing the meanings participants assign to them’.

Other writers like Bertsen et al also stand on the fact that “*research is interpretive if it is assumed that our knowledge of reality is gained only through social constructions such as language, consciousness, shared meanings, documents and other artefact*”(Bertsen et al ,2000)

Interpretive research methodologies and other methods of findings are not new but are today an alternative position in political science, disciplinary training and mainstream journals.

Despite the fact that there is some intersection between qualitative research and interpretive practices(Klein and Myers,1999), interpretive research is unique in its approach to research design, concept formation, data analysis, and standards of assessment (Bevir and Kedar 2008, Yanow and Schwartz-Shea, 2006).

The most important steps and principles of interpretive research was developed by Klein and Meyers(1999).These seven principles spelled out was in a light to help others researcher especially those of the information system(ibid)

These principles are:

The fundamental principle of the hermeneutic circle is based on the fact that all human understanding is achieved by iterating between considering the interdependent meaning of parts and the whole that they form.

The principle of contextualization is intended to explain the significant evidence of the social and historical background of the research setting, so that the readers can see how the current situation under study surfaces.

The principle of interaction between the researchers and the subjects talks on how the research data were socially constructed through the interaction between the researchers and participants.

The principle of abstraction and generalization is relating the idiographic details revealed by the data interpretation through the application of principles one and two to theoretical, general concepts that describe the nature of human understanding and social action.

The principle of dialogical reasoning greatly needs sensitivity to possible contradictions between the theoretical preconceptions guiding the research design and actual findings

The principle of multiple interpretations was developed to see main differences in interpretations among the participants as are typically expressed in multiple narratives or stories of the same sequence of events under finding.

The principle of suspicion is based on the fact that there are possible biases and systematic distortions in the narratives collected from the participants.

3.3.1 Data Collection

Qualitative research is an umbrella term under which a variety of research methods that use languaged data are clustered (Polkinghorne, 2005). This is seen in the fact that other research method like interpretative all end up in the qualitative form.

This research type may use different approaches in collecting data, such as the grounded theory practice, narratology, storytelling, classical ethnography, or shadowing (Norman and Yvonna, 2000). Qualitative methods are also loosely present in other methodological approaches, such as action research or actor-network theory. Forms of the data collected can include interviews and group discussions, observation and reflection field notes, various texts, pictures, and other materials

People's words and actions represent the data of qualitative research and this requires methods that allow the researcher to capture language and behavior from his participants. The key ways of capturing these are:

Interviews are one of the best methods of carrying out research study. The researcher tries to understand something from the subject point of view ,and uncover the meaning of their experiences .This method allows people to convey to others a situation from the participants own perspective and in their own words (Steinar Kvole,1996).

Interviews generally could be of various forms;

Structured usually with a structured questionnaire

Semi structured Open ended questions

Depth One or two issues covered in great detail Questions are based on what the interviewee says.

Observation in qualitative research is one of the most common methods for qualitative data collection; participant observation is also one of the most demanding. It requires that the

researcher become a participant in the culture or context being observed. The literature on participant observation discusses how to enter the context, the role of the researcher as a participant, the collection and storage of field notes, and the analysis of field data. Participant observation often requires months or years of intensive work because the researcher needs to become accepted as a natural part of the culture in order to assure that the observations are of the natural phenomenon

The collection of relevant documents when carrying out a qualitative research study is best when studying a culture, social setting or phenomenon collecting and analyzing the texts and artifacts produced and when used by members of the research team can foster understanding. There are many different types of documents researchers may be interested in collecting, like files, statistical records, meeting minutes, and email.

Photographs, Video and radio tapes are used with the participant's permission. This method is best used when the researcher knows his fieldwork is not related to his occupation, where lots of the terms and information used within the interview will have to be interpreted and well defined by further studies (Atkinson, 1995)

3.3.2 Sample Size

They have sometimes been problems with sampling in qualitative research, base on the situation that numbers are unimportant in ensuring the adequacy of a sampling strategy. But simple sizes may be too small to bear claims of having achieved either informational redundancy or theoretical saturation, or too large to permit the deep, case-oriented analysis that is the *raison-d'être* of qualitative inquiry. Influential sufficient sample size in qualitative research is in due course a matter of decision and experience in evaluating the worth of the information collected against the uses for which it is build (Depaulo, 2000).

The sample size comes from well selected medical personnel from the genesis telecare centre as well as from the Yagoua regional hospital. A total of about fourteen participants are involve in the research, from which five are medical persons and the rest are client; as users of the telemedical application.

3.3.3 Participant observation

Participant observation is a type of research strategy. It is a widely used methodology in many disciplines, particularly, cultural anthropology, but also sociology, communication studies, and social psychology, as it has to do with the characteristic of members within a

social society. It has as aim to gain a close and intimate familiarity with a given group of individuals; such as medical practitioners, religious groups, other occupational workers, or sub cultural group, or a particular community and their practices through an intensive involvement with people in their natural environment, usually over an extended period of time. It is known that data obtained through participant observation will greatly serve as a check against participants' subjective reporting of what they believe and do (Mack et al, 2005)

The participant observation to other research types has lot of disadvantages, ranging from time-consuming, to the fact that it is very difficult when documenting the data; it is due to the fact that it is hard to write down everything that is important while you are in the act of participating and observing at the same time (ibid). Participant observation is known to be the best method use in researching crimes or closed groups. The advantage it holds to other forms of research findings is that the researcher may gain access to social groups who would otherwise not consent to being studied, as well as the fact that the avoidance of problems of observer effect, the conception that individuals' behaviour may change if they know they are being studied. However, there are problems of recording data (Cassell and Symon, 2004, Hirsch, 1985).

Having a good nursing background, I could easily understand all my participants, As I did not have to look for deeper meanings of words and thought of every participant I had to face.

3.3.4 Interviews

During all my research interviews, I tried to understand something from the subjects' point of view and to uncover the meaning of their experiences. This has help me to convey to others a situation from the participants own perspective and in their own words. My interviews were based on the conversations of everyday life; that is whatever they pass through to make telemedicine application sustainable. These had been conversations with structure and purpose that are defined and controlled by me. During the study period, a total of nineteen interviews were conducted, of which six (6) of them were face to face, five (5) of them were done by email question and answer session correspondence, finally I manage to get eight (8) of the informant on phone.

The table below expresses those that took part in the interview, the type of interview conducted; which were F-F meaning face to face, E M meaning e-mails and H meaning phone. The symbol x shows the type of interview conducted to specific participant.

PARTICIPANTS	INTERVIEW TYPE			NUMBER OF TIMES INTERVIEWED	DURATION OF INTERVIEW
	F-F	E M	H		
Physician	x	x		2	45minutes
Nurse	x			5	30minutes each
Client	x		x	3	45 minutes and 20 minutes
Informatician	x	x	x	4	30 minutes each
Administrator of hospital	x			1	20 minutes
Administrator of genesis telecare	x	x	x	4	45 minutes each

Table 1:Data collection.

3.3.5 Literature Study

Knowing well my topic of study, I came to understand the difficulties African face with the implementation of telemedicine applications from journals; which are very few that talk on telemedicine in Africa. One of them is from Einterz, who in 2001 carried out a study in Kolofata, at the extreme North of Cameroon on the topic: Telemedicine in Africa: potential, problems, priorities. Approximately sixty percent (60%) of my literature came from the googlescholar search and class lecture at the University of Tromsø. The other part of the literature which has to do with community participation as a vital tool for health improvement and the quality of health came from my nursing knowledge. It has been very challenging for me because telemedicine is a very new discipline for Africans and as of now, little or no literature does exist on the subject.

3.4 Reflection on the Method.

A number of innovations in the medical field, designed to address the problem perceived to be the cause of high mortality rate in Africa has been identified to have its solution with the establishment of telemedicine.

As such, its innovation has become widely established, it has become increasingly necessary to examine their relevance and effectiveness in a systematic way and to see the beneficial impact it has on African health institution.

A second motivation for the study, stemmed from the realisation that much of the international literature on telemedical application and research methodology is still western oriented. How to transfer that knowledge to an African viewpoint depends entirely on Africans them self, who knows better the communities from which they originate.

It is hoped that this and other studies would complement these bodies of literature by adding increased sensitivity to the dilemma of the African health policy and practice from the perspective of a developing country. Putting in mind Africa is a continent of the less privilege, low income society, and politically not very stable society. With lots of encouragement from my supervisor, my formal colleagues, relatives and friends, I decided to get in to the challenge while hoping for a better out come.

I was also encouraged to undertake this study as a result of my personal interest in seeking strategies to proving better health to the rural areas.

3.4.1 Getting Access

Many medical researchers are familiar with the challenges inherent in conducting qualitative field research, especially when it comes to African health institutions of public origin. More often they are very challenging; the process involves having staff conducting face-to-face interviews in public hospitals, recording the responses with pen and paper, and then inputting the data after the fact. As of my case, it took me much more time to get access to both the Yagoua regional hospital and the Genesis telecare centre, than the litter time I had to send with both institutions. I had to identify myself as a nurse from Cameroon facilitated my access, but base on the fact that I study out of the country, I had to accept and sign forms base on the conditions they sided for me. One of them was confidentiality, which is very normal for any health worker. My point of interest is the fact that I finally got access to both institutions, from which I got lots of first hand information.

3.4.2 Working as an outsider

Generally speaking, being an outsider in the social interview is much more complex and multi-faceted than usually recognised. There are claims that, to a large extent, interviewing persons of totally different cultural community or working community, as an outsider researcher are often seen as pest and obstacles to the social atmospheric condition that had

existed, and there is increase awareness amongst both researcher and participant of the social divisions that exist between them. In doing so they will first highlight the way in which researchers may move-up socio-economically when interviewing, but will also stress that whilst such movement is possible through strategies of constructing rapport a certain power imbalance is to be expected.

Working as an outsider have relatively been very easy for me, as I could understand all the terminologies my participant were using (Atkinson, 1995). From the start, all the participant were somehow sceptical; about my personality, my mission and the fact that I was conducting a study for a university out of Cameroon (ibid). I could read from their faces that many of the participants would doubt the feasibility of outsider carrying out any worthwhile, credible or objective enquiry into a situation in which they are centrally involved (Robson, 2002).

After a period of interaction, I was finally gradually accepted and was given access to all types of information and data that could be of great help to my topic of finding.

3.4.3 Ethical Considerations

Generally, ethics implies doing something right as it is expected to be.

“Ethics is a body of principles or standards of human conduct that govern the behaviour of individuals and groups. Ethics arise not simply from [human’s] creation but from human nature itself making it a natural body of laws from which [human’s] laws follow” (Ethics and Culture Management Services for Organizations, 2004).

Within any research, there is a number of key expressions that illustrate the system of ethical protections that the current social and medical research establishment have created to try to protect better the rights of their research participants.

One of them is the voluntary participation, which requires that people should not be coerced into participating in research.

Closely related to the notion of voluntary participation is the requirement of informed consent. Essentially, this means that prospective research participants must be fully informed about the procedures and risks involved in research and must give their consent to participate freely in the study.

Ethical standards also require that researchers do not put participants in a situation where they might be at risk of harm as a result of their participation. Harm can be defined as both physical and psychological. There are two standards that are applied in order to help protect the privacy of research participants.

Almost all research guarantees the participants' confidentiality; they are assured that identifying information will not be made available to anyone who is not directly involved in the study. The stricter standard is the principle of anonymity, which essentially means that the participant will remain anonymous throughout the study, even to the researchers themselves.

Clearly, the anonymity standard is a stronger guarantee of privacy, but it is sometimes difficult to accomplish, especially in situations where participants have to be measured at multiple time points; like in the case of a follow up.

Increasingly, researchers have had to deal with the ethical issue of a person's right to service. This principle holds for every work of life and is much stronger within the medical field as it has to do with confidentiality of client information.

3.4.4 Limitations of the study.

It is important to stress the exploratory nature of this study and its limitations. There are several limitations that need to be acknowledged and addressed regarding the present study. The first limitation concerns the cross-disciplinary nature of this research project. The project had much to do with a combination of health and information system knowledge. It made it difficult at the point that one has to respect laws from both angles. The second limitations have to do with the extent to which the findings can be generalized beyond the case studied. The number of case is too limited for broad generalizations. Especially as it has to deal with a very large community of low social income; that is Africa. Coming from a country with so much telemedical applications in to a country of almost no functional telemedical application, one may be tempted of becoming a teacher from which much is needed; than maintaining your status as a researcher. Getting relevant literature for this study has been the most difficult aspect, as many researchers have still not exploited this part of the world in search for the difficulties face by the implementation of telemedicine in Africa. Further empirical evaluations, however, are needed to replicate the findings in different contexts and surroundings.

Cameroon being a bilingual country; that is speaking French and English, I was rather reckless in thinking I would be able to conduct interviews in French. My knowledge of the French language turned out to be too basic to be able to conduct interviews. Fortunately, most of my research participants were able to speak English, but nevertheless I was constrained in my interview possibilities.

The study was challenging, but very interesting.

CHAPTER 4

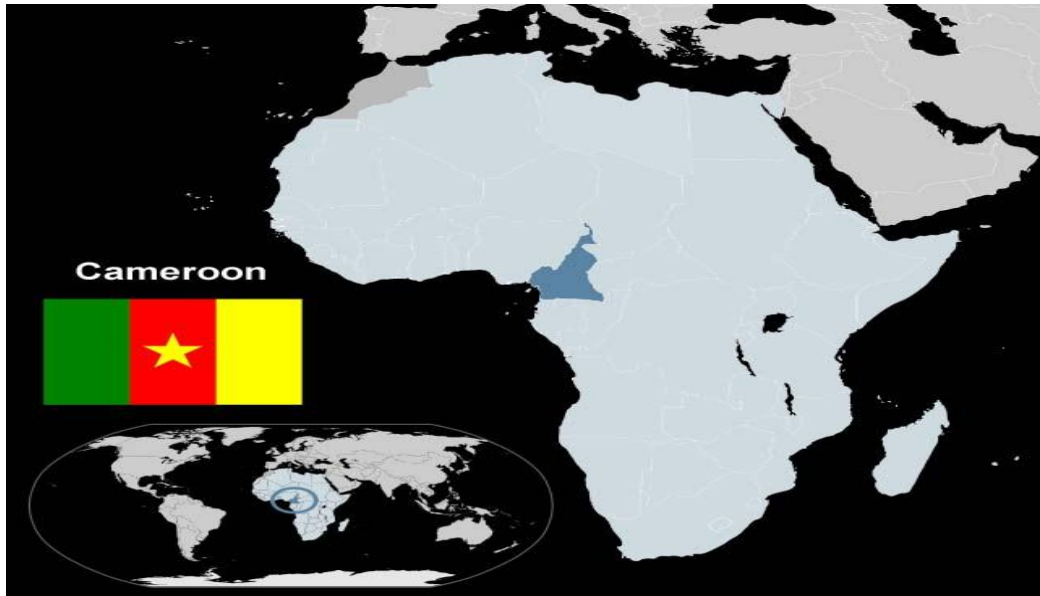
CASE STUDY

{This chapter contains information on the case study and therefore deals with the context of the study and research setting.

It begins with a brief introduction of the country-Cameroon; its population, geographical location, economic activities, the organisation of health institutions, and the health service provision. This chapter has information on the research settings; the two locations where the research took place, namely the Genesis telecare centre and the Yagoua regional hospital. At the end of this chapter is the outcome from the study, in which we figure out the challenges faced by telemedicine and their user within Africa. }

4.1-A Brief Description of the Republic of Cameroon

Cameroon is officially well known as the Republic of Cameroon, it is a country located in west Central Africa.



Picture 4: Position of Cameroon on the world map

It is bordered by Nigeria to the west; Chad to the northeast; the Central African Republic to the east; and Equatorial Guinea, Gabon, and the Republic of Congo to the south. Cameroon's coastline lies on the Bight of Bonny, part of the Gulf of Guinea and the Atlantic Ocean. The country is called *Africa in miniature* because it is one of the countries with about 250 ethnic groups, with French and English as official languages and over 270 African languages and dialects, including pidgin, Fulfulde and Ewondo. The country is also well known of its geological and cultural diversity. The Republic of Cameroon is one of the lone countries in the world with two colonial masters; France on January 1st 1960 and Britain on October 1st 1961.

Cameroon is now officially shared between Britain and France. France now occupies the largest area and Britain keeps the area bordering their colony in Nigeria. British Cameroon and Nigeria were first administered as one colony, but most British attention and efforts was based on to the development of Nigeria. British Cameroon has so far been neglected and

German settlers returns to Victoria (Today called Limbe) making private plantations. The French colony continues to grow with infrastructure.



Picture 5: Map of Cameroon showing important towns

statistic	values
Geographical Area	475,000 sq km(184.00 sq mile)
Political capital	Yaoundé
Economic capital	Douala
Total Population	20,424,645(2011 estimate)
Annual population growth rate	2.12%(2011 estimate)
GDP	\$22.522 billion(2010 current price)
GDP per capita	\$1,102.
Work force	Agriculture-70%,Industry and Commence-13%

Table 2: General statistic for Cameroon

(World factbook, 2011)

According to WHO health report for Cameroon, the table below shows some very important figures.

Cameroon Health statistic	Values
Total expenditure on health as % of GDP	5.6
Total expenditure on health per capital(Intl \$,2009)	122
Life expectancy at birth m/f (year)	51/15
Probability of dying under five (per 1000 live birth)	154
Probability of dying between 15 and 60 years m/f (per 1000 population)	420/409

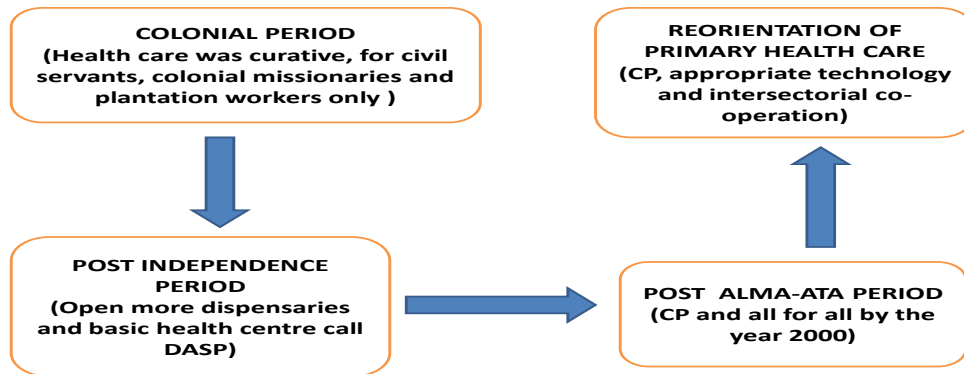
(WHO report, 2011)

Table 3: Health statistics for Cameroon

4.2 History of the Cameroon health sector:

The health sector has moved through very important stages as it is presented today. It moved from the colonial period ;where health care was basically curative oriented, to the post independent period(experimental period);where the health problems of the nation was gradually being given to the hands of Cameroonians, and the post alma-ata period. This means that organisation of the Cameroon health sector started long before the reorientation of primary health care (PHC), which began in the republic of Cameroon in 1989, and was presented as a reply to the economic and health environments prevailing at that time. A short discussion of the original PHC policy introduced following the Alma-Ata declaration identified a lack of effective communication between the community and the health services as a major problem. The basic elements of the reorientation were then presented and the obstacles and constraints encountered since beginning the reorganization process in 1989 were described. These have been identified as: an inadequate legal framework; incompatibilities between the political structure and the new health structure; incompatibilities between the goals of the new health policy and the organizational chart of the Ministry of public Health; the lack of trained personnel in health management; a highly centralized system of management with poor coordination of human resource management; the slowness of the extension of PHC coverage; the inability of the system to ensure that medicines are available and easily accessible; an inadequate health information system; poor promotion of the new PHC policy; and poor coordination of research activities.

The structure and history of the Cameroonian health system would give a great understanding and the ways by which the health sector is run. All health issues are run by the ministry of public health and headed administratively by the minister of public health.



Picture 6: Diagrammatic representation of the history of the Cameroon health sector

4.3 Organisation of the Cameroon health sector.

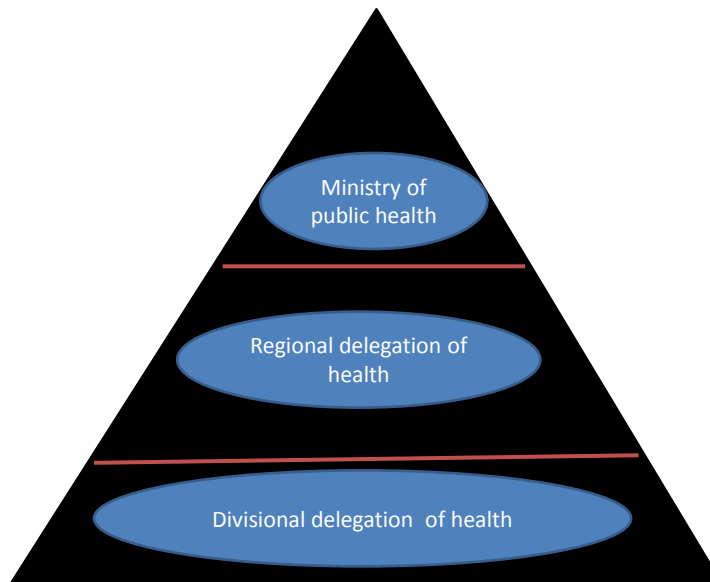
The Minister for the Public health has as role the development, the implementation and continues evaluation of the policy of the public health. For this reason, it ensures the organization, the management and the development of the public hospital formations as well as the inspection of the private medical formations. The ministry of public health is responsible for the preventive medicine.

It controls the exercise of the pharmacy and dental surgeon, medical professions and ensures the supervision of the corresponding professional orders and the organizations of public health. It contributes to the training of the doctors, pharmacists and personnel ancillary medical like with their permanent recycling. It ensures the supervision of the administrative publicly-owned establishments and organizations of the sector of the public health. It is assisted by a Secretary of State at the presidency. The health structural levels are:-

- The central Level; this is the stage where major decisions are taken and policies are made,
- The Intermediate Level; at this stage, most policies made by the central level are transformed in to programmes,

- The Peripheral Level; this is the most active level in the nation's health structure, and is the point where primary health care packages are implemented.

These health structures could be represented as follows:



Picture 7: Showing the organisation of the Cameroon health structure.

The diagram shows the main administrative division within the health sector. In addition, Cameroon has one university teaching hospital; located in the political capital, 10 regional hospitals; one per region, in the entire ten (10) region's head quarter (there are exceptions). One example is the region of Maroua whose regional hospital is situated in Yagoua instead of Maroua, as well as the south west region whose regional hospital is in Limbe instead of Buea. Looking critically at the health structure, the divisional delegation of health is the most active zone as it controls other district hospitals under its jurisdiction; and being the first referral hospital and the hospital which marks the level in which primary health care is most practiced (Owona et al, 1993).

We should hereby note that as of 2009, some district hospitals in Cameroon were uprated to the status of a Regional hospital annex. One of such hospital is the Buea regional hospital annex.

4.4 The Yagoua Regional Hospital

The Yagoua regional hospital falls in the intermediate level of the Cameroonian health system and is situated in the Far North Region (Far North Province until 2008), also known as the Extreme North Region (gotten from the France appellation of Province de l'Extrême-Nord). Yagoua is the capital of the department of Mayo-Danay. In 2008, the President of the Republic of Cameroon, President Paul Biya signed decrees abolishing "Provinces" and replacing them with "Regions". Hence, all of the country's ten provinces were and are now known as Regions. The far north is the northern most constituent regions of Republic of Cameroon. It borders the North Region to the south, Chad to the east, and the Federal republic of Nigeria to the west. The capital is called Maroua.



Picture 8: Map of the Far North region

The province is one of Cameroon's most culturally diverse. Over 50 different ethnic groups populate the area, including the Fulani, Kapsiki, Arabs and Shuwa. Most educated inhabitants speak French, and the Fulani language, Fulfulde, is a common language.

In Cameroon, all ten regions have a regional hospital as second line referral hospital and Yagoua being a metropolitan city was provided with one of the best hospital by the second and present president of the country Paul Biya.

The Yagoua regional Hospital (well known as l' hospital general) is an approximately 120 to 125 bed hospital in the Far North region of Cameroon and administratively, it is the principal referral hospital for the region.



Picture 9: Entrance to the Yagoua regional hospital

The hospital was built in 1995 and was accorded the status of a regional Hospital in the same year. The hospital's charter was to:

Offer the best quality of care to patients, with the available recourses put in place by the administration of the hospital as well as the management committee.

One other very important aspect of the hospital is that it offers pedagogic support to training institutions of health personnel in the country. This is done by accepting students from different training medical institutions to practice within the hospital.

Carry out operational research within the context of improving patient welfare.

Co-operate and collaborate with other health institutions, mainly on referral and counter-referral procedures.



Picture 10: Yagoua hospital entrance

In the early 2000, the hospital was suffering from major structural and organizational problems. By 2004, the attendance rate had dropped by 50%. Moreover, research revealed that there was a lack of knowledge among hospital staff, poor climatic conditions; with very high temperatures. Beginning at 10° N, the climate is tropical and Sahelian, and rainfall is a relatively small 400 to 900 mm per year, with rains falling a bit more frequently in the Mandara region (Gwanfogbe,et al 1983).Another problem is that of very low economic situation, where Sustenance farming serves as the primary occupation for most Far North residents(Neba, and Aaron,1999) .The Bororo Fulani and Shuwa Arabs both live principally as cattle raisers. From history, there have been a very low rate of education and very great gap of under development as compared to other regions of Cameroon.



Picture 11: Yagoua regional hospital corridor

However, after presidential decree that was mint to help develop those cities that lacked basic infrastructures, many young Cameroonians of different field of life were appointed to handle and head administrative positions within the far north and Yagoua was provided a face lift in health and education .This was when the genesis telecare centre came in due to lack of medical specialist within the region, so that the population of Yagoua could enjoy the same health facilities like those of very develop cities like Yaoundé and Douala, by installing their net work within the Yagoua regional hospital.

The hospital has received support from Cameroonians both within the country and abroad . Moreover, the Programme Germano-Camerounais de Santé has initiated training workshops in Cameroon, at least one of which (a workshop on sterilization) has been attended by technical staff from Yagoua regional Hospital and other hospitals within Cameroon.

Like hospitals in many parts of the Third World, the Yagoua Regional Hospital still suffers from several problems including lack of certain hospital supplies and equipment such as ECG machines and incubators. The hospital administration is working hard to raise money in order to solve these problems, which negatively affect the population of the Far North region.



Picture 12: Yagoua hospital ward

As an effort to help develop the hospital, in mid 2008, a partnership agreement was concluded between the Regional Hospital Yagoua and the Faculty of Medicine of the University of Rostock in Germany. This partnership was financed by the "Gesellschaft für technische Zusammenarbeit (GTZ)", the Society for Technical Cooperation, which belongs to

the German Ministry of Economic Cooperation. It was part of the ESTHER network (meaning Ensemble pour une Solidarité Thérapeutique Hospitalier En Réseau) of the European Union.

The goal of this partnership was aimed at improving care for patients with HIV and AIDS. Through this ongoing ESTHER cooperation, the laboratory had been upgraded (introduction of PCR technology), and physicians as well as laboratory technicians had been increased and received training in Rostock in Germany. In addition, joint Continuing Medical Education workshops had been conducted in and out of Yagoua (edenne wspaper).

The hospital offers units for Radiology, surgery, gynaecology and obstetrics, dental surgery, ophthalmology, paediatrics, maternity and general medicine.

Before 2000, practically no research had been carried out at Yagoua Regional Hospital. In the last few years, however, several research studies have been based at the hospital. A few examples are:

Members of the Health Sciences Department at the some Cameroonian Universities, like the University of Yaoundé, Douala and few staff of the hospital, conducted research on the effects of nursing training on the control of nosocomial infections. A paper based on this research was presented at the International Conference on Overcoming Health Disparities in 2004.

An international team of researchers in Cameroon and the United States of America did a study on adherence to antiretroviral therapy (ART). The research was carried out at the hospital's ART clinic.

In August and September 2008, Gavin Steingo, a researcher from the University of Pennsylvania, carried out research on the acquisition and use of medical instruments at Yagoua and other regional Hospitals within the country, on a grant from Merck Pharmaceuticals.

Currently, research on the prevalence of opportunistic infections in HIV / AIDS patients is carried out in the context of the ESTHER partnership with the University of Rostock / Germany and some few regional hospitals of Cameroon, to which the Yagoua regional hospital is taking part.

4.5 Medical doctors in Cameroon

A general practitioner (GP) or a physician who is a health care provider who practices the profession of medicine, which is concerned with promoting, maintaining or restoring human health through the study, diagnosis, and treatment of disease, injury and other physical and mental impairments. Cameroon like any other nation has the responsibility of providing better health to its growing population, and has to train its own medical doctors and other health workers.

Unfortunately, Cameroon is presently facing serious problems in the medical field due to an acute shortage of qualified personnel, especially medical doctors; their training facilities and the infrastructures used in training. One of the main obstacles to the training of more doctors in Cameroon is limited financial resources. In 2003, for example, Cameroon's total health expenditure was 4.2 percent of its GDP. Many people believe that an increased intake into the medical school will not be matched by a corresponding expansion in infrastructure and other needs. The government must find a more concrete solution to the health care problem than simply expanding admissions into the medical school. They should be able by all available means to provide to its population all the facilities for better health for a greater population. This in accordance with Flexner who says that:

“If the sick are to reap the full benefit of recent progress in medicine, a more uniformly arduous and expensive medical education is demanded” (Flexner, 1972)

The widespread implementation of these recommendations has led to the creation of a strikingly rigorous, demanding, expensive, and standardized system of medical training in the all nations of the world today.

The privilege of being a medical doctor is seen in the remarkable depth of trust that exists between patients and physicians. The diversity in medical specialties offers a formidable array of choices when considering a medical career.

Since its creation in 1969, the faculty at the University of Yaoundé one (I) medical school has overcome many obstacles to meet the country's health challenges. However, the present admission rate of 85 students per year, up from 48, 50 and 70 students in previous years, is considered too small to meet Cameroon's health needs. Like all other professional careers, at the University of Yaoundé I, the Faculty of Biomedical Sciences is the only medical school that had existed.

Fortunately, in recent years, the University of Buea had declared its intension to begin training medical doctors, it was only till about 2005-2006 academic years when medical students were admitted in to the university of Buea and some other private medical schools like Université des Montagnes (university of the mountains),base in Bangangté the western region of the country . Cameroon accredited institution in particular, requires frank determination, unwavering resilience, a unique desire for excellence and above all, a well thought-out strategy for success. Without these, one's chances of getting accepted into a program are extremely slim. The gate into medicine is still wide open. All you have to do is commit to it.

The Yagoua regional hospital is one that greatly makes use of all its well trained from any of the above medical training schools and offers units for Radiology; with a good number of trained radiologist, headed by a doctor, two surgeon that do all the surgery, gynaecology and obstetrics; headed by the doctor, the dental department which is headed by a nurse, the ophthalmology has the smallest number of worker and is headed by a doctor, the paediatrics unit has the largest number of works but is headed by a male nurse, maternity and the hospital has a very few number of general medical practitioners, for the most part of which studied in other African counties.

The Yagoua regional hospital has a good number of medical doctor; specialist and general practitioner, but this exit only on paper, as about 70% of the hospitals are not resistant in the Yagoua. This makes the hospital very short in staff. Today the hospital has just six practicing medical doctor; where by four of them are general practitioners and two specialist (one dental surgeon and one public health doctor, who functions as well as the director of the hospital). Furthermore, the situation has led to corrupt practices in the hospital. Health workers are transferred on paper but are always absent from duty. Most of the staff does not like staying within Yagoua because of the climatic condition, the low economic situation of the town. The World Health Organization recommends a doctor to inhabitant ratio of 1-to-10,000. Cameroon's ratio is 1-to-40,000, with most of the doctors concentrated in urban areas like Yaoundé; the political capital of the country, Douala; the economic capital of the Cameroon. (Ohmy news, 09-2006)

In an effort to meet the WHO ratio, the government has reviewed its admissions policy for students in the country's lone medical school; the Medical and Biomedical Sciences of the University of Yaoundé I, which is owned by the state (www.uninet.cm).

One main reason for the increases in the number of candidates is because the government wanted to give opportunities to students of the Extreme North to be admitted in to the school, so that medical doctors originating from Yagoua and its environ should after help to develop the health sector in their region.

It is because of the lack of health workers within this region that the genesis telecare centre has decided to bring medical services closer to the less privilege.



Picture 13: Inauguration of telemedicine at the Yagoua regional hospital

The question which has often been asked by the users is to know why are they promoting telemedicine and is there real need for that?

Yes there is a need and there are lots of patients out there who cannot get clinical consultation and decision making due to unavailability of doctors, lack of communication infrastructure or not-fit for travel. The following are the few major reasons I advocate telemedicine use at the Yagoua regional hospital.

Scarcity of General Practitioners makes many of the health care facilities within the Far North areas; for which the Yagoua regional hospital is one. The hospital do not have many qualified staff, a physician, and they are mainly depending on a nurse practitioner or paramedical staff who cannot take a life changing decision when it comes to critical findings. Furthermore, a great proportion of the population still have great believe on African traditional treatment (Threethambal et al, 2002).Many of them have mystical believe in the

origin of some disease and infections. It is generally known by the villagers of Kolofata in the Far North of Cameroon for example, that malaria gets in to the body when one stays long in cold rains, that pneumonia is caused by wind, Infantile diarrhea is originated from bad breast milk, that epilepsy comes from the devil(Eintiz,2001).



PIC 14: Traditional healer in Yagoua

Shortage of Medical Specialists is an important issue, sometimes when a client needs to be referred to a specialist to get an expert view. Even in the metropolitan areas, you may not have enough available specialists who could cater the needs of all patients in their area. The case is more severe when you go away from urban areas, where you do not have access to specialists at all. All such conditions warrant implementation of telemedicine strategies and network to support such patients who need expert opinion within the Yagoua municipality.

No Access to Current Information is one of the greatest needs for telemedicine in Yagoua. Sometimes a doctor or specialist himself needs to discuss his findings with someone who has more fresh and recent knowledge or in case of rare conditions. In most of the Middle East and other African countries, physicians still do not have access to fresh knowledge due to lack of up-to-date medical libraries, or Continued Medical Education (CME) system. This makes it easier for a doctor to get an expert opinion from his peers and share the case of his patient without having the need to travel.

Limited Transportation out of Maroua in general has been the biggest problem to many

inhabitant of the city. It is well known that infrastructure in developing countries is still not serving the whole community. It could cost lot of hassle, travelling, accommodation and other expenses for a patient to come to metropolitan city to get a client checked up or get a consultation. Sometimes the infrastructure and transportation is so bad that many patients in serious cases cannot make it to a nearby city (Einterz, 2001,).In an attempt to explain the difficulties faced by the inhabitants of the Extreme North of Cameroon, especially the Kolofata district hospital in Mora where she was the only doctor for close to 75000 people. She spelled out the woefully underdeveloped systems of transportation and communication. Such situation can be solved easily utilizing technology advances in medicine and information communication and by implementing telemedicine services which genesis telemedical Providers currently offers to all the other five zones as well as at the Yagoua regional hospital.

4.6 The Telemedicine Centre in Cameroon

Subjects related to the definition and appraisal of telemedicine are articulated as a basis for conducting theoretically based, empirically sound, and policy-relevant assessment. Many academics, have given diverse definitions and meaning to telemedicine. One most important definition is that produced by Rashid who sees telemedicine as an integrated system of healthcare delivery that employs telecommunications and computer technology as an alternative for face-to-face contact between health provider and client or patient (Rashid, 1995).

Telemedicine has the potential for ameliorating seemingly stubborn problems in healthcare such as limited access to care among segments or the underprivileged members in the population; especially the geographically disadvantaged areas with very poor transportation facilities as is the case of approximately 65% of the Cameroonian roads. There is a clearly uneven quality of care between rural and urban areas in the Cameroonian health sector, and cost inflation. It is true that merit has yet to be determined by systematic empirical study, especially within less developed nations like Cameroon and other low income countries (Bashshur, 2009).Rashid in his paper does not only shows the importance of telemedicine, but expresses the accessibility of health by all, and to all with programmes that are acceptable

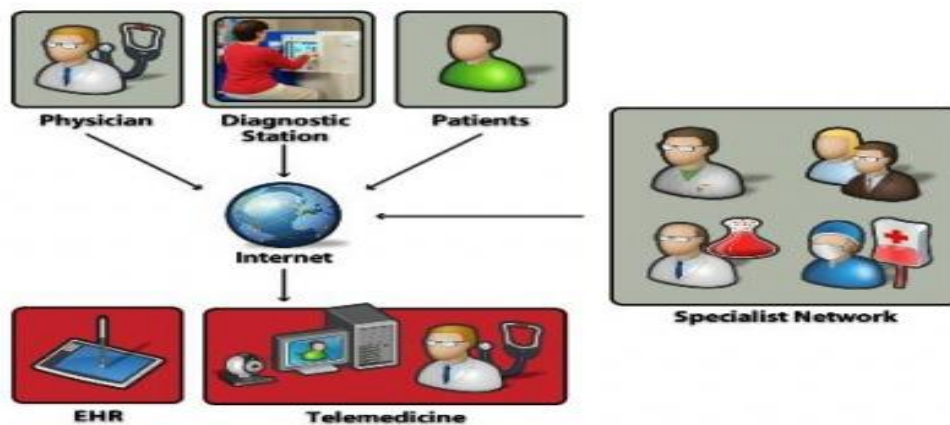
and user friendly to any medical health worker as well as clients as users of any of the application.

We should note that most, if not all the medical and paramedical practitioners in Cameroon and other low income countries base their mind on the economic importance of their job, giving client little or no human interest (Einterz, 2001).She out lined the pervasive corruption that exist in the states and within the health sector, which has eaten up the minds of health workers across Africa.

The first ever telemedicine centre in Cameroon went operational on the month of April 2009. Under the name Genesis Futuristic Telecare center, it was inaugurated in Yaounde,the political capital of Cameroon by the Secretary General in the Ministry of Public Health, Professor Fru Angwafor III (africanews). Administratively,the center is headed by a board consisting of Jacques Bonjawo - Chairman of the Board and founder, Armand Claude Abanda - President Institut Africain d'Informatique(Institute for African Informatician) , Prof. Wali Muna, – Cardiologist, Prof. Samuel Kingue – Cardiologist, Dr. Pierre-Marie Noundou - Surgeon and Amadou Vamoulke ;the present managing Director of CRTV(Cameroon Radio and Television) .The center has as to its account a good number of active personnels in its registers, including three informaticianer .Many specialist medical doctors are encouraged to make use of the center for distance consultations.The most common client consulted by the center are cardiovasculer, gyeonacological and obstretical cases.

Today,the center counts six regions were it provides it seVICES;these include the town of Abong-Mbang in the East region, the of Yagoua in the Far North region,the of Endom, the town of Nkateng,the town of Nanga Eboko and the genesis health care ,all situated in the Centre region of the country;Yaounde.

The genesis telecare centre has it office at ecole de police, Yaoundé, the political capital of the Republic of Cameroon, and it's connected to about six hospitals in rural areas. The challenges of health care delivery in rural areas of Cameroon are several and familiar: poor infrastructure, insufficient supply of skilled doctors, and dispersed poor populations, all of which make affordable care hard to achieve. Mr Janques Bonjawo, founder of the genesis centre, made as top priority to supply the same level of health in geographically difficult accessible parts of the country (interview of Mr Janques Bonjawo).



Picture 15: Network use at the genesis telecare centre.

The most common method of consultation used is the video conferencing.

The genesis telecare centre uses digital information and communication knowledge to offer and support excellence healthcare delivery and educational program to all its users, which are on one point (patient end) from another point (doctor's end), When distance disconnects, without limiting the geographical boundaries, most especially with the poor transportation in Cameroon.

With the advancement of information and communication technology, telemedicine has appeared as technology based services for diverse healthcare services ,from primary health providers; including medics and paramedics to specialist, digital explorations and intricate version ;like in the case of radiology, and some pathology, medical education and research, disease surveillance and epidemiology control etc, in order to provide healthcare to all, especially in rural areas where there are insufficient and inefficient medical personals, working mainly on probabilities and chances. This is one factor for high death in this continent.

Globally, people living in countryside and isolated area, which constitutes majority of population, struggle to access basic healthcare facility and timely treatment due to scarcity of medical care and professionals, as medical professional are concentrated in the urban and metro population.

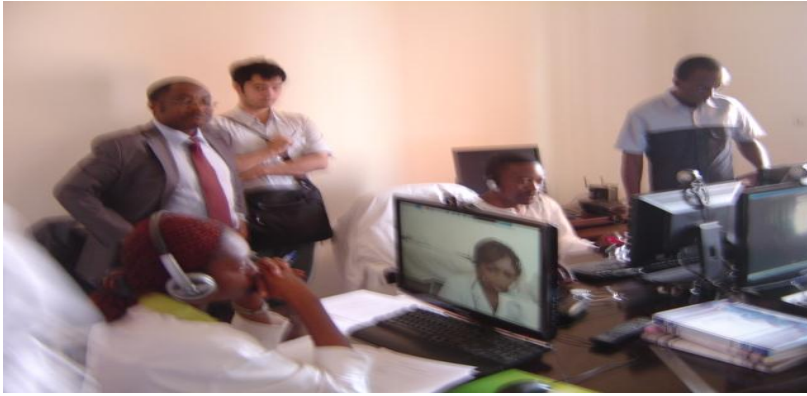
Telemedicine practice and all its technology has the potential to bridge the gap of inequality of quality healthcare delivery between urban and rural areas, and also augment the medical knowledge base of professional isolation of doctors practicing in rural area.

In any developing country, majority of population still lives in the village, where healthcare facility is poor. Most of medical specialists are unwilling to work in rural area due to inadequate amenities. In addition to this, numbers of medical professional are also very less as compared to standard norms of World Health Organization (World Health Organization: Classifying health workers. Geneva, 2010). According to recent report, India and some other countries of the world are short of approximately 600,000 medical doctors, a million nurses and 200,000 dental surgeons.

The case of African Union is still worse. Telemedicine is most pertinent and technology based solution to the country to accept as it faces scarcity of both healthcare facility and medical specialist.

The adoption of Telemedicine Technology may change the face of healthcare in African Union by improving access to experts, specialized medical information, medical diagnostics devices, consultations and faster pathological findings. Telemedicine can be used effectively by developing telemedicine health network to bridge healthcare divide, wherein, quality specialty services can be provided from medical professional distributed geographically from any part of the world.

The Genesis Telecare provides dedicated healthcare services with its own telemedicine platform. The group consists of experts of telemedicine technology, communication technology, bio medical engineering, health information system, hospital information system, a team of health informaticians (society) and medical professionals. The group have its own products starting from telemedicine system to that own by the hospitals and clients, in order to provide integrated healthcare and health care management. Their system meets international standard of healthcare delivery, imaging and communication standards.



Picture 16: Telemedicine conference

The telemedicine group's objective is to provide healthcare delivery to the population which are not able to access proper treatment in time. Their technology enhances the healthcare coverage without the physical movement of the patient and healthcare providers using the advanced information and communication technology in healthcare.

One of the most critical policy concerns with regard to the development of telemedicine is whether or not the dependence on telecommunications and computer technology for the delivery of health care will increase or decrease its over cost. That is well proven by the genesis telemedicine group, that there is a great reduction in health cost, where clients are allowed to pay for each consultation to a specialist the sum of 2000 frs CFA; approximately 23.4067Nok(exchange rate on the 15/May/2012 at 1Nok:86.1096XAF), instead of the 10000frsCFA(approximately 117.074NOK) per specialist consultation per visit.

The emphasis on cost is necessary because the instruction of a new technology is usually accompanied by questions about its potential inflationary effect. Historically; the use of technology has contributed to the total increase in the cost of care (Rashid I Bashshur, 1995), when is done to improve the infrastructures that have been exiting and to improve medical findings, faster diagnosis as well as fast treatment, with little side effect and complications. Will the genesis telemedical centre be able to overcome that hypothesis?

During my study period, the genesis telecare health centre had carries out several telemedicine services; for curative, diagnosis, preventive and educational purposes.

One that so much impressed me was the educational video conferencing. It was a bright Thursday morning, we happen to have been present when the team of informatician were

getting busy and ready for another awaited fortnight medical education meeting. We were informed of the meeting, but little did we know what was awaiting us, and had no expectations of what was to be done? At what time was it done? And how as it done?

From all indication, it showed that preparations for this particular event had started long before this day. We noted the presence of a larger number of personnel, and the mounting of a projector on a locally made screen.

After approximately one long hour, then came the test time, when all electricians, informatician, and programmes had to confirm the functionality of each of their components. Everything seems to sound well; good images, excellent internet connection and good speakers.

The guest speaker was Dr Fonkong Edmond, the chief medical officer of the Yagoua regional hospital. He is a GP with a specialty in public health (PH).

He has a good mastery of medical statistic foe all the health centres and district hospitals under his jurisdiction.

On this day, he was expected to give a lecture to some students of the Georges Pompidou hospital in France; while in Cameroon, via video conference. The day's topic of discussion was diabetes in the royal northern part of Cameroon.

After about six hours of preparation, the first video appeared on the screen; it was the voice and image of professor Kleinbrell Line, an endocrinologist; with great knowledge on diabetes, working with Georges Pompidou hospital, well known on the nick name "La femme digital" (The digital lady) . After presenting her class, small friends talks went on; a good indication that other lectures had taken place in the past.



Picture 17: Telemedicine office in Yaoundé.

Just few minutes after, came in the images and voice of Dr Fokong Edmond, and his colleagues from his office.

Finally, the screen had three set of images; one from the Georges Pompidou hospital, one from the Yagoua regional hospital and the last from the genesis telecare centre.



Picture 18 (I)



Picture 18 (II)

(The three pictures on the screen are the images that appeared, A; written in red is the image of Prof Line and her students at the hospital. B; written in red is the image of Dr Fonkong and his colleagues at the Yagoua regional hospital. And C; written in red is the image of the technical team at the genesis telecare centre.)

The lecture was aimed to take one hour fourth five minutes with two (2) fifteen minutes

breaks. Every plan went on as schedule, until twenty four (24) minutes to the end of the lecture when the images and voice from Yagoua regional hospital suddenly disappeared.

To find out what has gone wrong, the director of the genesis centre; Mr Janque had to call by phone the chief medical officer. It came out to reveal that electricity supply has been interrupted. The Yagoua regional hospital is in total black-out (without electricity supply).

We have been waiting for over half an hour, when like a click, the images and sounds from the Yagoua regional hospital finally re-appeared and the lecture continued.

It all ended well, but as students and researcher, reflected over several important points. One of them was to know why a lecture that was mint to last for less than two hours was papered for more than 48 hours. Why was an electricity alternative like a generator not used?

CHAPTER 5

DISCUSSION

{This section of the report has to deal with what I and other telemedicine users think, the perception some African countries have, in an effort to making telemedicine application sustainable at all times; at the cheapest possible cost and for a greater majority of the African society. Furthermore, this section involves the challenges African counties face while strafing to make telemedicine successful in to their health sector.}

5.1 Telemedicine as a tool to provide health in Africa.

Telemedicine is suggested as a partial solution to numerous problems of healthcare rescue to financially disadvantaged or low income communities and countries; like is the case of the majority of African nations. Africa is faced with the triple burden of disease, tuberculosis, malaria and HIV/Aids, aggravated by poverty. Regardless of this, it is said that the population of Africa will more than double by 2050(U.N report, 2011). Unfortunately, the growing population is gradually moving towards an uneven distribution of basic facilities like healthcare and food (How to feed the world in 2050).

The implementation of telemedicine in Africa will go a long way to solve approximately a greater proportion of its health difficulties, but note should be well spelled out that the implementation itself is faced with lots of difficulties and challenges, ranging from scarcity of equipments to scarcity of personnel and to a greater aspects continues to experience several social, cultural and political challenges (Arnaud et al, 2008).

The main challenge addressed is the de-isolation of care professionals working in inaccessible areas of developing countries. The core activity of Telemedicine is the webcasting of interactive courses targeted to clients (users), other care professionals and information technologist. Continuous health education of healthcare professionals and access to specialized advice are keys to improve the quality, efficiency and accessibility of health system. In developing countries, these activities are usually limited to capitals, and delocalized professionals do not have access to such opportunities, or even to didactic material adapted to their needs (Saraladevi et al, 2009). This limits the interest of such professionals to remain active in the periphery, where they are most needed to implement effective strategies for prevention and first-line healthcare, and sometimes with very limited resources.

In an effort to satisfy some of the African health need, the Geneva University Hospitals had developed a telemedicine network in Africa for Africans, called Réseau en Afrique Francophone pour la Télémédecine (RAFT)(Resource in French Africa for Telemedicine). Its inauguration was done in Mali, latter other branches were open in Mauritania, Morocco, and Cameroon. Then after in 2004,other branches were opened in Burkina-Faso, Senegal, Tunisia, Ivory Coast, Madagascar, Niger, Burundi, Congo-Brazzaville, Algeria, Chad, Benin, Guinea and the Democratic Republic of Congo

(DRC).

The main aim of this large-scale project was the deployment of telemedicine tools along with IT-enabled diagnostic devices such as portable echography; within some regional and district hospitals in some parts of Africa. Today, one problem still remains clear; the entire structure is not in the hand of the African them self, which is better.

The infrastructures could also be used to facilitate public health activities including the collection and communication of surveillance and healthcare indicators to the ministries of member counties like Cameroon. The usefulness of these tools to support isolated care professionals has been demonstrated, identified as the best method to fight medical workers insufficiency, as well as the sustainability of the implementation in large hospitals who can integrate the recurring connection costs in their operational budgets.

An estimated 500 US Dollar monthly has been the estimated cost to run a satellite connection for a population of 50000 to 200000(Johnston et al,2004) .With extremely large geographical regions, dense forest reserves, and unpredictable climate changes; will Africans be able to sustain these applications?

5.2 Sustaining telemedicine in Africa.

Simply making Telemedicine applications available and offering training rarely improves or increases health technological integration within the medical field in Africa. (Glazer et al, 2005). Typically, primary users of the applications; who are medical personnel learn about telemedical tools outside their continent and have limited opportunities to apply what they have learned. In most cases, African health workers are introduce to the basics of telemedicine without actually having to see any of the application, no how it functions Yet, in order to successfully implement and sustain its application, technology integration, and users need to be empowered to use resources from within, not just relying on outside expertise. A good example is the Kenyan health care system that has implemented the use of text messages via mobile phone to notify health workers of the shortage of Artemether/lumefantrine (Coartem); an anti-malaria drug, in some health structure (Tren. R,2009)

Effective telemedicine implementation requires users to learn that technology within the context of their settings; at hospitals or homes, are to be cared for so they can prepare,

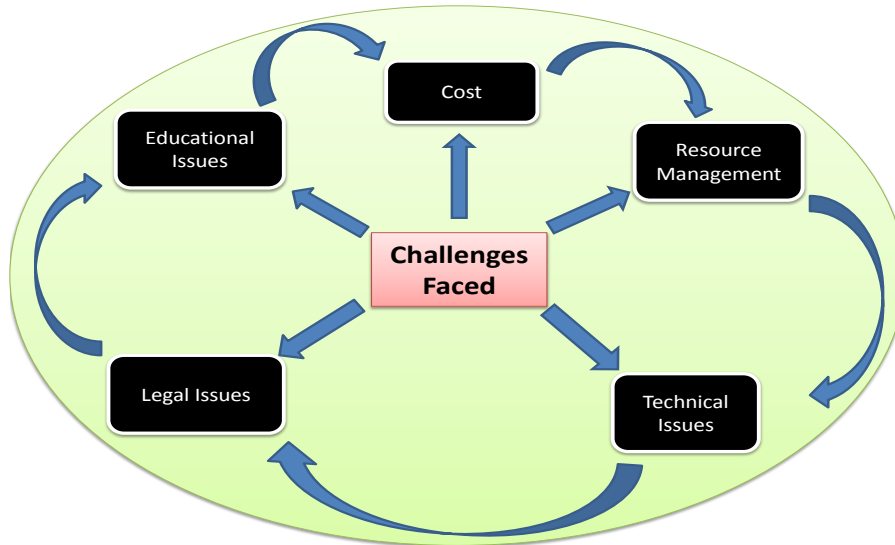
reflect, and modify their practices. The implementation is more successful when it is rooted in curriculum for both health and technology (Carrigg, Honey, & Thorpe, 2005). While telemedicine applications should be implemented in ways that support district and state curriculum and instructional objectives, it should also be viewed as a tool to expand opportunities for learning beyond what is already provided and a means by which to provide better health to all with no distinction on location and time.

Moreover, user's instructional practices are deeply influenced by the structure and culture of the society in which health providers practice. Sustaining telemedicine implementation requires an environment that encourages all users, to routinely interact around common problems of practice and to focus on how their instruction benefits the society in general (Carpenter et al., 2004). Telemedical application users in Africa need frequent opportunities to share ideas, successes, and failures within a supportive environment of peers.

5.3 Challenges faced by telemedicine in Africa.

While the deliberation over health care within all of Africa tempers on, as well as the economist struggling to recover from their cost of infrastructural development, and as more and more persons with health need continue to live without adequate access to broadband technologies; especially in the African continent and some other low income countries, the development of technologies continues to outpace our ability to profit from them. With all these setbacks in mind, there are a number of challenges that have to be addressed before full-scale implementation of telemedicine technologies can be achieved at any level. These challenges include cost and resource concerns, technical issues, legal issues, lack of awareness of telemedicine; either via education, previously unsuccessful trials using telemedicine technology and many more others. These factors listed above are very fundamental issues face by African health structures in their effort to providing telemedicine applications, and a means put in place for providing better health to rural health sectors of the African continent.

It should be earmarked that within the phase of implementation, all challenges are very important to be dealt with. This is because, as long as one phase is not solved within the implementation process, the rest of the project will come to an untimely end.



Picture 19: Challenges faced by telemedicine in Africa

5.3.1 Financial challenges

Getting better or improving the performance of the African health-care system is without a doubt one of the most important challenges that low income countries like Cameroon faces. In current decades, improvements in medical knowledge and standards of care have allowed people to live healthier, longer, and more productive lives. New medical technologies and treatments promise more and better to come. From my point of view, not as many nations in the world today especially the greater majority of Africans, benefit from these advance and fast growing medical technology via the use of telemedicine applications.

I will like to mention here that, health care is not only a scientific and social issue; it is an economic issue as well, this is because it makes use of much funds and any financial aspect of it, is very expensive (Castro-Leal et al,2000). The decisions health providers, stakeholders, other contributors make about health-care reform, especially in the use of telemedical applications, will affect many aspects of our economy, including the pace of economic growth, wages and living standards, and government budgets, to name a few.

By any measure, the health-care sector represents a major segment of the economy of any country, be it in the developed or in the developing world. Much is spend on achieving as well as much as well it got from the services it provides. Indeed, health-care spending is the single largest component of personal consumption; larger than spending on either

housing or food.

Health-related spending is also a large and growing share of government budgets. More importantly, health care also has long been, and continues to be, one of the fastest growing sectors in the economy. We should not think that no African country is capable of keeping a stable economic, which then implies that all African health facilities; like telemedicine is still struggling in the hands of African health workers.

As the public interest in these issues testifies, the stakes associated with health-care improvement, both economic and social, are very high. But we must keep in mind that, for all its problems, the Cameroon health-care system also has much strength, sometimes to overcome some of its difficulties by sub venting some aspects within the medical field. The stakeholders must as well take care that they do not lose what is good about their system as they try to address the significant concerns that certainly exist in the effort in achieving better health by the implementation of telemedicine services.

Moreover, a health system cannot be supported by patients alone, tax and insurance systems are needed to make it maintainable, especially when it comes to low income countries that do not only suffer from infirmities, but also suffer from a great deal of the world's deathliest diseases and infections. It is how ever wealth noting that with African, there majority of the nations have no health insurance policies. Within Cameroon in particular, health insurance is known and used by the very few well to do generation of persons.

However, it can take years before the health system is financially sustainable, especially in countries that are not economically viable like countries with recurrent crises, of which the Yagoua Regional hospital is a perfect example.

Financial sustainability should thus be one of the supports of the renovation of the health care system within African nations.

The question of financing and sustaining telemedicine application is a very big problem whose solution greatly lies in the hands of African decision makers; whose aim and priority should be on how to improve the health of its population.

5.3.2 Technical and organizational challenges

Health organizations today are faced with a host of issues, which may cripple their functionality, or in some extreme causes the health innovations to go bankrupt at their very initial phase of implementation. Technical and organisational challenges within telemedicine is mint to show the problem health institution within Africa face as an effort to organising different parties of the production phase so that the services provided should be satisfactory to both users and producers of the application used in providing health. These challenges are dependent on the nature of operations of the health institutions in Africa but generally, there are common challenges, which are faced by a majority who are greatly involved with the implementation of new health services, especially African. Technological advancements today are on the increase more than in the previous century. For any health institution to offer services, which are relevant, cost effective and compatible with the society needs, modern technology has to be employed. The initial cost of acquiring it, maintaining and running operations using the acquired technology is inhibitive. This is worsened by the short lifespan of most technological innovation which imply that health ministers and or health institution within Africa have to reinvest their methods in current technology frequently so as to sustain their relevance.

Considering that today's environment consists of the people, who are the recipients and users of the services by telemedicine, the fast changing nature of peoples likes, dislikes, preferences, opinions and lifestyles is thus a challenge facing the health sector. Generational gaps have created a difficulty in determination of uses behaviours yet most health workers of the research domain are investing heavily in users' behaviour analysis so as to determine the most appropriate way of matching a users need and satisfaction. Coupled with competition, (both fair and unfair) the challenge of making profit for instance has been pushed to only the top notch large scale institution with specialty services.

5.3.3 Infrastructural difficulties

Telemedicine applications and its infrastructure are all very fundamental to the provision and execution of health services at all levels, at all times and or even across nations. A

strong infrastructure provides the capacity to prepare for and respond to both acute (emergency) and chronic (ongoing) threats to our African health institutions, by a fast and efficient respond. Infrastructure is the foundation for planning, delivering, and evaluating public health in general.

Telemedicine, which is a combination of medical knowledge and telecommunication infrastructures assist in health delivery process. Generally, both of these element that make up the telemedicine implementation are very limited in supply all over Africa and Cameroon in particular, due the coming of telemedicine was mint to solve in one way the shortage of medical personnel in African, it is also an effective method to overcome some public health hazards like epidemic and endemic disease (Mengistu et al, 2007). Today, health workers migration sees the providers of medical services in particular; medical practitioners moving from one region, from rural areas to urban cities and sometimes from one country to another. This process creates problems for the provision of public health and medical services and poses challenges to areas with limited health workers.

There exists a global shortage of healthcare professionals. Nation; especially those of Africa, region ,like those of Yagoua that run regional hospitals and health rights movements have been both responsible for, and responsive to, this global community shortage through a variety of health policy, regulation and legislation which directly affects the migration of medical providers. But it still does not solve the problem in question, as many and many more health workers still move to the search of better pay work zones, while making less developed areas without any medical worker. Looking at the Yagoua regional hospital, one of its statuses is very short of medical personnel, not to mention of medical equipments.

Not only do African nation suffer health worker shortage, this part of the well also suffer from telecommunication service shortage.

The problems and venture in the telecommunications sector in Africa may differ substantially from one country to another depending on their level of development and their respective markets.

Contrary to the economy of developed countries that benefit from a certain level of diversity, the economy of developing countries is often based on a limited number of

sectors and their trade balance is heavily in deficit. While the telecommunication sector is a key sector to both the entire world economy and for Africa, it represents a source of income proportionately more important for the development of African countries and their health sectors. It is therefore normal that the governments of these countries seek to profit from the explosive growth of the telecommunication sector, while helping it combine with the health sector in order to provide better and equal health to all.

All these factors affect the revenues of the private and government sectors of telecommunications in Africa in addition to the convergence of networks and the development of Internet services via mobile phones. The technological gap between the industry and African authorities responsible for regulating it continues to increase, further reducing the ability of governments to control their income and protect citizens against various fraudulent activities which act as parasites.

5.3.4 Cost distribution and benefits

One very basic element of any health care system, as well as all its applications used in telemedicine application is its financing that is, how medical services are paid for. Generally speaking, in western industrialized countries, health care tends to be financed by two key sources: out-of-pocket payment and health insurance. But in Africa, all health payments are done based on out-of-pocket payment.

With a drastic growth in the African population, it becomes increasingly unacceptable that people die or suffer because they have no access to even the most basic of medical care. Equally unacceptable is when poverty is the result of large or catastrophic health expenditures. Evidence suggests that more than 150 million people globally suffer financial catastrophe every year due to out-of-pocket health expenditures. This is the only methods by which health institutions make their moneys to run the health institution. Implementing telemedicine in Africa will have to follow the same principle in order to help sustain it. Furthermore, we should note that many governments in Africa have not yet recognised the importance of health in the overall national development; consequently, they have not allocated commensurate resources to the health sector. The levels of health budgets in many of these countries do not demonstrate that health is rated

as a high priority among other national needs.

A good number of health ministries in Africa use basically the cost recovery method of financing their health institution (Stefan and Christel, 1998). Cost recovery, or the pricing of health-care services in government-run health-care facilities, continues to be a politically delicate subject in all of Africa. Nevertheless, ministries of health are now beginning to understand that the selective pricing of healthcare services can be a powerful tool for achieving the efficiency and equity goals that their governments have set, and for increasing ministry financial resources that can be used to improve the quality of care offered. The Yagoua regional hospital is one of the medical institutions in Africa that makes its fund from the cost recovery method due to the lack of health insurance policies. Clients of all health institutions have to pay all medical bills instantly. By so doing all the benefits got from here are just too small to sustain the hospital, and with the implementation of telemedicine, some other fraction of the money has to be allocated to run the applications put in place. The money here is really not sufficient to sustain telemedicine applications. In Cameroon, the government tries to subvert must medical innovations which are identified to be of great interest to the public health. Latter in 2011.the government of Cameroon gave some financial aid to the genesis telecare centre, but for how long and for how much will the government be able to sustain it, if a real and clear cut method is not put in place to sustain all of the telemedicine applications.

5.3.5 Policy and politics related setbacks

Generally, there is a growing apprehension that health is a fundamental part of sustainable development efforts. The significant importance of health among populations is also being recognized in foreign policy circles, in economic development discussions and within the context of socio-cultural issues of all countries; be it in low, middle and high income nations.

Domestic and international health policies in all African nations have been shaped by multiple, past and present international agreements and policies within African nations and their co-funding European countries. Some of these international agreements and declarations include: Alma Ata Declaration of 1978; World Bank and the International

Monetary Fund (IMF) Structural modification Program in the health sector of 1987; World Health Organization's Bamako Initiative in 1987; United Nations Millennium Declaration and Development Goals in 2000; Paris Declaration of 2005; and the second primary health care revolution of 2006, all of these in an effort to sustain health care policies in poorer counties. These agreements and policies heavily influenced the development of national health policies in low income countries. Most of the policies put in place for the African countries does not actually reflect the basic need at that time being, nor is not what African health ministers see as an immediate solution to their health sector.

One of the most influential international declarations on health is the Alma Ata; the Birth of Primary Health Care: The Declaration of Alma-Ata, formally adopted primary health care (PHC) as the means for providing a comprehensive, universal, equitable and affordable healthcare service for all countries, especially for African countries. It was unanimously adopted by all WHO member countries at Alma-Ata in the former Kazak Soviet Republic in September 1978.

PHC is essential health care based on practical, scientifically sound, and socially acceptable methods and technology that is universally accessible to individuals and families in the community. PHC must be affordable to the community and the country in order to maintain continued development in the spirit of self-reliance and self-determination. It forms an integral part of a country's health system, of which it is the central function and main focus, and of the overall social and economic development of the community. It is the first level of contact for individuals, the family, and community with the national health system. It brings health care as close as possible to where people live and work, and constitutes the first component in a continuing health care process. Where western-trained doctors and nurses were not available, village health workers were to be trained and used as a formal part of the health care system. This was history and a goal that was mint to achieve the jingle” *health for all by the year 2000*”, which finally failed. Today we were talking of better health to all especially to those of the rural region within Africa and other low income countries through the implementation of telemedicine. Unfortunately, politicians are using it to gain the minds of their population by installing the applications in their areas of interest and not in zones where it is much needed.

It is worth noting that it is the responsibility of the African governments, WHO, UNICEF, and other international organizations, multilateral and bilateral agencies, NGOs, funding agencies, all health workers and the entire world community is expected to protect and promote the health of all people; support national and international commitment to the implementation of telemedicine; and channel increased technical and financial support to it, particularly in rural areas within developing countries where greater attention is expected. Several steps are whereby very important to be taken to restructure the government through a process of decentralization in order to bring health through telemedicine closer to the people. The central government of some African countries should be in one part be able to transfer responsibilities, authority, functions, as well as power and some resources, to provincial or regional, district, sub-district levels, so as to be able to help rural health centres.

Most importantly, adequate supervision to ensure service quality, and telemedicine equipment, especially at the most peripheral levels, should be envisaged.

5.3.6 Telemedicine in the hand of the private sector.

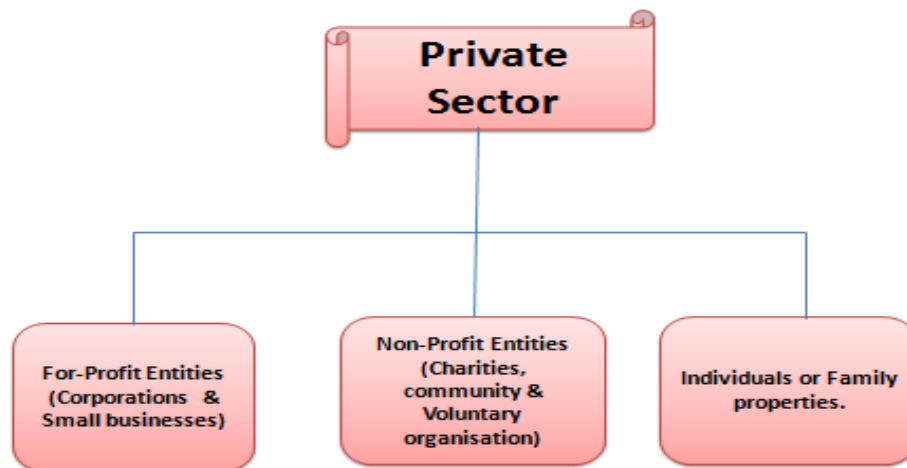
In Africa, one issue that tends to triumph arguably more than any other in the African public health policy debate is the issue of health care and health care delivery. At the heart of this issue is the debate over public versus private health care.

The Genesis telecare centre (GTC) has been the sole and main provider of healthcare through telemedicine in Cameroon for some years now. The GTC being privately owned, and in some instances works in collaboration with public healthcare systems, and now an increasing number of people now use public healthcare systems for virtually all of their health needs.

It is true that putting telemedicine within Africa in the hand of the private sector gives room for higher efficiency and better quality of work, but this will not be for a long time if the government of some African counties do not step in to give a helping hand. This assistance is needed partly because telemedicine applications are very expensive to run and is very difficult to be done in a small scale or remain on a small scale.

Furthermore, keeping telemedicine in the hands of the private health sector make the care

they provide to users more and more expensive for users of the application, this is because all private institutions have all one common goal; that of making large provide at any time. We should thereby note that when a private institution is not out for provide making, and then it is a charity organisation. The table below shows three conditions for which the private institutions operate:



Picture 20: Private sector in relation to health

The table above show that as long as telemedicine remains in the hands of the private sector, it will be either for profit making, non-profit making or an individual issue. If it has to be within an African country, then it will have to be in Lange scale and for profit making. But as long as the public sector or the government of the country set in, it will have a great influence on the price clients will be issued care.

Private healthcare systems play a considerable part in topping up in those areas that appear to be problematic in Africa.

5.3.7 Human resource-related challenge.

It is often generally accepted that the real wealth of a nation is its people; the members of the community. And the purpose of any development is to create an enabling

environment for people to enjoy long; as well spelled out by the II, healthy and creative lives. This simple but powerful truth is too often forgotten in the pursuit of material and financial wealth, especially with health workers of the developing countries like Africa, for which Cameroon is inclusive.

Globalization today within the African economy is compelling health institutions to rethink their future strategies. It is now widely recognized that transformation within the ICT is a pre-requisite to their survival and growth. Health institutions in Africa, especially the public health sectors are experiencing winds of change. For the greater majority of the African nations, there would not be a more existing and challenging opportunity than managing the complexities of change and transformation. Telemedicine application today is playing a lead role along with business functions in creating the necessary momentum and internal capabilities in providing better health to all at all distance.

One of the most difficult challenges African telemedicine implementers are faced with is human resource management. Human resources are one of the most important components determining performance of public health system in Africa. This study carried me more, to look at the uses of telemedicine application within the Yagoua regional hospital as well as the genesis telecare centre, in an aim to study the characteristics of health users of the application.

Today, it is well known that Africa faces enormous challenges from mobilization, liberalization and rapid technological changes, coupled with debilitating effects of large pools of skilled and experience human resources from the continent. The realization of these changes has given rise to many health researchers, with a view to seeking lasting solutions to those challenges.

The context and scope of Human Resource Management within the African health structure has changed dramatically within the past years, especially in Cameroon, where the health minister is encouraging youth to get in to the health field. The role most African health ministers now play has changed from implementation of health policies to the design and methods used within the health systems, which bring into line with organizational strategic objectives; providing advisory and consultancy services on health issues to the public service organizations. These policies with the help of telemedicine

applications will be very possible to health the African health sector.

Telemedicine implementation within Africa is primarily an effective professional alliance across the continent of Africa where health professionals will be able to:

Share information and experiences on Challenges facing telemedicine, as well as the management of all resources and development and other contemporary issues related to telemedicine.

Share ideas on how to put in place strategies that promote long-term skills development programmes to build economic reform plans to attract talent and retain employees

The practice of telemedicine is viewed as a possible solution to the human resources crisis in health care in all of Africa and internationally. Reports on its successful implementation and combating of health-related problems are readily available from both developed and developing countries. Even though these reports indicate that telemedicine seems to have addressed the problem related to the shortage of health care personnel, it is still posing a challenge to regulatory authorities such as other health workers and health ministers in Africa.

The dictatorial establishment are being built to ensure that quality health care service is delivered and that the patient will be protected from possible unprofessional conduct by the health care worker involved. Misconduct can occur through improper clinical care or excessive billing.

Policies and guidelines from both developing and developed countries have so far been reviewed to highlight how telemedicine is regulated elsewhere. The focus is mostly on the ethical implications of telemedicine practice. We all know without second thought that telemedicine has proved itself to be a possible solution to the human resources crisis, especially in developing countries or where there are vast rural communities.

However, the success of telemedicine has been reported in a number of developed and developing countries as a way of easing the human resources crisis and providing quality health care to needy communities of low income countries like Cameroon.

Scarcity of health care workers is today being experienced around the world, especially in Africa. The situation seems worse in African countries, as reported by Jacob et al, 2009.

In the very paper produced by Jacob et al, it is well highlighted that Africa carries 24% of the world's disease burden with only 3% of the world's health workers. It is because of situations like this that telemedicine is practised all over the world. Through telemedicine it is possible for health care practitioners to exchange information about patients' conditions without the patient having to travel from one area to another. Telemedicine is also used for education and training of health care practitioners. In providing quality care for patients, the practice of telemedicine ensures that advice or service by appropriately trained and qualified practitioners is made available. Successful implementation and combating of diseases through the practice of telemedicine are reported from low-income and developing countries such as Cameroon and other low income countries.

What poses a challenge to the regulatory authorities is how this practice should be regulated, as it has grown to the extent that it is being practised across the borders of countries and continents. How to manage the users of all the telemedical application is the biggest problem the African nations are facing.

5.3.8 Educational problems.

If not all, some African countries have done all kinds of good in trying to turn itself around since the colonial periods. New investment, new educational facilities, new laws, and better health are just some of the few problems African countries still hope for successes. But if a country wants to achieve sustainable development, economic, social, or human it must see improvements in educational system; especially at all levels.

Whatever education is all about stems from the fact that; knowledge in basic skills, academics, technical, discipline, are very important and to some other African, it is based on collecting knowledge without understanding its value.

How about the processing of knowledge, using inspiration, visionary ambitions, creativity, risk, ability to recoil back from failure, motivation, is all what education helps us to know. Many education institutions today do not consider these skills. These skills

are associated with understanding the value of knowledge.

I greatly think that Africa cannot advance without good education. The education system as compared to the education systems elsewhere, is nothing good to write home about. I am an African and I talk from experience. The education system in Africa is very bad. This type of study will not be able to support technological development within the medical field, not to talk of telemedicine application. Due to this problem, comes to light other important issues like that of sustainability

Many of the challenges faced in Africa revolve around helping the community to educate themselves.

Two educational problems contribute to increased interest in Africa: the shortage of qualified teachers and the urgent need for infrastructure in the African education system.

The challenge of education in Africa is not simply a problem of computer equipment in schools. In most African countries, one of the biggest obstacles of the "*Millennium Goals of the United Nations towards education for all*" is the lack of qualified and properly remunerated teachers within all of Africa.

For the first time, ICT can offer to everyone a unique opportunity to acquire knowledge and skills. Scientists, academics, teachers, skilled workers and others can share the latest developments in research and develop without having to leave their country or their jobs. They can participate in professional exchanges, sharing of experiences and networking with the rest of the world. Similarly, all sectors of African education and training can take advantage of via telemedicine application. But a very important problem starts ahead; that of running and maintaining the very few African schools that educate Africans on telemedicine and its applications (Maurice, 2007)

A rapid look at the record of African countries with the lowest literacy rates on the current UNESCO worldwide Adult and Youths Literacy brochure and those at the base of the UN Human Development Index discloses an age-old truth that education is the best piece of equipment for progress; meaning, where there is lack of education, development is little. The chief factor responsible for African underdevelopment is its failure to make courageous investments in education, and until we address the issue, Africa will remain poor in the domain of health and important innovations like telemedicine.

CHAPTER 6

CONCLUSION

Scientific and technological innovation within the healthcare sector is an important driver of cost increase for any nation. Users; health workers and clients, often embrace new styles since it is sometimes understood to be the better way of achieving old health results. These technologies can lead to increases in costs, either because they are simply more expensive than previous treatments or because their introduction leads to an expansion in the types and numbers of patients treated. This is when the innovation is meant to target same group of persons, at a more advanced way in providing better health. But with the case of telemedicine, this innovation is to help health organisations like the WHO, UNICEF (United Nations International Children's Emergency Fund), IFC (International Finance Corporation), the public and private health sector of nations to achieve better health coverage, especially to the less privileged rural areas of Africa.

Most, if not all healthcare improvements are well known or believe that new designs can and must be developed to simultaneously accomplish three critical objectives, namely: Improve the health of the population; especially to those with poor health accessibility, like is the case of those in rural areas of Africa and other low income nations, Augment the client (patient) experience of care (including quality, access, and reliability); and, Diminish, or to some extent control, the per capita cost of care to all.

But it should be noted that in a world where income level, ethnic origin, and geographical location serve as primary determinants of people's access to health care, telemedicine constitutes a possible approach to overcoming many of the existing difficulties to care.

Some nations, especially those of the developed world have accepted changes within their health care sector. But African health ministers are still very sceptical about the outcome of what should be a method to improve healthcare services and bringing healthcare facilities closer to its needy community in remote areas of Africa, but the use of telemedicine application, can possibly become the next encounter they will have to overcome.

Change is constant, especially in the world of healthcare technology. Health workers, who are proven experts in consumer health education, want to feel confident using the latest healthcare technology, and should be giving the green light.

So, how do we keep up when things keep changing and new appliances for patient care

seem to be rolled out every day? How do we know if our patients are correctly using the appliances or equipment given to them to support a healthier lifestyle? What do we do if we have never seen a certain appliance before?

These and others are some of the questions some of the health care providers within Africa and Cameroon constantly wish to be answered.

The most pronoun problem in Africa is the economic crises.

The financial sector is seriously affected and is reeling from massive capital flight. Africa is battling a multitude of problems and has become a victim of the global financial crisis. The raging global financial crisis has forced many Africans in a majority of communities lack basic health services. To my understanding, it is well known that finances are the bases for health and development. Many organisations as well as WHO has given great attention to health and development especially in Africa where it says:

It is concerned with the impact of better health on development and poverty reduction, and conversely, with the impact of development policies on the achievement of health goals. (WHO: Health and Development). Both health and development could not be separated, there is never health without development and never will they be development without better health. This is practically were telemedicine as innovation to health care becomes important.

One very other important problem the African health sector is faced with, is based on the fact that they are wanting to copy directly what is being used in the western world's health sector, putting aside the notion that both continent do not have the same economic status. To my point of view, the African telemedicine sector should make use of available resources, low cost and easily sustainable telemedicine applications. One perfect example is the used of solar energy in the place of hydroelectricity energy; it is cheaper, readily available and easily used. However, I would like African health ministers and other African policy makers to look at health development as the best tool for economic progress, and should always put in mind the notion of "start small and think big"(Broens et al,2007).

When we talk of Africa, it is generally know that it is a nation attached to culture. Some studies in some parts of Africa has showed the culture of a community to have been a setback to the successful implementation of telemedicine (Peter N. Meso et al, 2009)

Telemedicine systems fall short within Africa for many reasons, but a major contributing factor is the failure of designers to facilitate the interaction of incompatible cultural subsystems that prevent the transfer of knowledge from one cultural context to another; the western culture to a direct African culture.

Having practised in this part of the world, it is well known by all, that the African healthcare industry still has a lot of growing up to do. Moreover, changing the minds of some of the health workers remain the biggest challenge the African health ministers will have to face; removing corruptive practices to pure honesty or better still avoiding combining politics and health. In other words, Africa of the future needs to be build by Africans who greatly believe in Africa; especially within the healthcare sector.

Operating any telemedicine centre should be a single aim of providing better health to all with no restriction by political, tribal, ethnical or geographical constrain. Critically looking at the telemedicine centres run by some African nation, it could be seen that some of the outreach telemedicine centres are established, and concentrated to some zones. This practice is a contradiction of the well known slogan made by the WHO of “health for all”, and is gradually revolved to health for some.

Ultimately, despite the successes as well as failures within the African nations, telemedicine programs are still working to achieve the results needed to propel this new approach of health care forward. It is a mere challenge, and like others, often the biggest obstacle in meeting life’s challenges is actually our own fear of failure. But it is not failure that we should fear. The only real failure comes when we allow our fright to prevent us from taking on new and unknown challenges that will not only help health care needier, but will go a long way to assist ministries of health within the African nations with better health statistic and better healthcare coverage. Telemedicine is outstandingly from many studies very promising due to the great value that can be brought by its implementation.

CHAPTER 7

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CHAPTER 8

APPENDICES

A) A presentation by Mr Janques Bonjawo, the director of Genesis Telecare Centre.


Telemedicine Services for Remote Regions in Cameroon

The Genesis Experience




Jacques Bonjawo, *Genesis Telecare*

Overview




- Introduction
- Presentation of the project
- Evaluation Methods
- Results
- Discussion
- Conclusion

Introduction



Cameroon

- Developing country (Central Africa)
- About 70% of the population in rural area
- Predominance of infectious and parasitic diseases
- Progression of chronic diseases
- Inequitable access to health care services
- Difficulty in financing the health care system
- Lack of human and material resources



Presentation of the project

- Project conception: **Genesis Telecare**
- Start Date: April 21, 2009
- Based on a private initiative

Presentation of the project

- Aims at developing a permanent and self-sustainable telemedicine service
- Provides long distance specialized health care
- Trains health professionals to allow for more coverage and effective delivery of health services throughout the country

Presentation of the project

Partners

- **Public Health Ministry**
Ensures the availability of the public hospital infrastructures, including equipment and human resources
- **UNESCO**
Eases the collaboration between national and international administrations, and charity organizations
- **The Cameroon Telecommunication Company (Camtel)**
Offers easy access to the telecommunication equipment



Presentation of the project

Objectives

- Provide adapted health care to non-privileged areas by extending telemedicine activities to all the country
- Reinforce patient-physician relationship, minimize waiting time and maximize the effectiveness of the medical consultations
- Allow rural and remote areas to have access to sophisticated health services, generally located in urban centers

Presentation of the project

Objectives (cont'd)

- Develop appropriate technological and organizational solutions adapted to the realities of the country
- Monitor and evaluate the system efficiency during long distance consultations

Presentation of the project

Network architecture



- Inter-connect the reference center of the capital to a rural hospital
- Servers located in protected infrastructures
- Required equipment :
 - Redundant power supply
 - Controlled air-conditioning
 - Sophisticated security systems

Presentation of the project

Network architecture

- Development strategy: *Genesis Telecare*
- Technical system includes:
 - Desktops and laptops
 - Devices (cameras, printers, etc)
 - Specific softwares
 - Electrocardiographs (ECGs)
 - Electronic stethoscopes
 - Electronic blood pressure monitors
 - Ultra Sound equipments etc.

Presentation of the project

Services provided



- Distance consultation and diagnostic
- Exchange of video images between specialist physicians and health professionals
- Exchanges between specialist physicians and patients
- Exchange of electronic information (ex: ECGs)
- Creation of a patient electronic health record
- Collaboration between physicians with use of e-Communication and Visio-conferencing
- Training of health professionals

Presentation of the project

Organization and management of the network



- Project management : Genesis Telecare
- Board of Directors
 - Respected medical specialists + decision makers
- Locations of the project:
 - The consultation center in Yaounde
 - The Abong Mbang's district hospital
 - And four other rural villages

Evaluation methods

Evaluation strategy

- Comprehensive evaluation
- Outcome evaluation

Evaluation is viewed as an interactive process that informs decisions in the course of a project

Evaluation methods

Data collection

- Visit of sites
- Discussions with the main stakeholders involved in the project
- Data analysis of telemedicine services utilization
- Observation and interviews : validation of the evaluator's understanding of the strategic and operational dimensions

Evaluation methods

Analyses of the results

- Evaluation adapted to each step of the project
- The evaluation considers these indicators:
 - Utilization of the different services offered through the system and acceptability
 - Socioeconomic impact and impact on the quality of the care
 - Identification and evaluation of the new work procedures induced by the system

Results

During the study observation period (April 21, 2009 –May 2, 2010) 11540 individuals benefited from the telemedicine services

- Tele-cardiology at the urban and distant sites
- Tele-gynecology at the urban and distant sites
- Generalist consultations at the urban and distant sites

Results

The urban site

- 1630 consultations
- 64.3% men
- Mean age: 36.9 years
- 2160 (21,8%) : had high blood pressure
- 1440 (14%) patients had an ECG done
- 610 (6.2%): consultation in cardiology
- 500 (5%): consultation in gynecology
- 4200 (42.4%) received medical prescription

Results

The distant sites

- 9910 patients
- 73.9% women
- Mean age: 42.6 years
- 5300 (32.5%) had high blood pressure
- 6400 (39.3%) received a consultation in cardiology
- 2100 (12.9%) had an ECG
- 4800 (29,4%) received drug treatment

Results

Impacts on patients

- Approximately 12000 patients benefited from the telemedicine services
- The majority of the patients were seen in cardiology
- Thousands of patients had high blood pressure
- Several of them did not know the risks related to their conditions
- Patients received immediate treatment (cardiology)
- Prescription and free distribution of drugs

Results

Impacts on physicians

- Telemedicine: well perceived by the physicians useful tool for health professionals
- Remote physicians are highly motivated
- Provides opportunities for training
- Exchanges between colleagues



Results

Impacts on nurses

- Telemedicine : well perceived by the nurses
- Health care services are more accessible to the patients
- Expressed needs: ultrasound, ECGs and radiology
- Need to better inform the patients about the services offered
- Problems raised: group work procedure and computer skills

Results

Impacts on the cost of health care services

- Self-financing
- Cost-effectiveness
- Financial accessibility to the services
- Geographical accessibility to the services
- Reduction of the costs of treatment
- Time savings
- Savings for the health care system

Discussion

Conditions of adoption and diffusion of the project

- First project of its kind in Cameroon
- First site: District hospital with only one physician at the time of the evaluation of the project
- Huge need for telemedicine
- Complements the availability of health care services for remote and urban populations
- Patients agree with the idea to use the telemedicine

Discussion

Conditions of adoption and diffusion of the project

- Sustainability of assets
- Development of new clinical services and training activities
- Engagement of the Ministry of Public Health
- Agreement between the Ministry of Public Health and Genesis Telecare
- Engagement of the Ministry of Economy

Discussion

Success factors of the project

- Population open to telemedicine and great patient satisfaction
- Participation of health professionals convinced of the importance of the project
- Rigorous definition of the objectives of the project
- Judicious selection of the applications appropriate to the needs
- Simple and robust technology and functionalities based on established applications
- Consideration of data security and confidentiality

Discussion

Success factors of the project

- Mobilization of several key actors at the beginning of the project
- Young and dynamic team led by experienced project managers
- Execution of business plan of the project taking into consideration the costs of various scenarios
- Need to innovate and seek adapted solutions to the needs of the populations

Discussion

Main obstacles and risks affecting the project

- Resistance and lack of implication of some clinicians with negative perception of telemedicine
- Limited knowledge of patients and population regarding telemedicine services
- Demanding work conditions for health professionals that could limit their time for telemedicine
- High cost of technologies and connections
- Absence of a legal framework regulating the exploitation and the use of telemedicine services in Cameroon

Discussion

Considerations for the continuation of the project

- Guarantee the security and confidentiality of information regarding patients
- Ensure adequate training for staff involved in telemedicine services
- Support the implication of physicians and professors already working in collaboration with distant hospitals and/or in telemedicine

Discussion

Considerations for the continuation of the project

- Formulate the next objectives of the project in terms of targets to be reached
- Take into account the needs of patients and population using field studies and consultation of epidemiologic data
- Choose other pathologies to cover and identify the required equipment
- Consolidate the existing partnerships and establish agreements with decision makers

Discussion

Considerations for the continuation of the project

- Improve the involvement of physicians and other health professionals by identifying and supporting the leaders
- Consideration of the aspects of equipment safety and data confidentiality
- Inspiration from successful experiences in similar contexts
- Connection with other telemedicine projects in similar contexts

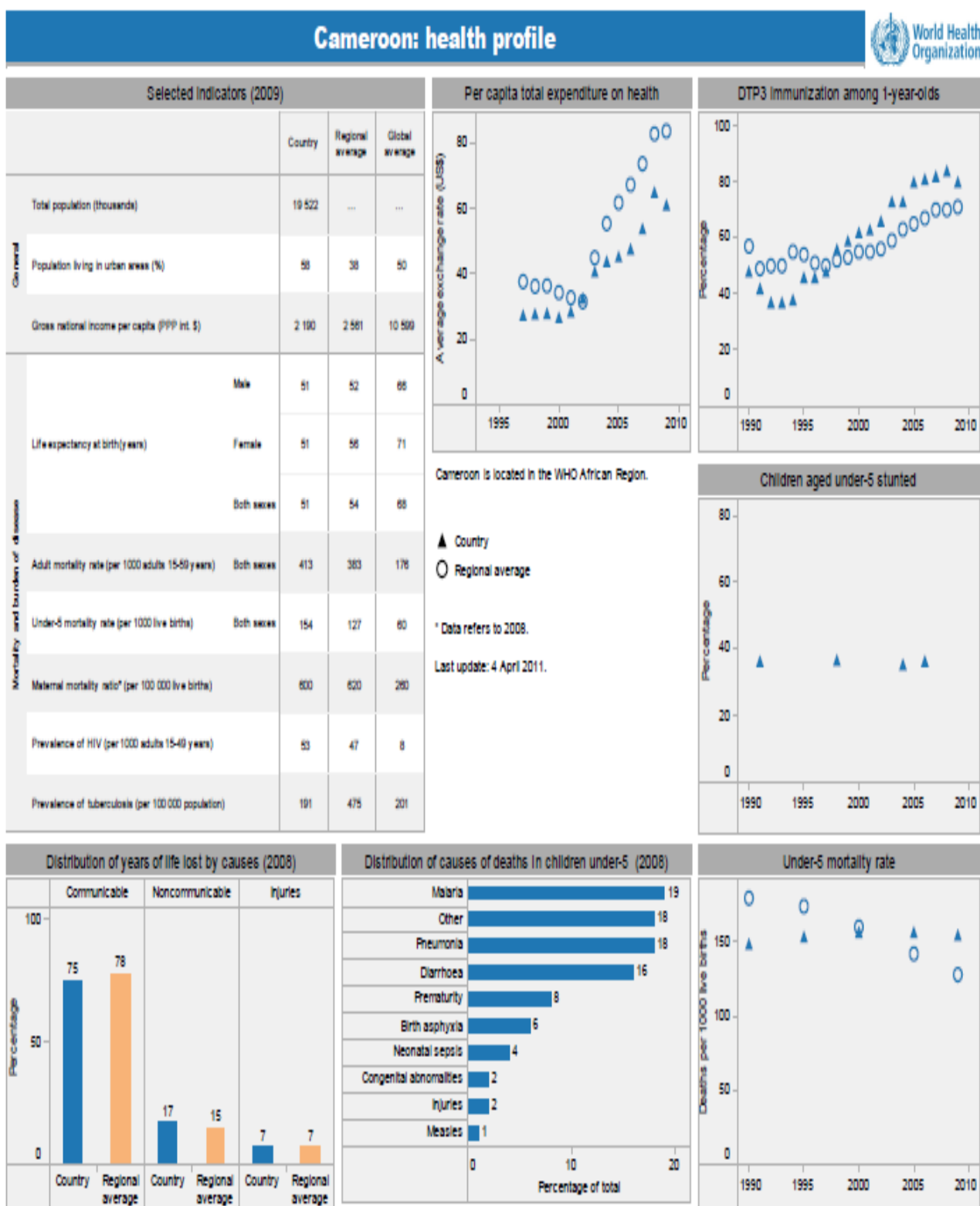
Conclusion

- First experiment to establish a service of telemedicine in Cameroon
- One of the first experiments of its kind in Africa
- Highly promising initiative to support access to health care services for the population in remote areas
- Favorable perception by the population, health professionals and decision makers
- Successful demonstration in Yaounde and Abong Mbang
- Extension of services in : Nkoteng, Endom, Nanga and Yagoua

Thank you! Contact: jacques@genesistelecare.com



B) Cameroon health profile



Cameroon: health profile



Cameroon is located in the WHO African Region.

