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UTILISATION OF ICT IN HEALTHCARE CENTRE TO SUPPORT HIV/AIDS FLOW OF INFORMATION AND SERVICE DELIVERY IN KHAYELITSHA

By

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DECLARATION

I, the undersigned, hereby declare that this dissertation submitted for the degree Magister Technologiae at the Cape Peninsula University of Technology, is my own original unaided work, except where stated otherwise. It has not previously in its entirety or in part been submitted to any other institution for a degree. I further declare that all sources cited or quoted are indicated or acknowledged by means of a comprehensive list of references.

Signature…………………………….....................

Siyamthanda Luthando Matondolo

Date……16..../……August.…../…2012……….

SYNOPSIS

This research is an attempt to investigate the utilisation of Information Communication Technology (ICT) in Healthcare to support the flow of HIV/AIDS patient's general information in public and private sector. Furthermore, the research examines the detail flow of database information for healthcare service delivery to patients, in particular HIV/AIDS patients, in Khayelitsha Township. Finally, the research will detail the types of technologies currently being utilised to transfer this information, technology utilised for capturing or data collection profile of the patient. The research study data collecting was done in 2009 in mostly private and public healthcare centre in Khayelitsha township.

First, the study will concentrate on general utilisation of ICT in healthcare service delivery and flow of information for public and private sector healthcare centres. Additionally, the research also looks at NGOs such as HIV/AIDS Unit in Cape Peninsula University of Technology (CPUT) and Treament Action Campaign (TAC) to find out what ICT equipment is being utilised to transfer this information to adult people to inform and make them to be aware of HIV/AIDS and improve healthcare service delivery to patients and particularly to HIV/AIDS patients. Taking NGO's such as TAC and CPUT HIV/AIDS Unit that are well informed about HIV/AIDS, nationally and internationally will make our research results to be more precise. The research will also look at the utilisation of ICT in flow of information at healthcare centre such as communication between healthcare providers such as receptionist/clerk, nurses, doctors and medical researchers since they are the first people who deal with HIV/AIDS patient cases when they come for healthcare provision.

The research literature will also do comparative study from developing, developed and BRICS countries, comparing their utilisation of ICT, service delivery and their information flow of healthcare communication among healthcare providers and healthcare providers to patients. This study is important for ICT equipment technology that is utilised currently and in future for transfer information, treatment and prevention purposes of HIV/AIDS and enhanced investment by government on ICT utilisation and flow of information.

Understanding the utilisation of information and communication technology (ICT) in healthcare centre 'public' and 'private' sectors in Khayelitsha, is important in the South African context and global information society. It is not clear how ICT is being utilised and deployed to enhance and support healthcare centre in the flow of information and service delivery to patients in general. Healthcare providers and the South African government (Minister of Health) must be aware of ICT utilisation patterns because this may influence improvement of the service delivery to the patients in the future. This study thus seeks to investigate how ICT has been utilised in the service delivery of healthcare centre in Khayelitsha.

This research follows a qualitative traditional approach and the following will be done: data collection, the target population will be defined, evaluation and interpretation of data collected from both participative observation. The survey conducted within the scope of research will be analysed in detail and interpreted. Two questionnaires were constructed and administered to healthcare providers and to patients.

The first questionnaire sought to obtain healthcare provider perceptions on ICT utilisation, deployment and constraints in delivering healthcare services to patients. The second questionnaire aimed to obtain patients opinions on ICT utilisation and what they perceived important in improving healthcare services provided to them. The questionnaire also helped to determine the factors that influence the utilisation of ICT in the healthcare flow of information service delivery in Khayelitsha.

Based on the literature reviewed and data collected from the survey, a healthcare landscape model was developed to depict healthcare centre service provision from healthcare providers to patients in 'public' and 'private' healthcare sectors in Khayelitsha. The health landscapes for Khayelitsha were developed to obtain a better understanding of the organisation of healthcare service sector and ICT health service provision in Khayelitsha Township.

DEDICATION

This thesis is dedication to my family: my mom (Nikiwe Gloria Mengcane), my siblings (Yandisa Cele, Mkhululi Matondolo and Mzwamadoda Matondolo) and friend (Sapho Ntanjana) for their loyal support and encouragement during the years of my research study.

To all the people who are affected direct or indirect by human immune deficient virus (HIV) and acquired immune deficiency syndrome (AIDS) and tuberculosis (TB) in Khayelitsha and rest of the world.

To my lovely and beautiful fiance Pholosho Mmnare Mildred Malebana, thanks Babes for you love and support thank God for blessing me with you indeed.

To the late Professor Vesper Owei may your soul RIP.

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CHAPTER 1

1.OVERVIEW OF THE RESEARCH

1.1 BACKGROUND TO THE RESEARCH

Information and Communication Technology (ICT) is an important part of modern society. ICT is utilised by government departments which are also known as 'public sector" as well as in "private sector" have been utilised for various reasons. Utilisation of ICT in previously disadvantage communities such as Khayelitsha Township is still lagging compared to many suburban areas.

Very few people can afford it and have access to ICT such as internet, (computers or personal computer (PC) or laptop) few percentages are able to appropriately utilise PC effectively due to the high rate number of people who only have basic education (Education, 2010:7). Networked ICT is a valuable tool for e-government (Vosloo, 2008:5-7), e-learning according (Clark & Mayer, 2011:29-62) to and in the South African context (Mlitwa, 2005:1-14).

E-health according to Niyato, Hossain, & Diamond (2007:72-83) innovations, thereby enhancing economic development and growth (International Development and Reseach Centre (IDRC), 2005). For the past decade we have seen unprecedented commitments to global healthcare and development, beginning in 2000 with the commitments in the United Nations Millennium Declaration that became known as the Millennium Development Goals (MDG) with their corresponding set of time-bound targets (World Health Organisation (WHO), 2008:1-4).

According to WHO (2008: 4-7), at the 2001 United Nations General Assembly Special Session on HIV/AIDS, United Nations Member States made pledges for a comprehensive response to HIV/AIDS in the Declaration of Commitment on HIV/AIDS, and expanded those commitments in achieving universal access to HIV prevention, treatment, care and support for all in need. This research investigated utilisation of Information Technology Communication (ICT) in healthcare centre to support HIV/AIDS patient,

and flow of information for patients in a public sector and a private sector for healthcare centre to district healthcare centre and finally looked at service delivery to patients in particular HIV/AIDS patients in Khayelitsha Township. One of the challenges facing the South African community is the HIV/AIDS epidemic. The epidemic not only disrupts the families of the affected members but also the economy and one of its emerging impacts is through the children who are left orphaned because of both parents having died due to HIV/AIDS. The challenge has come at a time of global recession where economic circumstances are making it difficult for extended families to lend a helping hand to children who are orphaned as a result of HIV/AIDS.

Khayelitsha is the biggest previous disadvantaged community in the Western Cape and second biggest township in South Africa after the historical Soweto. Khayelitsha presumed to be the largest and fastest growing township in South Africa, (Curry,Schreinera, & Richardson, 2011). Given that doctors and nurses are the first-line healthcare providers (HP) staff who deal with HIV/AIDS cases, their approach towards these patients is important for treatment, reducing mortality and prevention purpose.

According to Bokazhanova and Rutherford (2006:3-10) quoted by (UNAIDS, 2010): the number of new HIV infections globally declined 19% over the past decade, in 15 high burden countries HIV prevalence declined more than 25% among young people aged 15-24 years. These declines are largely attributable to expanded, improved HIV/AIDS programmes and better access to antiretroviral therapy in low and middle income. There was an increase from only 400 000 people receiving such therapy in 2003 to 5.25 million by the end of 2009 (comprising 35% of those estimated to be in need), HIV/AIDS-related deaths dropped by 19% globally over the period 2004 to 2009 alone. Significant reductions in the price of first-line antiretroviral medicines mean that low-income countries can provide a year of antiretroviral therapy at a median cost of US$ 137 per person. 53% of pregnant women living with HIV had access to antiretroviral medicines to prevent transmission of HIV to their infants, up from 45% in 2008 (Joint United Nations Programme on HIV/AIDS (UNAIDS), 2010:16-61).

1.2 SOUTH AFRICAN STATUS OF HIV/AIDS

An estimated 5.6 million people were living with HIV/AIDS in South Africa in 2009, approximately 3.2 million are women and 280, 000 children (age 0 – 14) which is more than in any other country (Health and Development South Africa (Pty) Ltd, 2010). It is believed that in 2009, an estimated 310,000 South Africans died of AIDS (WHO, 2011). Prevalence is 17.8% among those aged 15-49, with some age groups being particularly affected. Among women attending antenatal clinics, the prevalence was 29% in 2008, compared to 30.3% in 2007 (Department of Health, 2009). Almost one-in-three women aged 25-29, and over a quarter of men aged 30-34, are living with HIV (Rehle et al., 2010). HIV prevalence among those aged two and older also varies by province with the Western Cape (3.8%) and Northern Cape (5.9%) being least affected, and Mpumulanga (15.4%) and KwaZulu-Natal (15.8%) at the upper end of the scale. According to Health and Development South Africa (Pty) Ltd (2010:3-5), marking a welcome change from South Africa's history of HIV/AIDS, the South African Government launched a major HIV/AIDS counselling and testing campaign (HCT) in 2010. Since implementation in 2010, the HCT campaign has had a notable impact on the availability and uptake of HIV testing and treatment.

According to Statistics South Africa (2010:5-8), the impact of the HIV/AIDS epidemic is reflected in the dramatic change in South Africa's mortality rates. The overall number of annual deaths increased sharply from 1997, when 316,559 people died, to 2006 when 607,184 people died. This rise is not necessarily due solely to HIV/AIDS but it is young adults, the age group most affected by AIDS, who are particularly shouldering the burden of the increasing mortality rate.
In 2006, 41 percent of deaths were attributed to 25-49 year olds, up from 29 percent in 1997 (Statistics South Africa, 2010). This is a strong indicator that HIV/AIDS is a major, if not the principal factor in the overall rising number of deaths (Shamu, 2010:47-52). South Africa has comprehensive policies and programmes to address the epidemic, although some of these are yet to have a significant impact (Dorrington, Bradshaw & Budlender, 2008). Central to the prevention programmes are information communications programmes, including Khomanani, Soul City, and Love Life (UNAIDS, 2010). According to Collins (2006:979-990), there is a large free condom distribution programme, providing approximately 400 million male condoms annually. Free female condom distribution, although expanding, still lags behind.

South Africa has a comprehensive plan for the management, treatment, care and support of AIDS. This programme had enrolled approximately 370,000 people by September 2007 with Antiretroviral (ARV) treatment in the public sector and an estimated 120,000 people in the private sector. Although still significantly lower than the treatment need, it is currently the largest AIDS treatment programme in the world (Health and Development South Africa (Pty) Ltd, 2010).

In Southern Africa an area that has less than 2% of the world's population is home to about 30% of people living with HIV/AIDS worldwide, and alone accounted for almost one third (32%) of all new HIV infections and AIDS death globally in 2007 (UNAIDS, 2010:16-59). South Africa is one of the countries in the world with a large number of infections with an estimate of between 5.6 – 5.7 million people living with HIV (UNAIDS, 2010:5-31). 55% of all South Africans infected with HIV, reside in two provinces, namely: Kwazulu-Natal and Gauteng (Dorrington, Bradshaw & Budlender, 2008).

The epidemic varies considerably between provinces. HIV prevalence among pregnant women is highest in KwaZulu-Natal province with 39% and lowest in the Nothern Cape with 15% infected women, Western Cape has 16% and Limpopo province has 19% HIV infected women. In the five other provinces (Eastern Cape, Free State, Gauteng, Mpumalanga and North West at least 25% women attending antenatal clinics in 2006 tested HIV-Positive (Department of Health, 2009).

An estimated 1.8 million South Africans have died from HIV/AIDS related diseases since the epidemic began (Bokazhanova & Rutherford, 2006). In the Western Cape the rate is a bit lower compared to other major provinces but still high when compared to other countries states and provinces. This will be considered in this research, not only has HIV/AIDS related research been identified as a priority but for research specifically in the IT field.

1.3 SOUTH AFRICAN STATUS OF ICT UTILISATION

Information and communication technology (ICT) plays a very important role in almost all aspects of the life processes of governments, business institutions, and individuals. Networked computers, for example, are widely adopted as an e-government medium by governments to improve communication with the public, and improve its delivery of services (Gerster Consulting, 2008:2-17). For instance, citizens can now pay their electricity, water and lots of other bills from wherever they are thanks to ICT. However, in most developing countries like South Africa, the potential of ICTs to support the fuction of healthcare centre is yet to be fully realised. To date most of the attention both on policy and research has been on how the lack of infrastructure and access to technology affect the utilisation of ICT in the pedagogical of function healthcare centre to improve service delivery (Wallace, 2010). As the leader of information and communication technology (ICT) development in Africa, South Africa is the 20th largest consumer of IT products and services in the world. As an increasingly important contributor to South Africa's gross domestic product (GDP), the country's ICT and electronics sector is both sophisticated and developing. South Africa's IT industry is characterised by technology leadership, particularly in the field of electronic banking services.

South African companies are world leaders in pre-payment, revenue management and fraud prevention systems and in the manufacture of set-top boxes, all exported successfully to the rest of the world. Several international corporates, recognised as leaders in the IT sector, operate subsidiaries from South Africa, including IBM, Unisys, Microsoft, Intel, Systems Application Protocol (SAP), Dell, Novell and Compaq. However, it has also been shown that even in cases where the infrastructure is available, few ICT skills are effectively integrating ICTs in curriculum delivery. It can be said, therefore, that there are also non-technical factors that affect the adoption of ICT's for curriculum delivery (Grainger & Tolhurst, 2005). In all the different facets of the ICT's for education prism, South Africa boasts more than a decade of accumulated experience from its wide range of projects and programmes pioneered by noteworthy champions across the stakeholder spectrum of communities, the private sector, civil society, donors, development, and government agencies.

A number of studies have shown that there is a wide range of factors which influence healthcare provider's under-utilisation of ICT in their healthcare centre. These include access to resources, quality of software and hardware, ease of use, incentives to change, support and collegiality in their school, school policies, commitment to professional learning and background in formal ICT training (Shazia, 2006). In addition, computer-phobia is argued to be a major deterrent to the utilisation of ICT by educators. The study will investigate the status of utilisation of ICT such as computers and Internet in healthcare centre service delivery and lack of adequate skills and relevant programs to exploit the advantages of ICT.

1.4 STATEMENT OF THE RESEARCH PROBLEM

The utilisation of ICT in Healthcare to support HIV/AIDS patient's flow of general information for public and private sector and also details flow of database information for healthcare service delivery to patients in particular HIV/AIDS patients in Khayelitsha Township is still lagging compared to suburban areas in the Cape Metropolitan. This research will be a descriptive analysis to highlight the role and aspects of utilisation of ICT that are vital for the successful improvement in healthcare centre delivery in South Africa, especially in Khayelitsha township.

Investigate ICT equipment utilisation, on how they can be upgraded and improvement the information flow, such as referral of HIV/AIDS patients to other healthcare centre in or outside Khayelitsha to reducing spread of HIV/AIDS utilising ICT. There is, therefore, a need to continue with research, that will contribute towards the planning and implementation of strategies towards the utilisation of ICT in healthcare facilities to manage the service delivery to HIV/AIDS patients. Prevention and rapid spread of HIV/AIDS to manage by utilising ICT such as television, radio, internet etc to spread abstinence to sex for young people. This is s a complex problem with many facets and requires a multidisciplinary approach that covers the medical, social and other aspects. This study investigates the extent of correlation between information available and information required utilising ICT towards supporting HIV/AIDS care and the following two variables:

The flow of information between stakeholders involved in providing a healthcare to service HIV/AIDS patients

Healthcare sector flows of information between practitioners and healthcare departments.

American campaigners choose the phrase 'silence equals death' from the environmental movements, to describe the danger of a lack of information and communication around HIV/AIDS (Forman, 2004:2-10). Lack of information and communication continues to be one of the primary causes of infection among the worst affected groups of women and the youth (Forman, 2004:13-23). More effective communication about the disease and improved flows of information facilitated by supporting ICT will contribute to the success of HIV/AIDS healthcare strategies, and ultimately for reducing the number of HIV/AIDS positive patients.

1.5 RESEARCH QUESTION (HYPOTHESIS), SUB-QUESTIONS AND OBJECTIVES

Research questions, according to Leedy & Ellis Ormrod (2010:5-15), provide means for directing research's thinking and are more common in qualitative studies. The research problem, research question, sub-questions and research objectives are expanded upon in Table 1.1 below.

Research problem	Healthcare providers find it difficult to treat HIV/AIDS positive patients and this is even more difficult in disadvantaged communities. Information sharing and utilisation facilitated by ICT are under-utilised by Healthcare services to support HIV/AIDS in hitherto disadvantaged communities.
Research question	What is the current status on ICT utilisation in healthcare centres to enhance service delivery and information flows support healthcare service provision to HIV/AIDS ?

Table 1.1. Reseach Problem and Question

Research sub-question	Research method(s)	Objectives
How does information flow between the different healthcare stakeholders to support the care of HIV/AIDS positive patients from the patient's home through all the referral points?	Literature analysis Interviews (structured and unstructured) Data Models	Establish what information is required for a healthcare service and how this is exchanged and utilised to care for HIV/AIDS patients Identify the stakeholders and the information flows for a HIV/AIDS healthcare service Develop a landscape model to depict the stakeholders and information flows and the ICT to support the receiving, sending and transmission of information.
How is ICT used by healthcare stakeholders for information exchange and utilisation in Healthcare service provision?	Literature analysis Interviews (structured and unstructured)	Determine how ICT is used in healthcare services in different countries and other contexts. Establish how the healthcare stakeholders use ICT to support the care of HIV/AIDS patients.
What are the gaps between information and ICT requirements and the information and ICT available to the stakeholders of a Healthcare centre in Khayelitsha that provide a healthcare service to HIV/AIDS patients?	Literature analysis Case study (descriptive)	Determine how ICT could be utilised to support sufficient information flows between stakeholders in a healthcare context. Determine the information and ICT requirements specific to a HIV/AIDS healthcare service. Determine the information and ICT needs in a real-life context using a Healthcare centre in Khayelitsha.

Table 1.2. Sub-research questions

The ability to extrapolate 'qualitative data' for, within the ambit of qualitative research (Myers, 2009:5-27), it is usual to begin the research questions with 'what' or 'how'. Hypotheses are nothing more than tentative propositions set forth to assist in guiding the investigation of a problem or to provide explanations for the observations (Leedy & Ormrod, 2010:18-26).

1.6 THE RESEARCH PROCESS

Remenyi et.al. (2003:64-65), explains the research process as consisting of these fundamental stages namely: Reviewing the literature, Formulising a research question, Establishing the methodology, Collecting evidence, Analysing the evidence, Developing conclusions, Understanding the limitations of the research, Producing management guidelines or recommendations etc.

1.7 RESEARCH DESIGN

The concept of 'research design and methodology' includes critical aspects pertaining to 'data collection design and methodology', which ultimately culminate in extensive rework being demanded from the researcher. According to Yin (2003:19), a research design can be defined as "the logical sequence that connects the empirical data to a study's initial research question and ultimately, to its conclusions. Colloquially, a research design is an action plan for getting from here to here, where here may be defined as the initial set of questions to be answered; there is some set of conclusions (answers) about these questions". According to Leedy & Ormrod (2010:45), there are two research design methods (quantitative) and (qualitative) of which the following seems to be appropriate for this research.

1.7.1 'Qualitative' or 'Phenomenological' research

Involves the use of words to describe and explain a phenomenon. Qualitative is also a 'case study' which is an empirical enquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not plainly obvious maintaining that with qualitative research, there is no claim that "knowledge gained from one context can necessarily have relevance for other contexts in which they occur" (Baxter & Jack, 2008:2).

According to Collis & Hussey (2009:58-87), case studies are often descriptive and as explanatory research used in areas where there are few theories or a lacking body of knowledge.

Descriptive case studies: where the aim is classified to describing existing practice.

Illustrative case studies: where the research try to demonstrate latest and probably innovative practices adopted by a particular healthcare centre.

Experimental case studies: where the research look at the difficulties in applying new processes and techniques in an organisation and evaluating the benefits.

Explanatory case studies: where an current theory is utilised to understand and explain what is happening.

In this research the will be using a descriptive case studies where the will describe what ICT is currently being utilised by healthcare centre and patients. It is informative rich and can be conducted on a small sample using data collection methods such as observations and interviews. The research shall make use of qualitative research design methods because trying to understand situation better.

1.8 DATA COLLECTION DESIGN AND METHODOLOGY

The collection of data forms an important part of the overall of this research dissertation content, according to Collis & Hussey (2009:141-159), who believe that the data collection design and methodology provides the reader with insight into 'how' data was collected and subsequently analysed.

It could be successfully achieved if the researcher has taken note of the following elements: the unit of analysis, which would be used for data collection, the sample and sample type, which would be selected, data collection methods, which would be used.

The data collection methods which is utilised fall in the scope of this research and both the definitions attributed to the concepts 'field study' and 'survey'. Nielson Norman Group Seminar argues that field studies are the best way to learn about your research environment's goals and needs.

The researcher will visit people in their own environment to enable research to learn very different kinds of information from that collected in usability labs or other methods.

According to Gay & Diehl (2011:238), survey is defined as an endeavour to collect data from members of a population in order to verify the status of that population with one or more variables. The following data collection methodologies will be used in this research to provide a holistic perspective of the concepts: Focus group, Interview method, Observation, Critical incident technique, Diaries, Mixed methodologies and Questionnaires. The research study data collecting was done in 2009 in mostly private and public healthcare centre in Khayelitsha township.

1.9 ETHICS

According to Saunders, Lewis & Thornhill (2009:130), "ethics refer to the appropriateness of researcher behaviour in relation to the rights of those who become the subject of your research study, and who also affected by it". According to Leedy & Ormrod (2010:123-138), most moral concerns in research fall into one of four types namely: "Protection from harm, informed consent, right to privacy, and honesty with professional colleagues". Collis & Hussey (2009:38-39), expand on the above and add the following: Confidentiality or anonymity, Dignity and Publication.

In this research dissertation we do not require 'ethics' clearance since we are not going to be looking and focusing on patients' records nor healthcare workers' performance, we only focus on the generic fundamental flow of information and look at what technologies are utilised for data and transmitting. The actual data values, e.g., patient data, are not considered at all since the focus is on for example the data elements such as patient's name, age, etc.

Ethical considerations: Cooper & Emory (2007:101), argue that the research client has a right to research that is ethically conducted. According to Cooper & Schindler (2008:121), three guidelines should be adhered to, namely:

> Explain the benefits of the study.

Explain the rights and protections of the respondent.

Ensure informed consent.

Within the above guidelines, the following ethical considerations were considered during the research survey.

Before any proceedings with the study, I accessed permission first from Western Cape Healthcare Department, who they referred me to the Site B Clinic Manager to whom I explained the research study purpose and my role as a researcher and who gave me permission.

Prior to every interview, every participant received a full explanation of his or her rights during the interview sessions and after the interview sessions; the purpose of the study was explained as well as my position as a researcher at the Cape Peninsula University of Technology.

1.10 DELINEATION OF THE STUDY

The research investigates the flow of information utilising ICT during the care of HIV/AIDS positive patients in Khayelitsha. Information and communication are two of the most critical and abundant resources available in the fight against HIV/AIDS. This research is part of larger international study and in conjunction with the HIV/AIDS Unit, at Cape Peninsula University of Technology (CPUT).

This research does not require viewing any individual patient data and therefore the privacy of patients will not be compromised. Any results or comments of participants will be treated with care and permission will be obtained before any references are made in any publications resulting from this research. The nature of the research is to present information utilisation and flows in terms of its generic components and structure and not its specific values. The research study data collecting was done in 2009 in mostly private and public healthcare centre in Khayelitsha township.

1.11 CONTRIBUTION OF THE RESEARCH

The proposed research has the potential to:
Highlight the benefits, which could be gleaned from the deployment of ICT within Healthcare centre service for the flow of information to support HIV/AIDS patients.

Without excellent and good healthcare service, groups, families, individuals, cannot communicate and nations cannot hope to achieve their social and economic goals. The healthcare sector is an information intensive sector. ICT presents challenges but has numerous potential benefits.

ICT should therefore be employed as a valuable tool to enhance healthcare delivery in order to contribute to modernisation and development of the country through improved healthcare and productivity of the communities.

ICT has the potential for explosive growth but more importantly in the delivery of better healthcare that eventually reduces spread of HIV/AIDS and improved healthcare service delivery and flow of information. The South African government must demonstrate its commitment to the implementation of ICT policies and promote both concept and practical application through participation, allocation of resources and open communication. The anticipated outputs for this research are:

> A landscape model depicting the information flows and technologies that support HIV/AIDS healthcare services in Khayelitsha.

> A needs analysis of the information and technology needs at the different points of care of the HIV/AIDS healthcare path in Khayelitsha.

> A summary of the problems that hinder the flow of information and suggestions for improvement

> A summary of the technology currently used and recommendations for improved technology at the different points of healthcare service.

The outcome of the research will contribute towards the improvement of information flows and to better support HIV/AIDS healthcare in Khayelitsha.

1.12 CHAPTERS AND CONTENT ANALYSIS

The chapters and content analysis for this research study will cover the following:

Chapter 1: Overview of the Research: The chapter will provide a brief introduction and background to the key factors as identified, which will contribute to the scope of the research.

The research process will be explained, followed by the formulation of the research problem, the research question and supporting investigate questions. Critical research assumptions and limitations of the research will be listed, feeding into the overall research design and methodology, the demand for qualitative research strategy and overview of the dissertation structure. The chapter will furthermore provide details of the chapter and content analysis of the dissertation including key research objectives.

Chapter 2: Abbreviated Literature Review: The utilisation of ICT in Healthcare. A holistic perspective of utilisation of ICT on mainly two approaches that is where ICT is the lead and the other where ICT plays a supporting role in Healthcare service to support HIV/AIDS information flow to be provided. ICT utilisation challenges to enhance healthcare centre services for HIV/AIDS patients; information flow from all stakeholders and compared with 'public' and 'private' sectors;. types of ICT equipments that are used for data capturing and for the information flow of patients; comparing ICT in developing, developed and new industrial countries; will discuss and do comparative study on the flow of Information in healthcare centres; outline reason for the difficulties encountered include not only the obvious such as lack of the equipment; poor infrastructure and lack of the required skills but all stakeholders involved such as rigid managerial control over ICT financial budget. The research will include effects and the reason why ICT projects failure in developing countries in Healthcare sector compare with developed countries and BRICS countries, also look at the role that utilisation of ICT plays in the economy, other government departments and life expectance.

Chapter 3: Research Design and Methodology: In this chapter we will be looking at research action plan, research case study, ethnography, field experiments, future research, grounded theory, cross-sectional studies and hermeneutics etc. The research methodology will be elaborated upon the descriptions of the research, such as 'unit of analysis', the 'variables', and the selection of a 'sample and sample type'.

Chapter 4: Data Collection Design: The approach to data collection will be explained and the target population will be defined. Evaluation and interpretation of data collected from both participative observation and the survey conducted within the scope of research will be analysed in detail and interpreted, in terms of

the primary theme of the dissertation. The chapter will be concluded with a list of questions to be proposed to the target population.

Chapter 5: Khayelitsha Case Study: In this chapter, the research will be focusing and elaborate upon the landscape and challenges that correlate with the HIV/AIDS such as TB, poverty, crime, lack of education, migration etc. We compare the 'public and private' sector in the township of Khayelitsha and zoom into the current technologies and other resources they are utilising; compare Site B clinic information flow using ICT to help HIV/AIDS patients with other clinics around Khayelitsha and outside Khayelitsha Township.

Chapter 6: Discussions and Data Collection Results: In this chapter, the research will be discussing in more detail the data collected from all the research questionnaires will be analysed further and discussed. In addition, the results of the survey will be mapped to the literature review conducted in Chapter two.

Chapter 7: Conclusion and Recommendations: In this chapter we will do summary of the research and recommendation for future research.

CHAPTER 2

2. LITERATURE REVIEW

2.1 INTRODUCTION

In academic research the classic way is to identify a research problem by doing a literature search. Previous research may have suggested ways of eliminating inconsistencies between their findings and those of other studies or a theory. By doing so a review of research findings on a particular research topic that have already been published, researchers may become aware of inconsistencies and gaps that may justify further research. According to Bless, Higson-Smith & Kagee (2006:30-100), literature review is an ongoing process whereby acquaintance with different theories and models as well as research results take place, by necessity before a clear statement of the problem can be formulated.

The literature search will assist in familiarising myself with existing literature related to the study. According to Ferreira (2009:5-12), the literature search will assist the researcher in developing the ability to recognise and select the significant and relevant information, without getting lost in trivial matters. It will also assist the researcher in the knowledge of relevant literature and help to define boundaries of his or her research field. For the purpose of this study, the literature review from the following sources will be utilised, namely: books; government legislations; government policy documents; development papers, files; published and unpublished research material; journal articles; academic papers; official reports; and other relevant literature.

In this chapter on the question how ICT can support the healthcare sector in offering new services and becoming more efficient and effective is considered. This research will look at a perspective of utilisation of Information Communication Technology (ICT) on mainly two approaches, firstly, that ICT leads and secondly where ICT plays a supporting role in Healthcare centre to support HIV/AIDS. In addition the current information flows and the challenges and barriers that influence the flows are considered.

Technology equipments utilisation to capture patients' information from the onset they receive assistance from healthcare facility for the 'public' and 'private' sectors on the service delivery to HIV/AIDS patients and their information flows is also considered.

2.2 HEALTHCARE SERVICES

From the 1700s to the mid-1800s, those who became sick or injured and could pay stayed at home for treatment (William et.al, 2010). Only the lowest class person went to the hospital, which was often only a separate wing on the pesthouse (Torrens, 2008). In the late 1700s, at the urging of European-trained physicians, a few communities established the first community-owned or voluntary hospitals (Capron, 2007). Although these hospitals admitted both the poor and paying patients, it was not until the late 1800s that hospital stays became widely accepted (Torrens, 2008). Healthcare is a major industry in all developed countries where thousands of millions of dollars are spent each year and many millions of people are directly or indirectly employed. As a consequence, modern healthcare systems are extremely complex in order to deal with all aspects of services provision (Schorn, 2010). This imposes constant demands for information at virtually all levels of the healthcare system, including decision making, policy development, short-term and long-term planning, budget forecast and planning, management, research and development, and most importantly, patient care and clinical services (Thomas, 2009)

The current healthcare environment is characterised by three major problems: accessibility, quality, and cost (Kvedar, 2008). All three are interrelated and, given current directions, appear intractable. In a population that is plagued by unhealthy lifestyle choices, the proportion of uninsured and underinsured is growing, while the expansion of healthcare capacity is too slow to meet growing demand. Chronic illness cases are increasing while the number of providers is shrinking, leading to both capacity challenges and a need to keep patients out of healthcare facilities to relieve bottlenecks (Kvedar, 2008).

"Epidemic updates 2007 essential findings: every day over 6800 persons become infected with HIV and over 5700 persons die from AIDS, mostly because of inadequate access to HIV prevention and treatment services (UNAIDS, 2012)."

The HIV/AIDS pandemic remains the most serious of infectious disease challenges to public healthcare. Africa is the highly infected almost 30 million people, with the vast majority residing Sub-Saharan Africa countries and this region remains the most seriously affected region, with HIV/AIDS remaining the leading cause of death in this region (WHO, 2008).

Healthcare is one of the most technologically intense and data-rich industries (Kaushal et al., 2005). Today, however many if not most physicians collect and process patient information in an antediluvian manner,much as physicians did 50 years ago without the benefit of information-systems decision aids and prompts (Palank, 2006). Paper records are full of data, but contain little useful information and are prone to error (Middleton, 2008).

Modelling actual and theoretical healthcare information networks sets a foundation for analysing the issue of seamless transfer of medical information between different agents in the healthcare system (Walker et al., 2005). Such a network would link systems of clinicians, hospitals, laboratories, pharmacies, and insurers so that patient information is accessible from anywhere at any time (Bates et al., 2003).

The proper functioning of a healthcare information system requires an advanced healthcare information network that supports clinical care, personal healthcare management, the reduction of avoidable mistakes in population healthcare and research, and evidence-based medicine (Hanrahan et al., 2006).
Powerful social and economic forces are moving us towards an integrated, patient-centred healthcare information system that will allow providers to exchange up-to-date patient healthcare information quickly and easily. These forces include patient safety, potential health care cost savings, and empowerment of consumers, new policies and growing regional health care initiatives (Cotter, 2009).

Electronic medical records (EMRs) are a key component of future healthcare systems (Hill et al., 2007). EMRs are owned by healthcare providers (HCPs), and integrate information from multiple sources, capture data at the point of encounter, and provide decision support to clinicians.

The EMRs include clinical documentation, results management, order entry management, decision support, electronic communication and connectivity, patient support, administrative process support, and population healthcare reporting (Committee on Data Standards for Patient Safety, 2008).

Healthcare has also become one of the most troubled industries, currently confronted with massive cost overruns, increasing acknowledgment of serious quality problems (Ahern, 2008). Demands for universal healthcare that raise inflationary risk (Thomas, 2007). In a time when politicians rage about the need for a more expansive healthcare system, little attention is focused on how to pay for improved healthcare (Anderson, 2008).

2.2.1 Global Healthcare Services

To perform their services, modern healthcare organisations are profoundly dependent on rich and accurate information collected and shared between multiple organisational levels. However, to be able to manage large amounts of data, the organisations need an integrated structure and a health information system (HIS) to rapidly spread the information among managers and care providers (Kuhn & Giuse, 2009).

Some of the most promising and clearly demonstrated applications for ICT in development are in the improvement of health care service delivery. Experience to date suggests there is a number of specific ways ICT can be applied to achieve better health outcomes (ICT is being used in many developing countries and communities to facilitate remote consultation diagnosis and treatment) (Kuhn & Giuse, 2009).

ICT already now makes a significant contribution to the functioning of our healthcare system. Until now we have been struggling with severe limitations in capacity, for processing, storage and bandwidth. In the coming 10 years the technology will offer virtually unlimited capacity, in that respect the future looks bright. The development of reliable communication with adequate functionality to support new ways of healthcare delivery is crucial and far from easy (Kuhn & Giuse, 2009).

If this idea is accepted that ICT will be the main facilitator for innovation of healthcare delivery services, International Medical Informatics Academia (IMIA) might take the initiative to bring together the healthcare professionals, medical informatics academia and the industry to explore ways to accelerate the introduction of new forms healthcare delivery intensively support by ICT (Bakker, 2002:56). Healthcare is a complicated system. Many healthcare professionals will be involved in the healthcare for the same patient, for example, for a patient with HIV/AIDS they all need information to do their job properly. The healthcare processes may not be structured in detail; which could result in healthcare proffessionals improvising by finding round about ways to deal with these processes where they are not clear (Hossain, 2010: 204).

For ICT to make a contribution to the efficiency and effectiveness of the healthcare process there are high demands on amongst others functionality, quality of the data (complete, up-to-date, comparable, presented in a coherent way), the accessibility and availability of the data and the recording of the data (Bakker, 2009:56). Although a lot has been achieved already in the application of ICT in healthcare much still has to be done still. Broadcast media has been widely used to combine education and entertainment to provide important messages about health topics, with examples including same-language subtitling and entertainment programs containing messages about HIV/AIDS awareness (Halewood & Kenny, 2007:2-6).

The absence of ICT can mean disorder in supporting of the healthcare sector in offering new services and to become more efficient and effective. Only small numbers of healthcare centre facilities in South Africa store patients' records electronically, include townships and rural area (Bakker, 2002:57). Similarly, communication between district facilities, the provincial department and National department of Healthcare remain primarily manual (Nemeth et.al, 2010:193). Given that there is no cure for HIV/ AIDS, the government's strategy focuses on prevention by promoting public awareness and delivering life skills and HIV/AIDS education (O'Donnell et.al., 2010:2-5). At present, there are more telephone lines in Manhattan than in all of sub Saharan Africa excluding South Africa (Niyato, Ekram, & Diamond, 2007:72-75). Physical infrastructure must be accompanied by adequate education and an ICT culture; otherwise there can be no widespread use of these technologies (O'Donnell et.al., 2010:2-5) ICT is one of the key tools for modernisation and development of a country.

2.2.2 Healthcare Services in Developed Countries

Healthcare is a major industry in all developed countries where thousands of millions of dollars are spent each year and many millions of people are directly or indirectly employed (Gupta, Dasgupt, & Atul, 2008:147). As a consequence, modern healthcare systems are extremely complex in order to deal with all aspects of services provision. This imposes constant demands for information at virtually all levels of the healthcare system, including decision making, policy development, short-term and long-term planning, budget forecast and planning, management, research and development, and most importantly, patient care and clinical services (African Development Bank & OECD, 2009:34). Effective information management and communication of data require that healthcare systems install computer networks both within and between various healthcare institutions, particularly between urban and rural healthcare institutions (Gerster Consulting, 2008:8). Enhanced access to health-related information plays an essential and integral part in improving the quality of the healthcare system and in providing good services to the patient and community (Bakker, 2002:54).

Example of ICT opportunities in Healthcare key issues, growth prospects and market opportunities in Europe and the US is a report that outlines the geo-political and market pressures facing the healthcare sector and demonstrates how ICT solutions are helping to address them (Nemeth et al., 2010:193). Opportunities for ICT vendors, systems integrators, analysts, channel partners and consultants, enable them to target both the geographical regions and ICT segments that offer the greatest profit opportunities. Revenues increase by targeting the key growth areas in ICT spending in the US and European healthcare sectors (Mori, 2010:96).

In what follows the European ICT sector is compared to its Japanese and US counterparts in order to determine the basic similarities and differences across countries and regions (Mori, 2010:98). We then move on to analyse the patterns of specialisation; our main focus is on the dynamics, i.e. they determine whether the tendency of the ICT sector to cluster geographically has changed in the millenium. Empirical studies of specialisation have largely relied on the analysis of export statistics. This is indeed appropriate, if the common assumption that the export of a product signals the country's comparative advantage as suggested by basic Ricardian trade theory is accepted (Bailur, 2007:23-32).

ICT includes all the technology that facilitates the dispensate, move and exchange of information and communication services. In principle ICT has always been accessible since the arrival of the printing press. The only distinction is that from the late twentieth century, fast advances in technology revolutionised the conventional ways in which information was processed, communications conducted, and services available such as cellphones, internet etc. (Borgman, 2009:6-9).

2.2.2.1 Impact of ICT in developed countries general

Currently information services have been recognised as a necessary criterion for well-managed healthcare systems (Gupta, Dasgupt, & Atul, 2008:149). It has been shown by Leeder (2003) that properly structured information services will benefit all levels of the healthcare system, including the states and local communities, patients, care providers and managers.

To provide high quality and user-friendly information services, research and development have been carried out in various medical institutions, computer science and information industries on specialised aspects of medical information systems (Bless, Higson-Smith & Kagee, 2006:43).

The healthcare profession has many specialised needs in the areas of networking and communications, information management and monitoring, information recording, retrieval and update, and graphical user interface, etc. Providing the human capital required for ICT enabled industries the best form of intervention to expand employment opportunities for young people in this area with a better track record than industry subsidies and tax breaks (Bebbington, 2006:2025).

2.2.3 Healthcare Services in Developing Countries

The state of affairs is in developing countries is that poor people not only have less access to ICT, but they also have fewer schools and teachers, fewer doctors and nurses. At first, considering these other concerns which may give the impression that they more relevant, e.g. the fight against poverty than access to a telephone or the Internet. In fact in order to address these societal problem ICT and appropriate applications may become increasingly important to facilitate the delivery of services such as healthcare and education (Ward & Moule, 2007:62).

It is not an issue of opting between ICT and healthcare or ICT and education, but instead that of opting the most valuable way for ICT to help in the delivery of healthcare, education, and small business development services (Ward & Moule, 2007:62). However, according to Osterwalder (2004:335), capitalising on the opportunities of ICT depends not only on the existence of infrastructure and access, but to a large extent on the existence of ICT related human capacity which plays a huge part in service delivery. These capacities can be divided into three main groups, which are infrastructure related; sector application related; and user related see Figure 2.1 below:
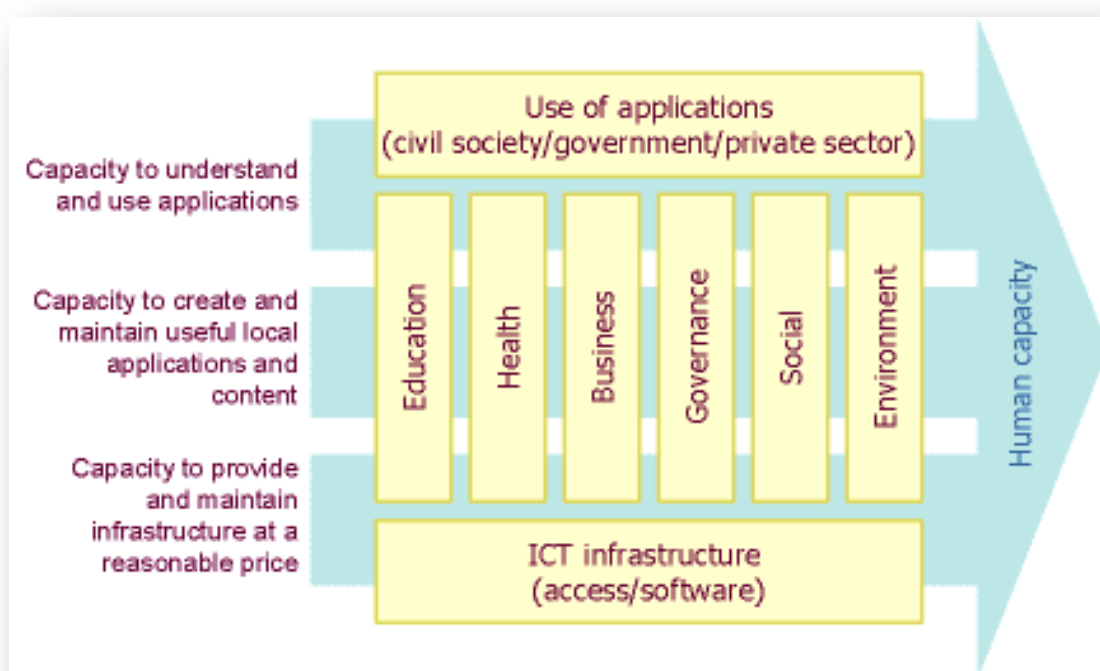
Figure 2.1: Cross-sectoral impact of ICT (Osterwalder , 2004:336)

The voices of women in a video proposal in Nairobi, Kenya, show how the utilise of ICT can give power to women living in poverty by giving them a voice in public policy making, through digital video equipment.The women in the project learnt scripting, shooting videos, editing and how to present their communities by presenting rough cuts and recorded opinions. This has guide to straight and maintained contact with political representatives and those in control of civic services. A most important impact has been the augment in contribution in the political procedure and the women have also secured a contract with a local TV network to regularly supply short news briefs from their villages (Foster, 2002).

In an perfect world, ICT can contribute to improved relationship between governments and citizens, by ever-increasing information flows, transparency and accountability. Additional, for citizens and civil society to have any authority on decisions that affect them, and to get hold of their rights, they need to be able to connect and communicate with government via straightforward usable and accessible information tools (Osterwalder, 2004:337). ICT has an significant impact on business in developing countries by making new opportunities, in particular by allowing the creation and delivery of digital goods, for instance music, but also by simply do away with the middlemen. This so-called dis-intermediation has authorised firms in developing countries to augment margins and revenue by right of entry on profitable foreign markets directly (Gerster Consulting, 2008:7).

2.2.3.1 A success ICT project for Entertainment as example in developing country

Caribbeat Entertainment is a corporation that promotes and sells Caribbean music all the way through the use of sophisticated ICT. The major reason of Caribbeat is to offer an online music portal that offers a variety of services to artists, musicians, distributors, and other persons with interest in Caribbean music. This is completed throughout a number of activities, for instance an online service that plays music from the English, French, Spanish and Dutch speaking islands. The music, which is free of charge and is send out from a server based in California, can straight away be purchased in the form of CDs from the online music store. Caribbeat Entertainment's biggest success to date has been the discovery of Abijah, a growing star who has won the Caribbean MusicExpo (CME) Talent Search in (Osterwalder, 2004:339).

2.2.3.2 ICT equipment such as Computer or PC

The adoption and usage of Information and Communication Technology (ICT) is changing business processes, and the way people live and work. New innovations as a result of ICT are continuing to emerge. According to Ssewanyana and Busler (2007:49), in the year 2006 worldwide, 839 million computers were being used with 534 million in USA, European Union and Asia, leaving 305 million in developing countries.

The number of computer usage was projected to grow to one 1.5 billion by the year 2009. Similarly, the Internet users were just over billion in 2007, and the number was estimated to grow to 2 billion users by 2014, and the majority of these users were in developed countries (Ssewanyana and Busler, 2007:50). The Internet usage rate in the developed world was 8 times that of the developing countries, and there were 22 million Internet users in Africa by 2004 . ICT has the capacity to cut costs of coordination, communication and information processing and many businesses have taken advantage of this (Ssewanyana, 2009:3).

Taking advantage of information and communication technologies (ICT) is an growing challenge for developing countries. In the tourism sector, local tourism providers use the internet to market their offers directly online. Most developing countries are now attentive of what they stand to achieve from ICT and are making vital efforts to give confidence their distribution and use. Yet, the gaps are still far too wide. For example, "while the number of Internet users in Africa grew by 76% in 2008, only 1% of Africans had access to the web, compared with 55% of North Americans" (James & Versteeg, 2007:120). ICT has development effects, and the more people use ICT, the greater the impact. Thus, governments should introduce ICT policies in all spheres of society.

This requires: raising public awareness of the role of ICT in improvement and providing training in ICT skills; providing affordable and quality access to the Internet and other technologies; promoting ICT among small and medium-sized enterprises; putting in place a legal framework for online transactions; ensuring that governments use ICT and encourage local businesses to do the same; supporting open content and open technology approaches, such as free and open source software; and measuring and monitoring the current use of ICT and its economic and social impact.

2.2.3.3 ICT challenges in developing countries

Many who are not familiar with the subject wonder if ICT is relevant to the poor. They argue that poor people in developing countries not only have less access to ICT, but they also have fewer schools and teachers, fewer doctors and nurses, and a lower intake per capital than people in developed countries (Busse & Hefeker, 2007:399-400).

An ICT strategy in keeping with national development strategies can help to achieve a global information society and its associated social and economic benefits. But this will only happen with the commitment and cooperation of national governments, the business sector, civil society and the global community. While developing countries are generally eager for their enterprises to adopt ICT solutions, there are numerous obstacles (Ssewanyana & Busler, 2007:44). Some are well-known: low income levels; lack of know-how; inadequate ICT infrastructure; cultural resistance to electronic trading; conservative business practices; and lack of security for online transactions.

From the early 90's with the advencement of the Internet, many have seen ICT as a difficult tool to close the gap between the developing world and the developed world by omitting certain stages of industrial development and leapfrogging into the Information Economy (Dasgupta, Lall & Wheeler, 2005:230-233). Analysis around the world reveals more than enough evidence, that if it is used in the right way and for the right purposes, ICT can have a dramatic impact on achieving specific social and economic development goals as well as play a key role in broader national enhance strategies (Borgman, 2009:4).

2.2.3.4 Bring ICT to benefit developing countries

ICT is any technology that enables communication and the electronic capture, processing, and transmission of information. Radio, television and print media are vital in many developing countries. In recent years 'new' ICT, such as mobile phones and the internet (and associated applications such as Voice over Internet Protocol (VOIP), transmitting telephone calls over the internet) have become available to growing numbers worldwide. The most rapid growth is in mobile phone usage (Faulkner & Loewald, 2008:7-12).

Information and communication technology (ICT) can help developing countries tackle a wide range of health, social and economic problems. By improving access to information and by enabling communication, ICT can play a role in reaching millennium enhance objective such as the elimination of extreme poverty, combating serious disease such as HIV/AIDS, TB, etc. and achieving universal primary education and gender equality (Gerster Consulting, 2008:6-10). However the benefits of ICT are not fully realised in many countries.

ICT is often out of reach of the poor and those in rural areas and previous disadvantage area such as Khayelitsha Township in our case (Jadad & Enkin, 2006:86). According to James and Versteeg (2009:118), the total (fixed and mobile) telephone access in developing countries increased from 31% in 2004 to 81.3% in 2009. Internet usage has also grown rapidly, from 6.7% of developing country inhabitants in 1994 to 67% in 2004 (Hadenius & Uggla, 2006:1634). However, there are wide differences between developing countries, the benefits of ICT are not fully realised as many countries have inadequate infrastructure and human capacity to support ICT (Hadenius & Uggla, 2006:1634). There are wide differences in the extent to which socio-economic groups within countries, benefit from ICT. The 'digital divide' commonly refers to the gap between those with access to ICT and those without; however, many factors besides physical access contribute to these differences such as the following:

> *Lack of appropriate products*: products are often not designed to meet the needs of the poor, or those in remote areas. These groups can face constraints such as access to electricity (lacked by two billion people worldwide).
>
> *Cost*: roughly half of the world population live on less than four dollars a day. Many potential users are too poor to afford any form of access to ICT. Healthcare and education: even where there is physical access to ICT, many people do not have the technical skills needed to benefit from ICT.
>
> *Language*: Poor literacy is a problem with ICT such as the internet. Of those who can read, many know only a local language, while the internet is dominated by English-language content.
>
> *Human resources*: As in many sectors, the migration of skilled ICT professionals from developing to developed countries contributes to a lack of human resources to support ICT.
>
> Lack of robust regulatory framework for ICT can limit uptake.

2.2.3.5 Case study: ICT policies in developing countries

Sub-Saharan countries fare worst (excepting South Africa), (United Nations, 2009:4). In 2007 Zimbabwe had 36.5 mobile subscribers per 100 people, compared with 68.3 for India, 76.3 for Brazil and 132 for the UK (Jeffrey James & Mila Versteeg, 2007:121). Although levels of access are low in many African countries, growth over the previous five years has averaged 60% a year. In 2004 Africa was the region with the highest mobile phone growth rate. Growth rates in India averaged 90% over the same period, among the fastest in Asia.

One reason for differences between developing countries is the wide variation in government policy on ICT.

2.2.3.5.1 Case study: Ethiopia

In Ethiopia 40% import tariffs on ICT equipment makes it too costly for all but the best. The incumbent public telecom operator has a monopoly over all telecom services. Although the number of mobile phone subscribers is growing, uptake in Ethiopia is among the lowest in Africa. About 60% of telephones and 94% of the 6,000 internet accounts are concentrated in the capital, Addis Ababa.

This is due to the limited telecom infrastructure, low levels of computerisation outside the capital and lack of human resources. However the government's attitude to ICT may be changing, with the establishment of an Ethiopian ICT Development Authority, and changes in management of the two key telecommunications agencies (Mengesha, 2010:1-4).

2.11.5.2 Case study: Egypt

In Egypt a dynamic Ministry of Communications and Information Technology has played a strong role in catalysing ICT enhancement in collaboration with the private sector. For example, its transfer of internet subscription charges from consumers to Telecom Egypt and internet service providers (ISPs) coincided with a sharp rise in new users: from 9 users per ten thousand inhabitants in 2001, to 55 per ten thousand in 2004, (Ragab, 2010:7-10).

Many factors could contribute to bridging the "digital divide" such as governments, NGOs, industry and international donors who all play a role, often working together. However, assessing whether differences are increasing or decreasing is difficult because sales figures give no indication of types of usage of the same ICT in different countries. New technologies, and changes in usage, can increase access to ICT. For example, recent developments in wireless local area network technologies are raising new hopes for internet diffusion in parts of the developing countries. Sharing of devices is common in developing countries; it can also generate employment. Open Source Software (OSS) is also an expanding area. Since there is no licensing fee attached to it, OSS can be cheaper to acquire than proprietary software (Parliamentary Office of Science and Technology (Postpone), 2006:2).

Some areas or community groups considered unprofitable to service might be left without access to ICT. Some analysts question whether industry will make a significant difference to the enhancement of ICT programme. However, industry commentators suggest it is playing a role. For example, in India, Intel is working to address problems in rural areas, where PCs are affected by heat, dust and unreliable power sources. Ericsson, in partnership with the United Nations Development Programme, is working towards improving mobile coverage for rural users in the developing countries. Many industry commentators attribute the rapid increase in mobile telecommunications in Sub-Saharan Africa to private sector investment.

2.2.3.5.2 Case study:Case study: Tanzania

Before liberalisation of the telecommunications sector in the 1990s, very few Tanzanians were able to access a telephone. This was because monopoly landline prices were high and services were poor, biased towards urban-centres and sometimes required payment of a bribe to be connected. With liberalisation, mobile phone subscriber rates in Tanzania increased almost 130% a year from 2003 to 2008. Airtime vouchers in low denominations cater for those who can afford to pay for only one call, while other customers without a handset can use a roadside line rental service available in many developing countries. Customers save on the costs of time and money used to travel to a landline in town, while the operators gain income and provides a service that reduces the digital divide (Postpone, 2009:3).

2.2.3.6 Government Strategies for ICT in developing countries

Government strategies in developing countries, from cutting taxes on devices such as mobile phones, to liberalising markets, can increase ICT uptake. However, it is argued that some policies increase only net ICT access. For example, efforts to develop the "high tech" end of the market, such as mobile phones with multimedia exchange, tend to benefit the middle classes rather than improving basic levels of access for all. It is also argued that governments sometimes set overambitious targets for ICT uptake, which have little hope of being put into practice. Some commentators suggest developing country governments should encourage uptake of technologies such as mobile phones, which have proved popular among the poor (Baliamoune-Lutz, 2005:154).

Many research papers show that it is better to promote ICT like the PC, uptake of which has been comparatively slower. IT skills training play a role in improving access to ICT. According to Hossain (2010:203) however, there is debate over how to raise awareness and generate demand: some say donor-funded telecentres (which offer a range of telephone, computing, internet and information services) have a role to play in familiarising people with basic ICT. Others suggest generating consumer demand is more important, citing the growth of the internet among middle-classes in China (Tang, 2010).

2.2.3.7 The NEPAD role for ICT in developing countries

New Partnership for Africa's Development (NEPAD) is an African-initiated strategic framework for the continent's revival. It identifies ICT development as a priority action area (Bakari, 2007). It focuses on two key areas: the rapid development of ICT infrastructure and dissemination of ICT skills across the African population, by implementing an e-schools programme across primary and secondary schools. NEPAD has been widely praised for having placed ICT on the development agenda although some critics suggest it lacks the resources and infrastructure to fulfil its goals.

2.2.3.8 Commission for Africa (CfA) for ICT in developing countries

Commission for Africa (CfA)

The CfA is a UK government initiative set up in 2004 to stimulate development in Africa. The CfA report from 2005 recognises the importance of ICT in many areas, including higher education, economic growth, governance, culture, trade and finance (Bakari et al., 2007). It urges donors to increase funding to support a free media (including new CT such as internet broadcasting).
Critics say that although the commission proposes substantial increases in funding to carry out its recommendations, it is not clear how these funding increases will be delivered (Baliamoune-Lutz, 2005).

The relevance of spending development aid on improving access to ICT is questioned arguing that basic services should be prioritised. However, it is increasingly acknowledged that the two approaches are linked, since ICT can improve access to basic services, such as health and education (Harris, 2004).

It is difficult to demonstrate that increasing access to ICT has a positive impact on enhancement, when looking at the broader picture rather than at specific case studies. According to Hossain (2010:205), there is limited research in these areas; although such links have been established in developed countries (where, for example there is evidence of a link between telecoms enhancement and economic growth) it is too early to observe this effect in developing countries. ICT has many social, environmental and economic impacts (Mwakaje, 2010:113):

Cultural: In many cases culture adapts to fit technological development, and not vice versa.

Intellectual Property Rights: ICT can help disseminate indigenous knowledge (such as herbal medicine). However, by publishing such information on the internet the knowledge of the economically poorer may be exploited with no benefit to them.

Employment: ICT can take jobs from those who have previously benefited from their specialised knowledge, such as agricultural middlemen who know market prices. ICT does create new jobs, although they are likely to be quite different from the disappearing jobs.

Environment and health: ICT devices often contain toxic substances, particularly 'reconditioned' (but sometimes obsolete) ICT hardware donated to developing countries. Increased use of ICT presents challenges for managing electronic waste as well as energy consumption.

2.2.4 Healthcare Services in the New Emerging Industrial World Countries

The New Emerging Industrialising World (NEIW), consisting of Brazil, Russia, India, China and South Africa is known as BRICS where these countries have the largest developing countries with the most prospective economic growth in the next generation of the world. The BRICS generated 27% of the world GDP (PPP) in 2005 by sharing 28.9% of land space and 43.2% of population (Manhart et.al, 2008:1-3).

Some of these sources claim that President Vladimir Putin of Russia Federation was the driving force behind this original cooperative coalition of developing BRICS countries. However, thus far, no text has been made public of any formal agreement to which all five BRICS states are signatories (Filippetti, 2011). Jim O'Neill told the summit that he was constantly being lobbied about BRIC status by various countries. He said that South Africa,

at a population of under 50 million people, was just too small an economy to join the BRIC ranks (Reuters, 2011) and (Investment Outlook Summit, 2010).

However, after the BRIC countries formed a political organisation among themselves, they later expanded to include South Africa, becoming the BRIC member to form BRICS (Yao, Watanabe & Li, 2009:9-28).

This does not mean, however, that they have not reached a multitude of bilateral or even quadrilateral agreements. Evidence of agreements of this type is abundant and is available on the foreign ministry websites of each of the four countries. Trilateral agreements and frameworks made among the BRICs include the Shanghai Cooperation Organisation (member states include Russia and China, observers include India) and the IBSA Trilateral Forum, which unites Brazil, India, and South Africa in annual dialogues (Yao, Watanabe & Li, 2009:9-28).

2.2.4.1 Economic strength of NEIW or BRICS countries

The new emerging industrial world (NEIW) has abundant natural resources. China accomplished a conspicuous economic growth of 9.8% p.a. over the period 1980–2003, followed by India and Brazil with 5.8% and 2.4% p.a., respectively (International Money Funds (IMF), 2009). The vast potential of the NEIWs' economic growth can be attributed to their affluent natural resources and land, coupled with a large and cheap labour market and a high rate of foreign direct investment. (Yao, Watanabe & Li, 2009:9-28).

Both China and India have massive populations of over 1 billion each, enabling the potential for job growth in manufacturing, software services, and call centres. While Brazil, Russia and South Africa have a total population estimated to be far lower compared with India and China, these countries try to develop their energy and raw materials driven industries (Pillania, 2009:90). In 2004, the amount of foreign direct investment in the BRICS countries was 15% of the total foreign direct investment in the world, and 41% of that of all developing countries combined (Gammeltoft, 2008:5-6).

However, the experiences of developed countries and BRICS demonstrate that sustainable economic development depends on technology innovation that activates and synchronises the potential of natural, financial,

and human resources with economic growth according to (Yao & Liu, 2011:1067). Similarly, BRICS countries sustainable economic development is subject to technology innovation, whereby they can effectively utilise their potential resources of all kinds. While BRICS have demonstrated total factor productivity (TFP) growth rate higher than that of other countries including industrialised countries such as the USA and Japan and their TFP contribution to GDP, the growth rate still remains at a lower level (Meschi &Vivarelli, 2009).

This implies that while the BRICS countries make use of potential technology development they still remain dependent on the momentum of rapid economic growth and not on substantial innovation which would enable effective synchronisation of their potential resources with sustainable development. Notable prospects for this expectation can be seen in BRICS's conspicuous advancement in information and communication technology (ICT) (Yao & Liu, 2011:1068-1069).

2.2.4.2 ICT in NEIW or BRICS countries

Corresponding to a paradigm shift from an industrial to an information communication technology society in the 1990s and with the unique features of ICT as a self-transmit energy reacting to the momentum of economic growth according to Kondo et al. (2003: 319-35); Watanabe et al. (2004:307-20), BRICS countries have demonstrated the world's highest advancement in development and utilisation of ICT in computers, the Internet, and mobile phones (Armijo, 2007:8-10). With the momentum of economic growth, such quick advancement in turn, drives the co-evolution of their institutional systems according Watanabe et.al. (2004:205-19).This increase suggests that the advancement of ICT in NEIWs could trigger the co-evolution between their innovative and institutional systems, which is essential for their sustainable development by means of effective utilisation of their potential resources (Yao, Watanabe & Li, 2009:9-28).

Furthermore, the unique nature of ICT is formed dynamically through the interaction with other institutional systems (International Development and Reseach Centre (IDRC), 2005:56). Given the obvious momentum in BRICS's development, there is a strong possibility for them to maximise the benefit of ICT by lever aging its self-transmit nature.

However, despite the increasing number of studies on BRICS's development and growth, to date, no attempt has been made to identify the possible co-evolution between their institutional systems and innovation, essential for their sustainable development by making effective utilisation of their potential resources (Yao & Liu, 2011:1069). Based on the preceding reviews, there are three hypotheses with special focus on the following dimensions (Watanabe et al., 2004:205-19):

> Firstly, the potential of BRICS' technology to utilise their potential resources for sustainable development

> Secondly, considering manufacturing technology, ICT and software as innovation, a comparative empirical analysis is conducted of the co-evolutionary dynamism between innovation and institutional systems in 40 countries with special attention to the four BRIC countries

> Finally, the triggering role of ICT to the co-evolutionary dynamism in the BRICs is examined. The ICT is represented here by the personal computer, the Internet, and the mobile phone.

2.2.4.3 Analytical framework of ICT in NEIW or BRICS countries

As reviewed in the preceding section, given the BRICS' strong impetus in development in addition to their conspicuous development and utilisation of ICT, their sustainable development can be envisaged. This can be done by triggering a co-evolution between innovation and institutional systems through the further advancement of ICT, thereby enabling effective utilization of their potential resources (Yao, et al., 2009. This dynamism is illustrated in Fig. 2.2.

In line with this dynamism, the following four dimensions essential for BRICs' sustainable development are analysed: Potential of technological advancement, Institutional systems, Co-evolutionary dynamism between innovation and institutional systems, and Triggering role of ICT (Yao & Liu, 2011:1070).
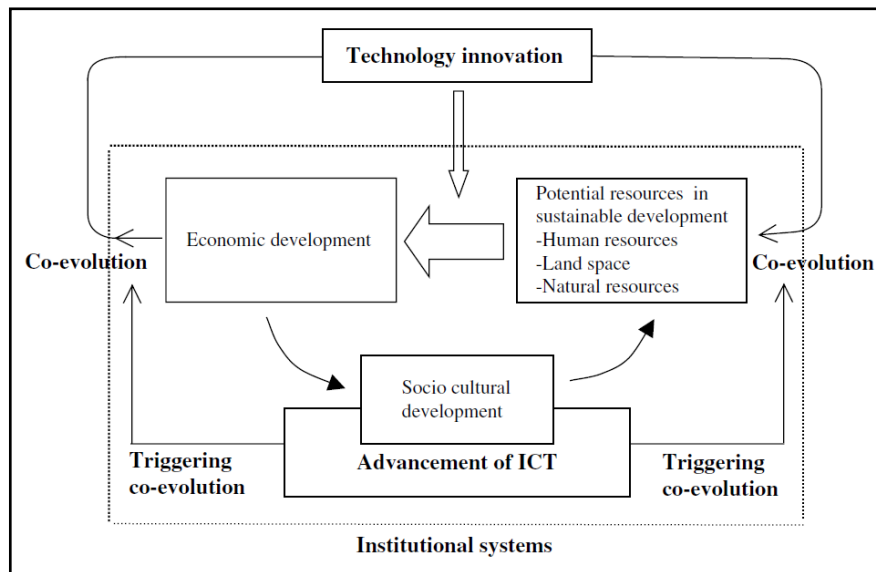
Figure 2.2: Scheme of NEIW sustainable development (Yao, et al., 2009:9-28).

Measurement of the triggering role of ICT in-depth analysis is focused on the triggering role of ICT to the co-evolutionary dynamism between innovation and institutionary systems taking PCs, Internet, as well as mobile phone as representing ICT. On the basis of the preceding analyses, the role that BRICS countries ICT may play in triggering the co-evolution between innovation and institutional systems is examined (Armijo, 2007:8-11).

This co-evolution leverages BRICS countries innovation driven economy and enables BRICS sustainable development by making effective utilisation of potential resources. On the basis of logistic growth model three depicts the ICT development trajectory, developing trajectories of PC, Internet (IN) and mobile phone (MP) as the core technologies of ICT (Yao, et al., 2009:9-28).

2.2.4.4 Impact of ICT in NEIW or BRICS countries

This is changing rapidly as the industry begins to realise the full potential of these technologies and an increased uptake creates a host of opportunities for vendors, systems integrators, service providers and resellers (Gammeltoft, 2008:7).

The ICT sector has fostered the growth of several developed and developing regional areas. One of the most interesting regional areas is China. According to a report by (Manhart et al., 2008:4-9). Nearly half a billion mobile phones were added to the global network 2000-2003 in new industrial countries alone (Stump, Gong & Li, 2008:398-400). Regarding the Internet, more than one quarter of a billion people in new industrial countries are users (Mohsen & Kenny, 2009:1). Nonetheless, ICT penetration is very low in remote areas in new industrial countries. New industrial countries have made significant progress in connecting schools in Chile, for example, 62 percent of schools are online. The percentage of schools connected to the Internet for eight countries in the Sub-Sahara Africa and the average proportion of schools covered in these countries is seven percent excluding South Africa and Mauritius (African Development Bank and OECD, 2009:77).

In some countries accessing the Internet through alternate means appears to be more adept. A survey conducted by Internet Society of China found that a considerable number of mobile phone users say they surf the Internet via mobile phone services (Gammeltoft, 2008:8). The study also suggests that the heaviest users of Internet via mobile have said that the results are not reflecting everywhere (Stump, et al., 2008:404-407). General survey results of usage of internet in new industrial countries, primary use of the internet was found to be mostly among youth, survey results in more use of email, google search as primarly to find information on internet (Geary, 2005).

Most of this type of research has been concentrated in new industrialised countries, where results have been mixed (Goolsbee et al., 2009). Moreover, its largest population in the world and fast economic development nowadays provide an enormous market for ICT-related products and services. For instance, Cisco, Ericsson, IBM, Intel, Nokia, Microsoft, Motorola, Samsung and Siemens, all have their subsidiaries in China where all of them operate well in terms of revenues (Guzma'n, 2009). China is Samsung's biggest market and its revenue in 2009 was 3.4 billion, followed by the USA with 2.7 billion. There are, however, ICT companies that play an important role within the global ICT industry China Mobile, the mobile network operator in China, is now the world's largest ICT company in terms of its market capitalisation (Thomson, 2006).

2.3 INFORMATION COMMUNICATION TECHNOLOGY IN HEALTHCARE SERVICE PROVISION

The wealth of a nation is the health of its people; as a result every attempt must be made to make sure the highest level of well-being is achieved especially where disease prevention and control are achievable (Gohlke, Hrynkow & Portier, 2008:3). ICT can have a massive impact on all aspects of healthcare, from delivering the information people need to lead a healthy lifestyle to providing new tools to design tomorrow's medicines; from making healthcare systems more efficient and responsive to providing mobile healthcare technologies. Healthcare is severely under-funded in Africa, and it is possible that 6-8% of GDP could be mobilised for healthcare (Yao & Liu, 2011).

Healthcare has always been at the cutting edge of technology for patient treatments and monitoring, yet the industry has made little use of information and communications technologies (ICT) to support these practices (Yao & Liu, 2011).

Clearly the underinvestment in ICT has not caused all the problems in our healthcare service, nor is it a solution to address all the issues. However, as with complex service enterprises such as airlines, insurance and banking, the transformation needed cannot take place without significant investment in ICT and the co-requisite business process re-engineering. ICT is the key enabler to a successful transformation which will meet the requirements of all the stakeholders - patients, professionals and taxpayers (Report of the Health ICT Industry Group, 2009:8).

ICT has demonstrated its ability to implement systems as advanced as any worldwide, in recognition of which worldwide centres of excellence have been established here in areas as diverse as e-government, financial systems, and digital consumer. Similar capabilities exist or can be rapidly developed in healthcare ICT, to help South Africa address its critical healthcare challenge and, subsequently, with the committed support of government, position South Africa as a African leader in the field of Healthcare technology.

But in some African countries this would still amount to only around $25/person per year (The Goldman Sachs Group, Inc., 2009). African countries continue to suffer from major healthcare threats, constantly diminishing healthcare resources, inadequate medical infrastructure, and multiple healthcare problems such as

HIV/AIDS, malaria, dysentery, cholera, typhoid, yellow fever, diarrhoea, and many more.

In a bid to find permanent solutions to the growing healthcare challenges on the continent, the government and healthcare experts are exploring the role of ICT in healthcare centre delivery (African Development Bank and OECD, 2009:4).

ICT utilisation would not only help to improve the delivery service of healthcare services but also to deal with constraints in uplifting the health standard. The potential role of ICT in healthcare is to support activities and operations of the health delivery system that can network all healthcare centres to collate information, share data and communicate online (UNAIDS, 2010). According to Weber (2011:2-4), tele-healthcare is defined as the delivery of healthcare across distances using telecommunications technology.

Tele-healthcare represents an opportunity to improve the delivery of healthcare centres in remote areas and rural areas where other healthcare practictioners can easily access information and contact other practitioners or consult medical specialist via tele-healthcare. Countries such as South Africa (SA) and Malawi have successfully applied healthcare delivery using ICT. HealthNet's global satellite networks have been used for the delivery of telemedicine in several African countries (African Development Bank and OECD, 2009:8).

It is often stated that healthcare is lagging behind other sectors of our society in the use of ICT. They state "Health care has already profited extensively from ICT developments" and "without ICT today many hospitals and physician practices could not provide adequate patient healthcare services". The opinion that healthcare is lagging behind is mainly based on a comparison of the percentage of the total budget spent on ICT (Bakker, 2002:52-55). The adoption of ICT can accelerate the integration, standardisation, and knowledge transfer of administrative and clinical information. Most healthcare information is currently in paper records, hospital information systems and clinical research databases. "Paper kills" is how Newt Gingrich (Former US House Speaker) describes the problem of paper health records, which lead to problems that directly affect the patient in terms of morbidity and mortality (Report of the Health ICT Industry Group, 2009:21).

2.3.1 ICT comes at a cost

There is a high start-up costing in acquiring computers, software connectivity, and training. Without an increase in the healthcare budget, it will be difficult to realise this vision. ICT has already made an impact on the healthcare sector, but there are more opportunities which need to be explored in order to ensure affordable, high-quality healthcare service and delivery. Africa is at an early stage of using ICT to improve the delivery of healthcare centre services. Investment in ICT in the healthcare sector could complement basic healthcare services through the enhancement of administration, access to information and decision-support systems for curative and preventive healthcare and the improved distribution of medical supplies (Gupta, Dasgupt, & Atul, 2008:141-143).

Identifying and using the opportunities which ICT could offer to the healthcare sector will require more research beyond these research projects some of which have already been performed. Innovative approaches are needed to maximise the use of ICT in our healthcare system. One way to address the infrastructure and start-up challenge is for all the major medical institutions in the country to establish, for example, MEDNET as a centralised and shared service entity. This will make it possible for the medical institutions with limited technical and financial expertise to have access to the healthcare information (Hassol et al., 2006:5-7). In developing countries, ICT in healthcare has the potential to act as a bridge between private and public healthcare services. In order to address this disparity, and to ensure that this same disparity does not affect the development of ICT in healthcare, it is essential to motivate ICT providers to create a more equitable access structure (Rizo, Enkini & Jahad, 2009:36). The knowledge of what ICT in healthcare means, how to implement it, is incomplete at this point in time, especially with regard to the developing countries as well as for South Africa.

2.3.2 Challenges of ICT in healthcare

The following questions could be considered:

> Can developing countries afford to do ICT research in Healthcare?

> Can they afford not to?

According to Sachs (2009:21-45), technology gains in wealthy or developed countries, which is often introduce by scientists who originally come from developing countries and does not necessarily diffuse to poorer nations. He further states that in order to move forward with effective development strategies it is essential for ICT in healthcare to focus on the commonalities between developed and developing countries, and to capitalise on these commonalities to build strong collaborative relationships. Developed and developing countries share populations that are greatly concerned with healthcare and high expenditure and low efficiency healthcare sectors.

The ICT and healthcare systems are extremely fragmented (Jadad & Enkin, 2006:84). Many of the basic issues behind healthcare in general, and ICT in healthcare in particular are unclear and poorly understood. There is an accelerated movement in this field, but not a systematic one. In order to maximise success in this field we need: effective international collaboration; high input and output systems; resource sharing; economies of scale; to avoid duplication and real-time evaluation (Jadad & Enkin, 2006:84-86). In addition to the pure technical aspects of healthcare; we need to understand the ICT in healthcare needs workflow for a global e-health database so that ideas and information could be easily shared; and that duplication would be minimised by utilising ICT in healthcare. Information needs to be packaged and portrayed in a culturally relevant and significant manner (Rizo, Enkini, & Jahad, 2009:38). It is unlikely that e-Health will be a viable business model in Africa in the near future, but that does not mean it should not be pursued (Jahad et al., 2009:3) There are many unused resources available, but it is necessary for us to make it easy for healthcare providers in the developing countries including to utilise ICT in healthcare (Kalua et.al., 2009:7-17). ICT in healthcare sectors need to be able to show some concrete economic or healthcare benefit. Without understanding what people need from the healthcare web using ICT, one will not be able to provide Internet technologies that are helpful.

The best way to understand what people need is to actually understand how they operate on a day-to-day basis and they suggest that it may be necessary to actually go into a situation and follow people around to get a feeling for their needs as opposed to just asking "what do you want?") (Kalua et al., 2009:21-29). The cost of access is still very significant even if we keep it low-tech (Rizo et al., 2009:37). Even a long distance phone call is prohibitively expensive in many places. Regardless of the use of tele-healthcare by some South African healthcare centres, there is an urgent need for the full adoption of ICT in those communities severely affected by HIV/AIDS (Health & Development South Africa (Pty) Ltd, 2010:8).

2.3.3 ICT is an urgent need in our communities

Very few healthcare facilities store patients records electronically. In most government hospitals patient files dating back decades ago are stored in boxes. Only recently some of the healthcare centres in Africa have begun the process of digital medical records (Kalua et al., 2009:45-47). Similarly, communication between district facilities and the Ministries of Health remain primarily manual. Some healthcare centres prepare weekly or monthly reports which are faxed to the Ministry (Kalua et al., 2009:45-47). Thus the main challenges of ICT in the public and private healthcare sectors are the following: inaccurate and incomplete records; lack of standard formats of record keeping; low computer literacy rate among health providers and low nation literacy rates; attitudes about ICT use (fear factor); low level of ICT technologists and technicians; low density of ICT in Healthcare units; low distribution of reliable telecommunications and grid power in community healthcare unity; lack of standardisation and specification of ICT technology in health unit for compatibility; and poor work culture or attitudes of record keeping; and high cost of set-up of ICT given the limited budget for Health services (UNAIDS, 2010:34-39).

2.4 INFORMATION COMMUNICATION TECHNOLOGY IN DEVELOPED COUNTRIES

Benefits of utilising ICT in healthcare should be measurable to determine the impact of ICT interventions. The various national healthcare sectors have embraced ICT as a tool for enhancing healthcare services (Hossain, 2010:201). ICT already now makes a significant contribution to the functioning of healthcare

system. Viviane Reding, EU Commissioner for Information Society and Media, summarised the opportunities of using ICT in healthcare in a speech on 8 May 2006 as follows: "New technologies can make healthcare more efficient, while responding to the increasing demand for health services in an ageing society." The areas in which ICT can help to make healthcare more effective and efficient beyond solutions and which are already available area management of healthcare; medical treatment; prevention; patient mobility; interoperability and system integration; and Health cards and electronic health records.

In very broad terms, ICT is defined as technologies that help the creation, transfer and exchange of information across geographical distances through the radio, Internet, web browsing, remote processing, etc. The various national healthcare sectors have embraced ICT as a tool for enhancing healthcare services. As we are in the 21st century, healthcare centres are making increasing use of technology and healthcare information records that are not digital especially in developing countries. However, the handling of healthcare information is often a mixture of mental recollection, handwritten notes, large charts on white boards, verbal reports, digital records and printed records (Aisbett et al., 2008:23-28). Information flow in whatever mode provides the opportunity for nurses in consecutive shifts to communicate important healthcare information records, such as patient's diagnosis, vital signs, diagnostic tests and restrictions, and to ensure the continuity of HIV/AIDS patients care or any patient at large (Australian Council for Safety & Quality in Healthcare, 2005:2-4).

In order to offer the best promising healthcare to patients, medical professionals working in different departments must work collaboratively to make sure all the duties related to patient care are carried out well. While sending patient information such as face to face, communication between medical professionals may occur inside patient rooms, along corridors of clinics, but currently information flow is distributed over paper-based, verbal, displayed, and digital sources such as a Personal Computer (PC) (Hossain, 2010: 204). The figure 2.3 below gives an indication on how information flows verb in a healthcare centre based on all the types of distribution as mentioned above.
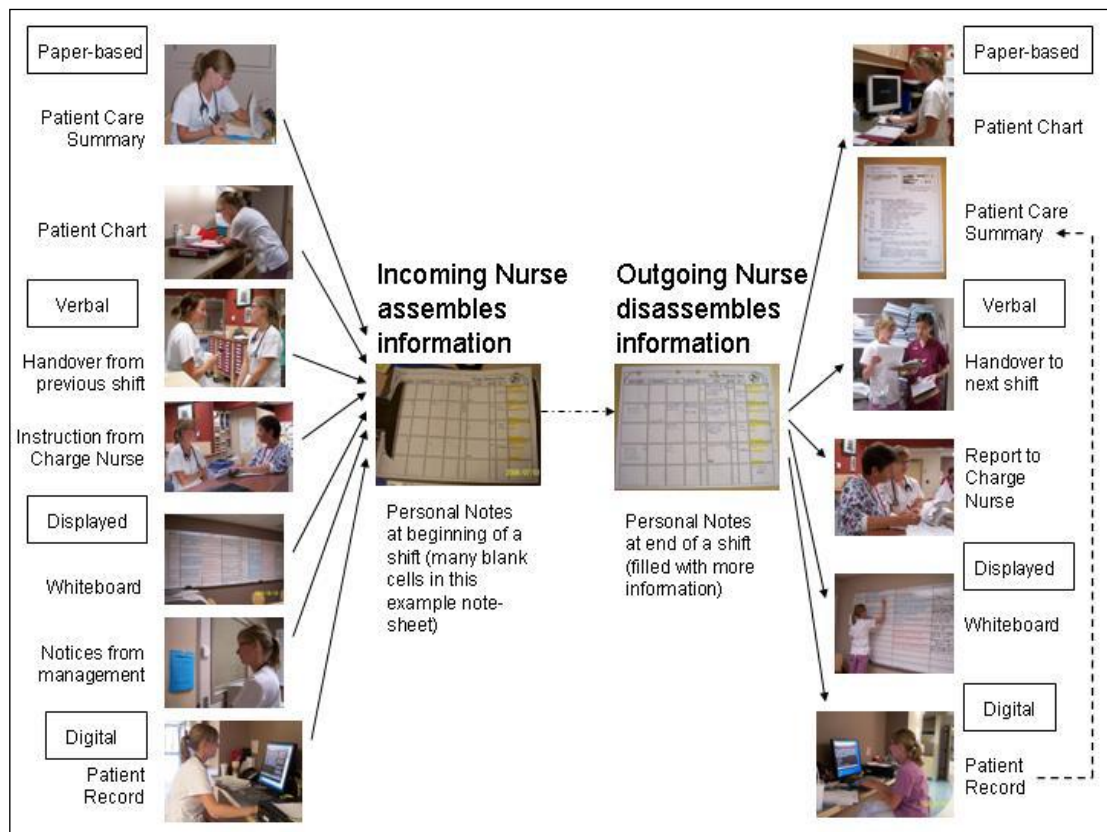
Figure 2.3: Information flow assembly and information flow disassembly during shift change (Tang & Carpendale, 2009).

At the level of service providers, ICT can enable efficient movement of necessary information flow to professional medical workers through the integration of information flow across the healthcare sectors with stable and shared views of patient information data (Hossain, 2010:205). It can also permit the matching of resources to activity levels through important up-to-date information flow data and reliable and timely evidence-based decision-making and devolution of budgetary accountability to medical managers (Australian Council for Safety & Quality in Healthcare, 2005:5).

Nevertheless as Haux (2006:268-271) says, ICT has already contributed largely to the efficiency and effectiveness of healthcare. Among others ICT contributeted in the supply of information to support the healthcare, treatment processes, in supporting logistics, in improving diagnostic facilities (laboratories, medical imaging), in supporting the administration and to a limited extent in supporting decision making. Healthcare was and is people's business.

2.5 ICT ROLE AS A LEADING ASSET IN HEALTHCARE

For a healthcare system to function effectively it is important that: appropriate services are made available and accessible to all people (Report of the Health ICT Industry Group, 2009:18-23).

Relevant and up-to-date information leads to better decision making, better service provision and greater outreach to all. Appropriate technology is required to capture, process, exchange and disseminate the information to all stakeholders

According to Harris (2004:27), right from paper, radio television to computers, internet and remote sensing satellites, ICT has increasingly become more and more specialised in information collection, storage, management and dissemination, and it is this which make it indispensable to all development efforts, including public healthcare. Only small numbers of healthcare centre facilities in South Africa store patients records electronically including townships and rural areas. In most government hospitals patient files dating back 30 years are stored in boxes. Only recently some of the hospitals in Africa have begun the process of digitising medical records (Bakker, 2002:55). Some of the many ways in which ICT has facilitated healthcare are summarise as follows:

- ICT enables remote consultation, diagnosis and treatment through telemedicine. This is increasingly being used in developing countries to transmit patient information to medical practitioners and specialists who then advise on treatments to be given

- The connectivity via the internet and satellites is also used for co-operation and collaboration between medical practitioners. It enables sharing knowledge regarding new methods of treatments, and case-specific consultations for expert opinion, ensuring more effective treatment. This is useful not only for treatments but also for healthcare research and education purposes

- ICT supports healthcare research in a big way by enabling networking of libraries and other information agencies (thus increasing access to current

information by students and researchers), transmission of field information for analysis to remote research institutes, and exchange of ideas on similar research fields between researchers in different institutes. ICT enabled training mechanisms are being used increasingly to deliver training to healthcare workers

The establishment of new technology has significantly improved ICT sector opportunities. The economy of most of the developed countries there is largely supported by utilising ICT for the developing of new technologies, good and quality network for communication. ICT constitutes almost 45% of the healthcare service delivery (Hossain, 2010:199-201). ICT is the major source of enhancement in most developing and developed countries (MacGregor & Vrazalic, 2007:34-48).

ICT is changing communities on a global scale, by affecting economies, changing value systems and social relations as well as the pattern of traditional systems and social relations. It offers the possiblility to facilitate knowledge exchange that both have negative as well as positive influences (Baliamoune-Lutz, 2005:152-157). According to Hossain (2010:199-204) a survey of existing ICT-related development activities in disadvantaged local areas as well as a survey of support for such activities in local government was done and the following where achieved:

- One or two direct interventions in disadvantaged local communities aimed at implementing ICT-related development projects (with community and local government participation).

- Since South African municipalities are tasked with developmental local government activities, project researchers will approach and interact with selected municipalities' clinics (both with officials as well as medical professionals) with a view to include such ICT-related development activities in their plans and budgets.

- Since local governments on a national scale will play a critical role in poverty alleviation in South Africa, information and experience gathered from ICT-related case studies and budgets will be made available to local and national government institutions with a view to share such experience and influencing public policy.

- Nevertheless, it is important to note that the critical or realistic view should not be taken as a negative view of the potential of ICT in development. It is common for new technologies to go through an initial period of widely varying views about its potential, followed by a period of more balanced assessments of what they can or cannot do.

2.5.1 Healthcare approach towards ICT

One of the important development issues that need to be at the centre of every country's economic planning is healthcare. One reason is because some major healthcare parameters are not easily tangible and take a longer time for benefits to be seen (Gerster Consulting, 2008:27).

ICT can be the main facilitator of innovations in healthcare by making data and communication ubiquitously available. Communication not only between ICT devices but also between care providers will make specialised knowledge available at remote locations when needed (Bakker, 2009:52).

In order to benefit from ICT, to deliver better services in healthcare and education, to create better living conditions and to explore new business opportunities, a certain infrastructure must be in place. Because ICT plays a key role in healthcare, education, production, social relationships and politics, collective access must be an objective to achieve such as, taking into account shared access within the community (Osterwalder, 2008:335).

2.5.2 Non-Governmental Organisations (NGO) too utilise ICT

The early history of ICT utilisation in Africa is largely a story about Non-Governmental Organisations (NGOs) and their effort to take part in the global information society (Nielinger, 2007:5). According to Nielinger (2007:8), (citing Levey & Young 2002), in 2002 at Earth Summit in Rio de Janerio a new era of international networking and new scope of electronic communication started among NGO communities. However, identifying NGO's as and facilitators of the information age cannot be taken as general evidence for the scope of their ICT utilisation (Mwakaje, 2010:113).

[1]The World Bank (WB), among others, defines a NGO as a private organisation that pursue activities to relieve suffering, promote the interests of the poor, protect the environment, provide basic social services, or undertake community development (Osterwalder, 2008:336). The term NGO can be applied to any non-profit making organisation, which is independent of the government. They are typically value-based organisations, which depend, in whole or in part, on charitable donations and voluntary services. Although the NGO sector has become increasingly professionalised over the past decades, principles of altruism and voluntarism remain key defining characteristics (Bebbington, 2006:2021-2029).

The use of technologies such as emails has become the norm rather than the exception within NGO communities according to Nielinger (2003:9), (citing Esterhusysen, 2002), are clearly premature. It is only today that the discussion about NGO's utilising ICT is raised to a new level of a more comprehensive and systematic approach targeting the broader picture (Hadenius et al., 2006: 1621-1639).

The heterogeneous nature of NGO's is echoed through the survey and reflects a broad range of different user profile (Nielinger, 2003:11). These can be divided into at least three main user groups:

- A first group consists of professionally managed user

- This group uses ICT as an accepted and understood tool supporting daily working procedures. This applies to advanced applications that make administrative routines more effective but also reflects considerable internal and external, national and international information flows.

- A second group, often well acknowledged in the respective working field

- These NGO's might be less sophisticated than those in the first group, and be not utilise the technology in all potential working areas, but within their limits they value the technology as an important tool, especially with

Esterhuysen, Anriette (2002): „Networking For a Purpose: African NGOs Using ICT", in: Levey/Young (2002) [11] Levey, Lisbeth A., Young, Stacy (eds.) (2002): Rowing Upstream, Snapshots of Pioneers of the Information Age in Africa, Johannesburg (available online http://www.piac.org/rowing_upstream/tableofcontents.html)

respect to national and international networking, internet based research and the like.

- A third group, at the same time majority of NGO group consists of small NGOs, often working at grassroots level. Their ICT profile focuses on email usage and some basic application. They have a low profile, low intensity usage with basic ICT needs and apply the applications that are available and affordable.

Health and Development Networks (HDN) as an example, an international NGO, used ICT to increase the participation and broaden the perspectives of two major HIV/AIDS conferences in Africa and Asia (Osterwalder, 2008:334). Through moderated e-mail discussion forums HDN was able to include people in the conferences, who can rarely participate in the international discourse (Bailur, 2007:61). Mwakaje (2010:114), citing Keck and Sikkink (1998:12), argue that NGOs can play a unique role in promoting community development among poorer and more marginalised groups. They are able to gain public trust and to employ the mobilisation mechanism tool against powerful corporations. Mwakaje (2010:114), (citing Edwards & Hulme (1995:49-51), contents that a growing body of literature draws attention to the importance of NGOs' own accountability and legitimacy when they perform such functions.

2.6 INFORMATION FLOWS IN HEALTHCARE UTILISING ICT

For many years healthcare was considered as a closed systems (Gammeltoft, 2009:5). Patients come into the hospital for medical care which will be provided to them and they leave healthcare service in with assistance healthcare services. Healthcare information systems (HIS) were developed following this healthcare model as well and today we have many healthcare information systems which are advances in information flow and e-health technologies that are working well in healthcare centres (Haughney et al., 2008:1682-1687). The healthcare sector is, however, very information intensive, so advanced ICTs can make healthcare systems more cost-effective, allowing more funds to be spent on healthcare, and less on administering it. Health can therefore be regarded as an emerging an important new global industry (Shoniregun et al., 2010:125). eHealth systems are not just about replacing paperwork with smartcards, however - ICTs also enable healthcare to be personalised.

This not only makes treatments more effective, it enables doctors to diagnose problems quicker, and even predict them before they occur.The healthcare system around the world has undergone substantial change, adoption, acceptance and use of ICT is gaining increase (Yellowlees et al., 2009) presenting new challenges for the profession. To prepare for these changes healthcare needs to be able to utilise existing and emerging ICT (Marcelo & Nakano, 2009). Now healthcare centres are evolving towards a different model, as they are acquiring a higher degree of compromise and [2]participation in healthcare systems (Yácubsohn, 2008:172). The following figure is the South African information flow of healthcare that shows how information flows from major departments in the government.

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[2] Esterhuysen, Anriette (2002): „Networking For a Purpose: African NGOs Using ICT", in: Levey/Young (2002)
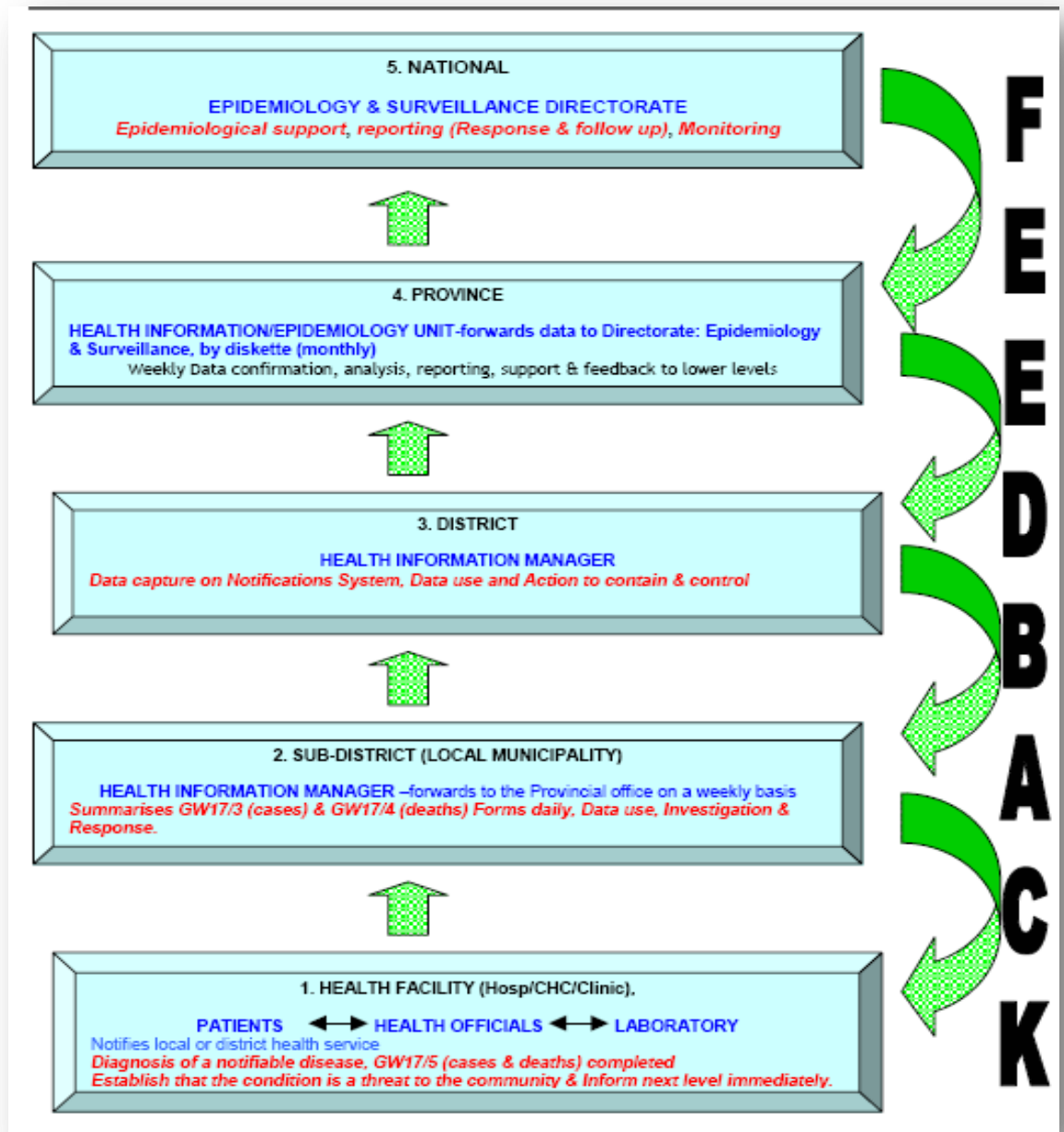
Figure 2.4: Schematic of Information flow medical condition in South Africa (Department of Health South Africa, 2007)

Figure 2.4 describes the information flow around South African cases. South Africa is divided into provinces which are further divided into municipalities. In other areas there are districts and local municipalities. In this research the focus is on the Khayelitsha Township which is part of the Tygerberg municipality. The interfaces to the world outside the healthcare should be clearly defined, to allow for information flow across the borders of the healthcare (Clark & Mayer, 2011:37).

Concepts like preventive medicine and epidemiology, healthy and sick individuals according to Sherrer (2004), and the growing emphasis on the collection of information related to healthcare and the increasing use of information flow to plan, manage and resource healthcare (Singer et.al, 2009:302). Links between healthcare systems and healthcare centre are recognised, and integration seems to be the key. There is limited understanding of a the healthcare centre, whatever the appearance, and as an institution is in great need of research (Jadad & Enkin, 2006:86).

2.6.1 Flow of Information in healthcare centre for 'Public' and 'Private'

There are still very few healthcare facilities that store patients records electronically. In most government hospitals and clinics such in the case of Khayelitsha, patient files are stored in boxes. Currently, some healthcare centres prepare weekly or monthly reports which are faxed to the Ministry. Thus the main challenges of ICT's in the healthcare sector especially in previously disadvantage areas in South Africa (Harris, 2008:3).

Most healthcare facilities use a combination of paper based records for patient folders and some then convert these to electronic records. Although there are some computerised applications within the facilities, the flows between facilities are still mostly paper based in the form of referral letters to the next echelon of healthcare (Singer et al., 2009:304). Both 'private' and 'public' use mostly paper based records for patients, prescriptions to pharmacies, lab sheets to laboratories, reports to the referral facilities, and appointment cards to patients for the next session of check up (Yellowlees et al., 2009).

2.7 ROLE OF SOUTH AFRICAN GOVERNMENT IN ENHANCING ICT IN HEALTHCARE

South Africa's government has placed a strong emphasis on ICT sector development through the implementation of a National ICT strategy. The government will be stepping up its fight against HIV/Aids in 2011 by promoting various prevention measures, including medical male circumcision and prevention of mother-to-child infections, president Jacob Zuma told Parliament (Zuma, 2011:16). This plan proactively addresses ICT penetration particularly for disadvantaged societies.

The ICT sector is growing vibrantly, with the government spending at list R70 billion which equalls to around U$9.6 billion, 6.9 percent of GNP (Faulkner & Loewald, 20011:7). The government has implemented a number of frameworks for policies, infrastructure, partnerships and task forces that will help South African communities to play a role in the global economy (Kanyane, 2005:6).

According to South Africa Case Study (2005), the ICT sector will not be directly responsible for a significant number of new jobs, but rather is positioned as an enabler of increasing competitiveness in other sectors, as a source of future export earning, and as a key enabler to achieve development goals.

The government has created a state Information Technology Agency (SITA) to encourage the provision of information technology, information systems and related services in managed secure environments. The government has also launched 'Info.com 2025', which serves a collective program of ICT projects designed to establish a networked information community and make S.A globally competitive. 'Info.com 2025 addresses issues of policy, infrastructure, human capacity and local content within ICT industries (South Africa Case Study, 2005).

The government also intends to train more nurses and doctors in 2011 (State of Nation, 2011). "Plans are in place to revitalise 105 nursing colleges across the country, and a medical faculty that is expected to be established at the Limpopo Academic Hospital will train more doctors", president Jacob Zuma said (Zuma, 2011:23). In addition, renovations and refurbishments at the country's hospitals and clinics will continue. Focus will also be given to women's health. "We will broaden the scope of reproductive health rights and provide services related to ... contraception, sexually transmitted infections, teenage pregnancy and sanitary towels for the indigent," the president said (Zuma, 2011:33).

2.8 Holistic programmes and the potential improving ICT in healthcare

ICT has already a major impact on the healthcare sector, but there are more opportunities which need to be explored in order to ensure that affordable, high quality healthcare will continue to be available to all South African citizens especially in previous disadvantaged communities like Khayelitsha. In 2006 the Department of Health has been working round the clock to address ICT concerns.

The department has installed new technology at three of Khayelitsha community health centres which one includes Khayelitsha (Site B) where the research will be based. The new technology provided by the Department of Health for these three community healthcare centres with total of 20 printers and 31 computers with appropriate software programmes including intranet and GroupWise better up communication among medical workers. An X-ray machine was installed and is fully operational at Nolungile (CHC) and a radiographer has been appointed to provide service. Also in Khayelitsha (Site B) a new facility has been established that should provide comprehensive health services to survivors of rape and sexual assault and it operates 24 hours a day.

New ICT technologies can make healthcare in South Africa as a whole to be more efficient, while responding to the increasing demand for healthcare services in an previously disadvantage society (Gupta, Dasgupt, & Atul, 2008:145). There are three main areas in which ICT can help to make healthcare more effective and efficient beyond solutions which are already available: management of healthcare; medical treatment; and prevention.

The use of ICT in the healthcare sector has increased and the administration of many healthcare centres and medical professional providers are now computerised. Healthcare information systems, the Internet, telemedicine, personal digital assistants, electronics patient records and other applications will inevitably become common place in healthcare (Shoniregun, Dube & Mtenzi, 2010:124). However, the key players, which are healthcare professionals, have not fully embraced the valuable resource of ICT (Jadad & Enkin, 2009), although research has catalogued the reasons for barriers to using ICT within healthcare for example: (Klan & Shaw, 2008).

2.9 CONCLUSION OF LITERATURE REVIEW

Without excellent and good healthcare service, groups, families, individuals, communicators and nations cannot hope to achieve their social and economic goals. ICT presents challenges but has numerous potential benefits. ICT should therefore be employed as a valuable tool to enhance healthcare delivery in order to contribute to modernisation and development of the country through improved healthcare and productivity of the communities.

The anticipated outputs for this research are: a description of the information flows and technologies that support HIV/AIDS care in Khayelitsha; an analysis of the ICT needs at the different points of care of the HIV/AIDS care path in Khayelitsha; a summary of the problems that hinder the flow of information and suggestions for improvement; and a summary of the technology currently used and recommendations for improved technology at the different points of care. The outcome of the research will contribute towards the improvement of information flows, supporting ICT to better support HIV/AIDS patients and healthcare centre in Khayelitsha.

The literature reviews in ICT utilisation in developing, developed and NIW countries such as applications of ICT in healthcare and finally the ICT policies and strategies in healthcare. The background information on South African shows that the country's ICT status is relatively advanced by African standards although there are still some barriers that hamper ICT in different sectors including healthcare (Hesselmark & Miller 2002:5). ICT has been used to support healthcare centre service delivery to some extent, but there is still a need for improvement on efficiency and effectiveness of processes especially on the operational level. Literature was reviewed on ICT use in developing, developed and NIW countries, applications of ICT such as benefits and challenges of ICT use and finally ICT policies and strategies in health were discussed. ICT use in the healthcare sector in developing and NIW countries can facilitate provision of basic needs by improving the quality of healthcare and generally it can also help in poverty reduction. In general developing countries are lagging behind with ICT use and developed countries are way ahead in their ICT use especially in the healthcare sector.

CHAPTER 3

3. RESEARCH DESIGN AND METHODOLOGY

3.1 INTRODUCTION

According to Peffers et al., (2008:45-47) citing Adam (2004:10), the research should be done in a planned and systematic manner with the researcher using appropriate tools and methods to collect relevant data. A difference between the terms methodology and methods needs to be made according to (Groenewald, 2004:1-2) citing (Bailey, 1978:26).

Research methodology is referred to as the research strategy or methods of collecting data; it necessitates a reflection on the planning, structuring and execution of the research to comply with the demands of truth, objectivity and validity (Pope & Mays, 2006). It clearly indicates the methods of data collection as well as the techniques used for such data collection. There are two common research methodologies/frameworks within social sciences, namely; qualitative and quantitative research methodology. Qualitative research methodology refers to research which produces descriptive data; generally people's own written or spoken words (Leedy & Ormrod, 2010:52-53). Quantitative refer to data that can be quantified. Although these frameworks are used within social sciences they are also considered for research in information system (Creswell, 2009:65).

Qualitative research is used to focus on the characteristcs of language as a means of communication or a cognitive representation of culture and to discoveries realities, through the scrutiny of the relevant literature, interviews, published and unpublished literature government policies and observation. These techniques will assist the researcher to explore a phenomenon bounded by time and activity (a programme, event, process, institution or social group) and collect detailed information by using a variety of data collection procedures during a sustained period of time (Leedy & Ormrod, 2010:37).

Quantitative research is used when data can be expressed in numbers. The most common research designs are: design for exploratory research; designs for experimental research; and designs for descriptive research.

The Quantitative Research Methodology is based on the quantification of constructs to measure the properties of phenomena through quantitative measurement, such as assigning numbers of perceived qualities of things and the use of variables to describehuman behaviour according to (Leedy & Ormrod, 2010:39) citing (Babbie & Mouton, 2002:281).

In my study the most important aspects of research will be to explore what the social problems are in utilisation of ICT in Khayelitsha. In this study the focus is on describing the effects of lag of utilisation of ICT in healthcare centre for HIV/AIDS patients with the hope that at the end of the research an assistance of alleviation of ICT utilisation could be recommended. According to Irani et al., (2004) citing Chadwich et al., (1984), research methodology of social research consists of the preparation of a plan whereby verifiable knowledge about the research problem is obtained.

This chapter presents an account of the research methods used in carrying out the research conducted within the field of this study. The research methodology environment will be elaborated upon and the delineations of the research methodology be listed. The approach to data collection will be explained and the target population defined. Case study research was employed as the research strategy to consider the problem situation in reality for a better understanding thereof. Since utilisation of ICT within healthcare service affects the virtual healthcare sector, the flexibility of case study allowed for small researchable units to be used and it also allowed for the use of the methodological triangulation for data collection.

Moreover, participative observation through survey questionaires was conducted, leading to a better solution to the research problem. Content analysis was used to analyse participative observation through survey questionaires, while data survey questionaires was analysed statistically. The research question forms the crux of the research and as formulated in chapter one is as follows: "How can Healthcare services optimise their facilities opportunity through the utilisation or deployment of ICT within the context information flows to support the reducing of the spread of HIV/AIDS?"

In support of the research question, the investigative sub-questions read as follows:

How does information flow between the different healthcare stakeholders to support the care of HIV/AIDS positive patients?
How is ICT used by healthcare stakeholders for information exchange and utilisation in Healthcare?
What are the gaps between information and ICT requirements and the information and ICT available to the stakeholders of a Healthcare centre in Khayelitsha that provides a healthcare service to HIV/AIDS patients?

Table 3.1: Research questions

Chapter Two provided some evidence of the challenges faced by healthcare centre and the flow of information in the healthcare, and the benefits and opportunities that can be realised by the healthcare services through utilisation of ICT within healthcare centre services to assist HIV/AIDS patients identified during the literature review. This information adds value in addressing the research question by supporting the conclusions drawn from both participative observation and survey data collected. In addition, it provided insight which enabled a better understanding of utilisation within healthcare centre in Khayelitsha in particular.

3.2 RESEARCH DESIGN

According to Zainal (2007:1-3) citing Yin (1994:19) a research design can be defined "the logical sequence used to align the empirical study with the research questions and objectives to reach specific conclusions and could be regarded as an action plan". According to Nebeker (2006) citing Trochim (2006:103), research design is thought of as a structure of research, and it is the "glue" that holds all the elements in a research project together. It is a concise notation that enables the researcher to summarise a complex design structure efficiently.

To better understand what research design is, the following definition serves the purpose, describes research design as a systematic, organised database and a critical effort to conduct an inquiry or investigate a scientific problem with the specific objective to find an answer or solution. The researcher used both primary and secondary sources of information, which were obtained from the white papers, books, Internet, university libraries, and government institutions, in our case healthcare centre. In this research we have used qualitative research techniques of data collection to enable the researcher to explore opinions, attitudes, perceptions and beliefs about the impact that ICT utilisation has impacted healthcare centre in previous disadvantage areas (Sekaran, 2007:34-56). According to Leedy & Ormrod, (2010) citing Bless, Higson-Smith & Kagee (2006:71-93), primary data is when the researcher collects its own data from a real-life situation for the purpose of the research study. They described primary data "as that which lie closest to the source of phenomenon."

According to Creswell (2003:73) citing Stugwig (1995:51), a research design is a ·plan that guides when, how often, what data to be collected from whom and then how to analyse the collected data. The design should indicate the purpose of the study and that the plan is consistent with the purpose and type of the research. As identified, the type of research design for a specific research project is influenced by the following factors (Maxwell, 2005:67-78) citing (Struwig, 1996:41):

Method of data collection: The researcher must decide if the data will be collected either through questionnaires, observation, case studies and focus groups.

Degree of measuring accuracy: The researcher must further decide whether to use a qualitative or quantitative research approach to measure the degree of accuracy of the collected data.

Main objective of research: The research design could be influenced by the main objective of the research, which could be:

     be evaluated in nature

     test hypotheses

conduct comparative research the main objective of this research study

conduct a descriptive study

Reason for collecting data: The reason for collecting data is to determine whether primary data should be gathered or whether a secondary analysis will be sufficient.

Exploratory research assists the researcher in investigating a problem about which little is known. Stugwig (1996:45) as quoted in Pekeur (2004:144) states that "the main purpose of exploratory research is to develop and clarify ideas about the research setting to later formulate questions and hypotheses to be used for further research. This method also involves the gathering of a great deal of information on one or a few cases". Pekeur (2004:144) further states three possible methods used for exploratory research namely:

the study of secondary sources of information as done by reviewing related literature

an analysis of selected cases

a survey of individuals who are likely to have ideas on the subject on the whole

According to Leedy & Ormrod, (2010) citing Struwig, (1996:46), "descriptive research attempts to describe something or some phenomena". The descriptive research design according to Pekeur (2004:145), identifies the following characteristics of the descriptive survey research method (Leedy & Ormrod, 2010) citing (Leedy, 1985:134):

it deals with a situation, which demands the technique of observation as the principal means of collecting data

it chooses the population of the study carefully, is clearly defined and specifically delimited in order to set precise parameters for ensuring discretion to the population

its data is susceptible to distortion through the introduction of bias into research design

its data is organised and presented systematically so that valid and accurate conclusions may be drawn from it

According to Nebeker (2006) citing Pekeur (2002:146), "identifies the following studies as example designs for descriptive research, namely cross-sectional design, longitudinal designs, time series, panel studies, case studies, focus groups interviewing and meta-analysis". These studies will help the researcher to answer questions such as:

how many

how much

how efficient

how effective

how adequate

Strugwig (1996:47) as quoted in Pekeur (2004:146) indicates that "case studies provide the researcher data about how something appears in reality and why this is the case. One of the strengths of case studies is that they can involve multiple sources of data collection. Focus group interviewing is used to obtain detailed information from a small group of individuals".

3.3 RESEARCH METHODOLOGY USED

3.3.1 Introduction to Research Methodology

Methodology aims to investigate the motivation of the research and it aims to better understand the process of reaching the research objectives (Cohen & Manion, 2000:26-40). Methods refer to the possible approaches used in research to collect data which are used as a basis for analysis and interpretation, or explanation and prediction. This refers to the research techniques used in gathering information or data and may include focus groups, questionnaires and participant observation and focus groups (Cohen & Manion, 2000:29-44). According to Leedy and Ormrod (2010) citing Leedy (1980:4-7), research methodology is essentially defined as a thought process on accumulated facts and data in order to determine what the facts "say" and what the data means.

According to Poggenpoel and Myburgh (2005: 304), qualitative research refers to a deep, holistic exploration and description of an identified phenomenon in the field. Qualitative research can be theoretically speaking, be described as an approach rather than a particular design or set of techniques. According to Welman, Kruger and Mithell (2007:188), (citing Van Maanen (1979:250), it is an "umbrella" phase "covering an array of interpretive techniques which seek to describe, decode, translate and otherwise come to terms with the meaning of naturally occurring phenomena in the social world". Therefore, the qualitative approach is fundamentally a "descriptive form of research".

Qualitative field studies can be used successfully in the description of groups, small communities, and organisations. Qualitative field studies may lend themselves more aptly to studying cases that do not fit into particular theories. A qualitative approach is concerned about the depth of information required to make sense of an individual's actions and experiences (Myers, 2009).

The statement is made that 'theoretical' research is frequently associated with the 'phenomenological' research paradigm. The 'phenomenological' research paradigm, which is used to answer questions about the complex nature of phenomena, often with the purpose of describing and understanding the phenomena from the participants' point of view, is also commonly referred to as the 'qualitative' research paradigm (Leedy & Ormrod, 2010:103).

Creswell (2003) defines qualitative methodology as one in which the inquirer often makes knowledge claims based primarily on constructive, perspectives the multiple meaning of individual experiences, meaning socially and historically constructed, with one intent of developing a theory or pattern or advocacy/participatory perspective also using strategies of inquiry such as narrative, phenomenological, ethnographies, grounded theory studies or case studies the researcher collected open-ended emerging data with the primary intent of developing themes from data. Struwing and Stead (2007:12), describe qualitative research as "the non-numerical examination and interpretation of observations, for the purpose of discovering underlying meanings and patterns of relationships". This research methodology, as described by Stead and Struwig (2007:78), involves the use of approaches such as: participant observation; archival source analysis; interviews; focus groups; and content analysis.

The qualitative methodology was used to search and identify evidence of the effects of utilisation of ICT in healthcare centres in private and public sectors in the community of Khayelitsha; the interviews were conducted within the entire target group of the Khayelitsha area. The interview questions were structured and strategically attempted to gain some insights to some of the issues suggested in the literature. Further, the questioning format was closed and open-ended, which allowed for the emergence of unique and unanticipated issues. The interviews were transcribed and analysed for recurring themes. Therefore, qualitative research can be viewed as interdisciplinary, multi-paradigmatic and multi-methodical. Stead and Strewig (2007:81), have stressed that the use of qualitative methods allow for an in-depth analysis of a given phenomena.

3.3.2 Literature review

According to Nenty (2009:19-20) citing Mouly (1970:126), "the review of the literature provides an overview of the current status of the research topic". Through the literature review it is possible to minimizes the risk of dead-end rejected topics, rejected studies, wasted effort, trials and error activity oriented towards approaches already discarded by previous investigators and – even of more importance, mistaken findings based on faulty research designs. It promotes a greater understanding of the problem and the issues around the problem and will avoid of unnecessary duplication.

A literature review has been explored in existing theories on ICT utilisation in healthcare centre by developing, developed and BRICS countries to care and support centres available to HIV/AIDS patients in Khayelitsha specifically. The literature provided the researcher with a clearer idea of the range of research instruments used to obtain data, while the body of knowledge available in the literature serves as a foundation on which to base the research and analysis of this study (Cohen & Manion, 2000) cited by (Rashe, 2006). According to Majija (2009), citing Ferreira (2005:2), the literature search will assist the researcher in developing the ability to recognise and select the significant and relevant information, without getting lost in trivial matters. It will also assist the researcher in the knowledge of relevant literature and help to define boundaries of his or her research field.

For the purpose of this study, the literature review from the following sources was utilised, namely: books; government legislations; government policy documents; development papers; files; published and unpublished research material; journal articles; academic papers; official reports; and other relevant literature (Majija, 2009).

3.3.3 Case study

This study is situated within the frame work of a case study. The case to be studied is utilisation of ICT in healthcare to support HIV/AIDS patients in Khayelitsha. Case studies recognise "the particular contexts of the problem setting and aspire to describe and analyse the aspects of the research and the conditions the influence these aspects (Simons, 1989:115) cited by (Adams, 2004). According to Cohen & Manion (2000:89-100), the purpose of a case study is "to probe deeply and to analyse intensely" the problem setting in real-life conditions with a view to establishing generalisations about similar. According to Leedy (1997:25) cited by Leedy and Ormrod (2010), the researcher explores a single entity or phenomenon (the case) bounded by time and activity (a program, event, process, institution or social group) and collects detailed information by using a variety of data collection procedures during a sustained period of time". Yin (2003:20-27), lists the following aspects of case study research:

- a case study is an empirical study that investigates a contemporary phenomenon within a real-life context

- case study research aims not only to explore certain phenomenon, but also to understand it in a particular context

- case study research uses multiple methods for collecting data, which may be both qualitative and quantitative

- a case study is typically used when contextual conditions are the subject of research

By using this technique, the researcher will be in a position to collect data by describing the phenomenon. Leedy and Ormrod (2010) citing Leedy (1997:26) state that, "data collection in case studies can be in the form of words, images or physical objects". Three types of data analysis, for example, structural, reflective and interpretational analysis.

For the purpose of this study, analysis will be used as it examines the data for constructs, themes and patterns that can be used to describe and explain a phenomenon (Leedy, 1997:26) cited by (Leedy & Ormrod, 2010:40). Case study method will be used to draw conclusions on the evaluation of utilisation of ICT in healthcare centres to support HIV/AIDS patients in the healthcare vicinity.

According to Welman, Kruger and Mithell (2007:188), the term 'case study' concerns with a limited number of units analysis frequently the term 'case study' does not refer to specific technique that is applied. Primarily falling within the phenomenological (qualitative) paradigm, case study research can equally be to applied the context of the positivistic (quantitative) paradigm. According to Welman, Kruger and Mithell (2007:188), citing Yin (1994:1), case study research can be used in many situations, including: Policy, political science, and public administration research; community psychology and sociology research; city and regional planning research, such as studies of plans neighbourhoods or public agencies; and organisational and management studies. According to Collins and Hussey (2009:68-70), case studies are often described as exploratory research used in areas where there are few theories or a deficient body of knowledge. In addition, the following type of case studies can identified:

- *Descriptive case studies*: where the objective is restricted to describing current practice.

- *Experimental case studies*: where the research examines the difficulties in implementing new procedures and techniques in an organisation and evaluating the benefits.

- *Explanatory case studies*: where existing theory is used to understand and explain what is happening

- *Illustrative case studies*: where the research attempts to illustrate new and possibly innovative practices adopted by particular companies.

Participant Observation

According to the Garson (2007), participant observation immerses the researcher in the subject being studied. The researcher is presumed to gain understanding, perhaps more deeply than could be obtained, for example, by questionnaire items or interviews. An important aspect of researching a case study is observations. There are two broad types of observation, namely: non-participant and participant[3]

Non-participant observation: refers to when the researcher is completely apart from that which is observed. In this situation the researcher is somewhat like a uninvolved spectator - interested, but not part of it (Cohen & Manion, 2010: 40-109).

Participant observation: transposes the researcher from the role of the spectator to that of an active participate. The researcher now actively engages in the very activities being observe (Cohen & Manion, 2010:101). Babbie and Mouton (2009:293) posed two types of observations, namely; direct observation vs. passive observation. They further argued that a qualitative framework can make use of two types of observations, namely; simple observation and participative observation. In the former "the researcher remains an outside observer" while in the latter the researcher is simultaneously part of the group or situation which she/he is studying.

According to Welman, Kruger and Mithell (2007:188), participant observers have to assume the roles of the group members in order to personally: experience what the group members experience; Understand their life world; see things from their perspective; unravel the meaning and significance that and they attach to their life world, including their own behaviour.

The danger of subjectivity is acknowledge whilst being engaged in observations. To guard against the possibility of subjectivity, observations were discussed with

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[3] Yin, R.K 2003. Case Study Research: Design and Methods. 3rd Sage: Thousand Oakes.

the healthcare centre employees and patients who were interested to participate. In the study the general practices around the utilisation of ICT in healthcare centres were observed from a non-participant perspective. Particular aspects observed are the information flow of the patients when they came to the healthcare centre, the type of atmosphere that the healthcare centres operate in, healthcare givers role, throughout the day.

3.3.5 Collecting primary data using 'observation'

The observation serves as data collection methodology for research methods falling within the context of either the positivistic (quantitative) or phenomenological (qualitative) research paradigms (Watkins, 2008:61). According to Collis and Hussey (2003:171-172), there are two ways in which observation can be conducted, namely 'non-participant' and 'participant' observation, which are elaborated below:

In using either non-participant or participant observation, the researcher is cautioned against observer bias, which may arise, such as when one observer interprets an action differently from a colleague. According to the Garson (2007), participant observation immerses the researcher in the subject being studied. The researcher is presumed to gain understanding, perhaps more deeply than could be obtained, for example, by questionnaire items or interviews. In the researcher we have chose to use participative observation based on the following:

- *First-hand information:* The researcher observed and recorded what he witnessed in healthcare centres 'public' and 'private' sector at Khayelitsha.

- *Natural environment:* Participants were studied in their natural environment. This helped the researcher to gain a deep insight into how participants understand and utilise ICT in healthcare centres to assist the flow of information for HIV/AIDS patients in Khayelitsha.

- *Flexible:* The researcher reacted to events, followed leads and pursued avenues of the research

- *High quality and depth information:* The researcher recorded all the events, which deemed to be valuable to ICT utilisation within healthcare centres resulting in high quality data collected.

3.3.6 Questionnaires

The advantage of questionnaire is opinions of a large number of people can be established. Responses can be anonymous and all participants also allow for written responses. Written responses are also not likely to be unquestioned by sceptics. It is an impersonal instrument for collecting data and must therefore contain clear questions, worded as simply as possible to avoid any confusion or ambiguity since the researcher probably will not be present to explain what was meant by any one particular question (Babbie & Mouton, 2002:180-187).

The questionnaire should be designed to fulfil a specific research objective; it should be brief and the sequence of the questions logical. There are three forms of questionnaires, namely: structured, semi-structured and unstructured questionnaires. Structured questionnaires are mostly used in the place of interviews (Babbie & Mouton, 2002:187). In this research case study, an unstructured questionnaire is used as a mode of data collection.

Healthcare centres, private and public employees of private and public healthcare centre e.g. clerks, nurse and doctors, as wel as care-givers, field workers, and patients were identified as suitable candidates for the questionnaires. The questionnaire was constructed in a manner that prevents any bias or unethical conduct from the researcher. There will be no personal contact between the researcher and respondents during the completion of questionnaires as a precautionary measure to ensure objectivity and honesty from the respondents.

Healthcare employees as service providers and patients in the private and public healthcare sector were interviewed to explore their use of existing ICT. Semi-structured interviews were conducted with healthcare professional in the private and public health sectors in Khayelitsha. The interviews were employed to determine how ICT is being utilised to deliver healthcare services to patients, the extent of ICT deployment and constraints in the delivery of health services to patients. A second questionnaire for patients was developed to obtain views from a sample of patients in various healthcare centres in Khayelitsha. Focused sampling is concerned with choosing participants with certain noticeable characteristics that the researcher is interested in (Struwig & Stead, 2007:122).

The patient's questionnaire was done in private and public healthcare centres in Khayelitsha and this included, waiting areas, wards, and patients as theyn arrived and left. The patient's questionnaire covered factors that influenced the use of ICT in healthcare centres and the information flow from patients to healthcare providers, perceptions of ICT use for healthcare and it also considered patient's record access "from and to" by utilisation of ICT. A high response rate was reached in this study due to self-administration procedure of questionnaires. Through conducting face to face interviews with healthcare providers or employees and with patients, this will increase the response rate unlike online surveys.

Both questionnaires consisted of open-ended and closed-ended questions. The advantage of open-ended questions is that they give respondents the freedom to freely answer the questions and allows them to formulate an answer in their own words (Groves et al., 2004:156). Closed-ended questions were used to limit lengthy answers where these were unnecessary. Closed-ended questions in both questionnaires were pre-coded for analysis. All questionnaires were assigned a serial number on each page to identify the questionnaires and to avoid mix up should pages of the questionnaire go missing.

The advantage of is a relatively quick way of exploring the opinions of a large number of people (Gay & Diehl, 2011). Responses can be anonymous and they also allow those who are generally not good public speakers a chance to respond in writing. Written responses are also not likely to be unquestioned by sceptics. Healthcare givers or employees and patients were identified as suitable candidates for the questionnaires.

The questionnaire was constructed in a manner that prevented any bias or unethical conduct from the researcher. There was no personal contact between the researcher and respondents during the completion of questionnaires as a precautionary measure to ensure objectivity and honesty from the respondents (Watkins, 2008). Two questionnaires were prepared for healthcare providers/employees (HP) and patients before commencing with the field study. The primary questionnaire was developed for healthcare to explore current ICT being utilised in healthcare centres 'private and public' in Khayelitsha.

We also look at the flow of information and their constraints in delivering healthcare services specifically to patients with HIV/AIDS and other chronically diseases in Khayelitsha and looking at Site B. The first step in designing questionnaires was to develop specific questionnaire items for the concepts employed in the research question (Greenfield, 2002:174). The ***primary questionnaire*** healthcare providers/employees (HP) questionnaire consisted of five sections:

- The first section captured personal particulars of health institutions.

- The second section explored the current ICT utilisation in healthcare centres in the Site B clinic. The third section questioned the role of ICT in collaborations with other institutions.

- The fourth examined factors that influenced the utilisation of ICT for healthcare services centres (HSC) and

- The fifth section explored healthcare centre facilities potential investments in ICT equipment to enhanced healthcare service and delivery to chronically such as HIV/AIDS, TB etc patients. The (HP) questionnaire was designed only to be used as a guideline in semi-standardised interviews.

The ***secondary questionnaire*** was developed for patients with chronically diseases example HIV/AIDS, TB to help determine the factors that influence the utilisation of ICT in the healthcare services and delivery in the healthcare centres 'private and public' in Khayelitsha. The questionnaire for patients initially comprised of four sections:

- The first section of the questionnaire identified patients targeted for this study research. Screening of patients was done and patients were included in the study if they have visited a health facility in the past 3 weeks to a month. Research target ages were from at least 18 years of age up to the age of 65 years

- The second section focused on respondents' views about the use of ICT and how they perceived ideal healthcare services offered to them

- The third section explored factors that influence the utilisation of ICT for healthcare services centres (HSC) and

- The fourth section obtained patients' demographic information

Both questionnaires consisted of open-ended and closed-ended questions. The advantage of open-ended questions is that they give respondents the freedom to freely answer the questions and allows them to formulate an answer in their own words (Groves, et al., 2004:156). Closed-ended questions were used to limit lengthy answers where unnecessary. All questionnaires were assigned a serial number on each page to identify the questionnaires and to avoid mix up should pages of the questionnaire go missing.

Open ended Questions: When respondents take the time to reflect on answers to questions, this provides the opportunity to get more meaningful information than from closed questions. This also assists in receiving responses that provide a clear indication of what the respondent feels about the topic (Madikizela, 2008:64). Open-ended questions provide a wealth of information provided respondents feel comfortable about expressing their opinions, providing the respondents an opportunity to express themselves freely resulting in a greater variety of information and virtually eliminating the possibility of the investigator's bias (Kumar, 2005). The questions helped the researcher gain better understanding and able to better interpret and analyse some of the answers for the close end questions (Madikizela, 2008:64).

Closed-ended questions: provide 'ready made' categories within which respondents reply to the questions asked by the researcher, help to ensure that the information needed by the researcher is obtained (Kumar, 2005). The respondents were given a set of alternative choices from which they could choose to answer the question such as, for example, "yes," or "no," multiple choices, a rating or a ranking (Madikizela, 2008:65). Closed questions can usually be answered quickly, allowing researchers to gather large amounts of information quickly. However, the disadvantage is that respondents may rush through the questions and not take enough time to think about their answers. This type of questioning was regarded as beneficial to this topic as the questions and answers provided were instrumental in identifying and providing input related to the hypothesis presented (Madikizela, 2008:65).

Bias: The primary goal of research is to arrive at valid conclusions through scientific enquiry. Valid conclusions can only be reached in observational or experimental research if bias can be eliminated. Bias is defined as a systematic deviation from the truth which can potentially take place in the design, implementation, or analysis of a study. In most cases, bias cannot be completely eliminated, but it can be minimized (Dunn et al., 2003).

3.3.7 Collecting primary data using 'interviews

The purpose of interviewing according to Welman, Kruger and Mitchell (2005), (citing Patton, 1982), is to allow us to enter into another person's perspective. The assumption is that the perspective is meaningful, knowable and capable of being made explicit (Ndingane, 2009). The interview research serves as data collection methodology for research methods falling within the context of phenomenological (qualitative) research paradigms. According to Copper & Schindler, (2006:204, 208, 210,-211), three types of interviews are identifiable:

- ***Structure interview***: similar to a questionnaire to guide the question order and the specific way the questions are asked but the questions generally remain open-ended.

- ***Unstructured interview***: no specific questions or order of topics to be addressed, with each interview customised to each participant.

- ***Semi-structured interview***: generally starts with a few specific questions and then follows the individual's tangents of thought with interviewer probes.

Interviews, according to Collis and Hussey (2003), are associated with both positivist and phenomenological methodologies. They are methods of collecting data in which selected participants are asked questions in order to find out what they do, think or feel. Furthermore, according to Collis and Hussey (2003), interviews are associated with both positivist and phenomenological methodologies as employed within the ambit of this dissertation.

In this dissertation by using interviews as one of the techniques in collecting the data, the researcher wanted to gain an understanding of the underlying reasons and motivation for people's attitudes, preferences, and behavior.

More specific, the survey conducted in this dissertation falls within the ambit of the descriptive survey as defined by (Nebeker, 2006).

3.3.8 Collecting primary data using 'mixed methodologies'

The mixed methodology according to Creswell (2003:67), the use of multiple, but independent measure is known as triangulation, of which four categories can be recognised namely; theoretical triangulation, data triangulation, investigator triangulation and methodological triangulation. Simple random sampling is the usual method of selecting a sample from a homogenous or same kind of population. Every member of the population has an equal chance of being selected for the sample.

3.4 QUALITATIVE RESEARCH METHODOLOGY USED

Research Focus	(Qualitative) research paradigm
Purpose of the research	To describe and explain
	To explore and interpret
	To building
Nature of the research process	Holistic
	Unknown variables
	Flexible guidelines
	Emergent design
	Context-bound
	Personal view
Method of data collection	Informative, small sample
	Observations, interviews
Analytical form of reasoning	Inductive analysis
Method of communicating findings	Words
	Narratives, individual quotes
	Personal voice, literature

Table 3.2: Distinguishing characteristics of phenomenological research paradigms (Leedy & Ormrod 2010:102)

3.4.1 Validity of the research

While this author acknowledges that a number of strategies can be applied in similar research projects, the well-known concepts of objectivity, reliability, etc. Inherited from the empirical analytical paradigm, is suggested for business research in more or less the traditional way. Quoting Thorndike & Hagen, these concepts are defined by (Cooper and Emory, 2007), as follows:

> *Practicality:* Practicality is concerned with a wide range of factors of economy, convenience, and interpretability.
>
> *Validity:* Validity refers to the extent to which a test measures what we actually wish to measure. Yin (2003) identifies 3 subsets to the concept validity, namely: Construct validity, internal validity and external validity.
>
> *Reliability:* Reliability has to do with the accuracy and precision of a measurement procedure.

3.5 RESEARCH LOCATION

Khayelitsha is part of the City of Cape Town's Metro South East Region, commonly know as Cape Town's poverty trap. In 2008 the area houses an estimated 1 029 000 people, representing 15,5% of the city's population. Some surveys suggest it is closer to 500 000 people. It is estimated that 50.81% of the economically active population is unemployed and that 70% of households earn less than R2500 a month (Maverick, 2008).

Key challenges face Khayelitsha in the light of high incidents of chronic diseases such as high level of HIV/AIDS, TB, high rate of unemployment, overcrowded living conditions and a lack of land for formal housing. The existing high level of HIV/AIDS and TB is linked to the deterioration of the physical living conditions that need to be addressed by a government, healthcare facilities, NGO and other healthcare related programme as well a housing programme. Although there is a annual increase in the budget for Khayelitsha, there remain challenges in achieving a fair distribution of healthcare services in the area (Maverick, 2008).

Although there are many problems in Khayelitsha, the Urban Renewal Projects and the building of a new district hospital will go a long way in improving the health services and bridging the inequity gaps.

The Department of Health's social capital project will contribute towards addressing some of the social determinants of ill-health to the improvement of the health indicators (Ndabeni, 2009:2). The study was conducted in the healthcare centres in Khayelitsha which is one of the previous disadvantage communities.

3.5.1 Khayelitsha Map

Figure 3.1: Khayelitsha as part of Cape Flats Metropolitan
(www.http://URP_Khayelitsha_Map.htm)

There are three Provincial Government clinics in Khayelitsha. Khayelitsha (Site B) CHC (Community Health Clinic) is the principal clinic, and is the only 24 hour trauma and emergency unit in the township. Michael Mapongwana (Harare) CHC and Nolungile (Site C) CHC are the other Provincial Government clinics. These three government clinics normally transfer patients to Jooster hospital in Manenberg, Tygerberg Hospital in Tygerberg and Groote Schuur Hospital in Observatory (Ndabeni, 2009:4)

Three main public healthcare clinics connect with outside hospitals. The ones that are marked with red are going to be my field of concentration. There are also numerous small municipal clinics throughout the township, as indicated from figure 3.1. Services offered at these municipal clinics include child health, family planning, TB treatment, HIV testing, HIV/AIDS treatment, pap smears and treatment and diagnosis of sexually transmitted infections (STI). There are no private hospitals and private clinics in Khayelitsha in the township only private doctors, general practitioners, surgeries and private "Sangomas" who specialise in using traditional medicine.

3.6 SAMPLING TECHNIQUES

Collis and Hussey (2009:106), argue that a correctly chosen sample would present an accurate extract of the population, without error or bias in the results. Furthermore, the researcher must ensure that the sample is collected in a systematic manner, so that the impact of the sample members on the results can be estimated and evaluated. The choice of a sample size is crucial according to Struwig and Stead (2007), stated that accuracy of the measurement must be balanced against cost and feasibility. Emory and Cooper (2007: 200-228), define two methods of survey sampling namely:

- The conventional sample, whereby a limited number of elements smaller than the chosen population are considered (typically randomly) in such a manner as to accurately represent (without bias) the total population.

- The census approach, where attempts are made to survey every element within the population.

The sampling procedure was initiated by identifying the target population to be studied. The target population in terms of a geographical area (Khayelitsha) studied was the healthcare providers or employees and patients in healthcare centres in Khayelitsha. The sampling procedure was therefore designed to produce a representative sample of patients from various healthcare centre facilities in the township of Khayelitsha.

The selection procedure of the population sample was based on two sampling methods, namely multistage stratified sampling and purposive sampling. The target population consisted of healthcare providers/employees: clerks, nurse, doctor and care givers) and patients from healthcare facilities in Khayelitsha. The geographical region was a selected for this study, as it was deemed likely that Khayelitsha was previous disadvantaged area.

Collins and Hussey (2009:153-160), define a sample technique as is the method used to select a number of items or participants of the total number of items or persons from a homogenous or a group of people of the same kind. A sample is made up of some of the members of a 'population' (the target population), the latter referring to a body of people or to any other collection of items, in this case the persons under consideration for the purpose of the research. A 'sampling frame refers to a list or any other record of the population from which all the sample is drawn. Simple random sampling is the usual method of selecting a sample from a homogenous or same kind of population where every member of the population has an equal chance of being selected for the sample (Howard, 1985) cited by (Rashe, 2006).

The sampling procedure was done by identifying the target population to be studied. The target population in terms of a geographical area studied was the healthcare providers or employees and patients who are part of the healthcare service provision in Khayelitsha. The sampling procedure was therefore designed to produce a representative sample of patients and healthcare professionals and workers from various healthcare facilities in the township of Khayelitsha.

 In any research it will be useless and completely impossible to try to reach the entire larger population of a study; therefore, through an appropriate sampling technique a researcher can draw a representative sample, or a small collection of elements or cases, from the larger population. The techniques used in drawing the sample could either be by probability or non-probability (Stead & Struwing: 2007:89). According to Welman, Kruger and Mitchell (2007:188) probability sampling is where the research can in advance determine that each segment of the population will be represented in the sample and 'non-probability' where the researcher has no way of forecasting or guaranteeing that each element of the population will be represented in the sample.

Three of the more popular methods of probability sampling that can be used to select a sample are: random sampling; systematic sampling; and stratified sampling". Stead and Struwing (2007), stress that the quantitative sampling technique allows for findings that can be generalised across the entire sample population. The qualitative sampling technique focuses on a sample to acquire clarity and understanding of social life in a specific context, as was the case in this research where the context is the previously disadvantaged community of Khayelitsha.

The target population for this research is anyone ranging in age from eighteen or older and situated in Khayelitsha. The study was therefore limited to the above-mentioned group. The type of sampling technique used for the survey implies that sample members should conform to certain criteria (Cooper & Schindler, 2008:37-44). The survey questionnaires were only handed to community members who met those criteria. 70 patients and 30 healthcare providers respondents were targeted and the respondents were chosen via the random sampling technique.

3.7 LIMITATIONS OF THE STUDY

This study was limited to investigating the utilisation of ICT in healthcare centres in Khayelitsha and to assist in service delivery of HIV/AIDS patients. The study excluded other healthcare services providers such as pharmacies and medical aid companies etc., because the research purpose was primarily to focus on utilisation of ICT in the healthcare centre for private and public sectors around Khayelitsha. The research also looked into the flow of information utilising ICT during the care of HIV/AIDS positive patients in Khayelitsha.

3.8 ETHICS

This research does not require viewing any individual patient data and therefore the privacy of patients was not compromised. Any results or comments of participants will be treated with care, confidentiality and permission will be obtained before any references are made in any publications resulting from this research. The nature of the research is to present information utilisation and flows in terms of its generic components and structure and not its specific values.

Another critical limitation that affected this study or research was the limited or non-existent study or research conducted on the utilisation of ICT in healthcare in areas such as Khayelitsha. The time and resources that were available to conduct this study were not sufficient, hence recommendations for future research are raised. According to the literature reviewed it follow that the culture of research is not well recognised and well established in Khayelitsha. Where it was known, it was regarded as an exercise of little value that would not make any real difference in people's lives. Lack of knowledge cause attitudes and made it difficult to distribute questionnaires in some of the significant areas for the purpose and goals of the research. The most common problem encountered during focus groups was the suspicion of some type of political agenda the researcher may have. The respondents felt that the responses would be used against them at some stage or another especially the nurses.

Future studies should probe ICT utilisation and information flow in private and public healthcare focusing on a specific patient group or functional area, e.g. HIV/AIDS, maternity, emergency services etc. Alternatively, a similar study could assess the willingness to use modern technologies such as mobile phones, as there are likely future platforms for healthcare services delivery; and some risks and benefits associated with such applications.

3.9 CONCLUSION OF CHAPTER THREE

A thorough study of all research methodology was done and this concludes Chapter four, which dealt with the empirical study, in order to achieve the objectives of this study. The next chapter will present an in depth data analysis and discussion of the results and findings of the research. The focus of this chapter was mainly on the research instruments for collection of data on an evaluation utilisation of ICT in healthcare to assist flow of information for HIVIAIDS patients in Khayelitsha: the identified research instruments (structured questionnaires and focus groups) were designed in such a way that ultimately unbiased and objective data was collected supported by consistent observations. The methodology, purpose and the objectives of the study were at all times placed in a central position by testing their relevance and eventual reliability, in respect of this study.

CHAPTER 4

4. DATA COLLECTION DESIGN

4.1 INTRODUCTION

'Research data collection forms the core of quality research. Quality research data is further more dependent on the appropriate identification of respondents within a specific research with the specific purpose to elicit 'accurate' and 'relevant' data (Watkins, 2008:139). For this particular reason data collection cannot commence if the following key elements have not been adequately addressed within the ambit of the research.

According to Welman, Kruger and Mithell (2007:188), each data collecting method and measuring instrument has its advantages and drawbacks. Furthermore, what counts as an advantage for one may qualify as drawback for another *vice-versa?"* The researcher took sole responsibility for analysing and interpreting the qualitative data, which proved to be a difficult task due to the complexity of the study. Cooper and Schindler (2008), (citing Taylor et al, 1984) argued that monitoring the process during the actual data collection is advisable. Waiting until the project is completed, records and materials returned may result in unexpected problems.

4.2 DATA COLLECTION

During the development of the questionnaire, a pilot study was conducted in the Western Cape with specific reference to the area of Khayelitsha, for the questionnaire's relevance and easily to be understood. Seventy five (75) respondents in greater Khayelitsha participated in the pilot study. The questionnaire contained both qualitative and quantitative methods of data collection, thus allowing the research to use the mixed method, which involved strategies of collecting data simultaneously, or sequentially to best understand research problems. Some people completed the questionnaire while others refused to participate stating dissatisfaction with other research or surveys done in past in the area and in different areas where they have not yet seen the results of these studies.

One reason cited was the non-implementation of results acquired, thus considering it a waste of time. Khayelitsha was chosen because of its rampant and growing poverty and its apparent lack of new infrastructure development in terms of healthcare services. The response was only accepted in English and Xhosa then as researcher who is fluent in both languages I was able to interpret them to English. The majority of the population is conversant in isiXhosa, and English was used where the respondents were not conversant in Xhosa. The target population for this study amounted to three hundred (300). Three hundred survey questionnaires were sent, however, only over hundred and fifty were returned.

The questionnaire process was conducted during a one month period every weekend and some weekdays. The sampled method was randomly selected in each identified area as the target population.

4.3 METHOD OF DATA COLLECTION

The questionnaire method was used for collecting data. According to Pekeur (2002:159) "the research questionnaire is a set of questions dealing with a specific topic or related group of topics, given to a selected group of individuals for the purpose of gathering data on a problem under consideration". The data collection method used in this research falls within the ambit of both the definitions attributed to the concepts „survey and „field study. Survey, according to Cooper and Emory (2007), (citing Gay & Diebl, 1992:238), is an attempt to collect data from members of a population in order to determine the current status of that population with respect to one or more variables. Saunders, Lewis, and Thornhill (2009), (citing Kerlinger, 2000:372) define field study as a non-experimental scientific inquiries aimed at discovering the relations and interactions among variables in real structures. As in the case of most academic research, the collection of data forms an important part of the overall dissertation content. The research method chosen make this kind of data gathering possible, and produced reliable and valid results. The researcher utilised the following data collection methods for data gathering, which are elaborated upon below.

4.3.1 Collecting primary data using 'in-depth surveys'

An in depth survey serves as a data collection methodology for research methods falling within the context of either the quantitative or qualitative research paradigms (Watkins, 2008:58). Survey research is a common approach and relatively simple in design that is why the research has used it as a method of collecting data. In this type of research a series of questions is posed to willing participants, responses are summarised with percentages, frequencies or statistical indices and then inferences about a particular population are drawn (Leedy & Ormrod, 2010).

In depth surveys attempt to obtain detailed in-depth evidence from a relatively small number of participants through a series of interviews. As a rule a structured questionnaire is not used for in-depth surveys, but rather the participants are allowed to freely on the subject of interest to the researcher (Watkins, 2008:57). The research either records the interview or takes notes during the interview, the objective being to compile a transcript of discussion.

4.4 DATA ANALYSIS AND INTERPRETATION

According to Plummer (1983), cited by Babbie and Mouton (2002), "the analysis of the data is an important part of the research and typically requires much more discussion it will probably take more time than the collection of the data". According to Gardner (1978:122) cited by Gay & Diehl (2011), "to understand the results sometimes requires two separate processes".

Firstly, we must find out what the results are saying; before trying for the meaning of the results Zainal (2007), (citing Kavale, 1996:177) states that "the purpose of analysis is to uncover the meaning of the question, by considering the presuppositions. Further more it points out that the interpretation of the results focuses on the tension between what is said and what is not said in the question" (Zainal, 2007) citing (Kavale, 1996:186). The interpretation and analysis of over 30 healthcare givers and 70 patients completed questionnaires from individual respondents and in collecting data to analyse the utilisation of ICT in healthcare centres, 'private and public' sectors in Khayelitsha and also investigate the flow of information in healthcare centre services from all the stakeholders involved (Pope & Mays, 2006).

Once the data has been analysed and the findings stated on the basis of qualitative and quantitative analysis, these findings and the whole procedure leading to them will be thoroughly and critically reviewed to detect any errors of measurement (Cooper & Schindler, 2008). The research report will follow and that is basically a description of what the researcher did, with special emphasis on the researcher's idea of how the subject interpreted their social world and what their actions meant to them (Ndingaye, 2009).

4.6 RESEARCH QUESTIONNAIRES ANALYSIS

4.6.1 Validity of Questionnaires

Any measurement procedure needs to be valid and reliable. Reliability refers to the confidence that the measuring instrument will generate the same numeric value when repeated on the same object (Gaur, 2006). A measuring instrument is valid when it measures what it is actually supposed to measure. If an instrument is considered to be reliable, it does not necessarily mean that it is also valid. According to Babbie and Mouton (2003), a way to ensure reliability is to use measures that have proven their reliability in previous research.

According to (Welman, Kruger and Mitchell (2005), validity ensures that data sets collected are pertinent or relevant to the research. Furthermore, Welman, Kruger and Mitchell (2005), (citing Schwandt, 1997), the latter defined validity as "the sound, cogent, well-grounded, justifiable or logically correct data". Validity is concerned with reducing the amount of interference by non-relevant or non-valid aspects. Another way to measure reliability is by using the test-retest method which measures the same object twice and correlates the results (Rubin & Rubin, 2007:185). The measure is reliable if it generates the same answer in repeated attempts. Establishing reliability in this way is, however, difficult as the respondent who repeatedly undergoes the same test cannot remain neutral to the test. Other ways of assessing reliability include Cohen's 'kappa coefficient' for categorical data and Cronbach's 'alpha' for internal reliability of a set of questions (Gaur, 2006).

In terms of measurement procedures, validity is the ability of an instrument to measure what it is designed to measure (Maxwell, 2005:78). In fact, the research is concerned with investigating a hypothesised casual relationship between an independent variable and dependent variable. If such a relationship is found, inferences are drawn about the population and, perhaps, a variety of circumstances in which the relationship may apply beyond those of the particular study carried out (Cooper & Emory, 2007:123-130). Therefore, validity is premised on the assumption that what is being studied can be measured or captured, and seeks to confirm the truth and accuracy of this measured and captured data, as well as the truth and accuracy of findings or conclusions drawn from the data (O'Leary, 2004:78).

4.6.2 Reliability of Questionnaires

Reliability is premised on the notion that there is some sense of uniformity or standardisation in what is being measured, and that methods need to consistently capture what is being explored (O'Leary, 2004). An instrument is proven reliable if it provides the same results on repeated trials. A research instrument is reliable if it is consistent and stable, and, hence, predictable and accurate. Reliability will be analysed using SPSS by calculating the correlation of values of items for questions of which responses are predicted.

According to Birley and Moreland (2000:33), defines reliability as, "the extent to which a test would give consistent results if applied more than once to the same people in an organisation under standard conditions". According to Poggenpoel and Myburgh (2005) (citing Guthtrie, Petty and Yongvanich, 2004: 289), highlights the fact that reliability could be broken down into the following issues:

- It proves that the coded data set produced from analysis is consistent. Multiple coders can be used and their results should have minimal discrepancies.

- The coding instrument should be standard. It should incorporate well-defined decision categories with well-specified decision rules.

Struwig and Stead (2007:138), assume that these two concepts are usually complementary, albeit with occasional cases of conflict. If test scores are not reliable, then they are not valid as well. Researchers are more concerned with the accuracy, than validity of data in most quantitative researches.

4.6.3 Administration of Questionnaires

One of the main primary data collection instruments in research is the survey questionnaire. Modes of data collection by questionnaire differ in several ways, including the method of contacting respondents, the medium of delivering the questionnaire to respondents, and the administration of the questions. Questionnaires are an inexpensive way to gather data from a potentially large number of respondents. Often they are the only feasible way to reach a number of reviewers large enough to allow statistically analysis of the results. A well-designed questionnaire that is used effectively can gather information on both the overall performance of the test system as well as information on specific components of the system. If the questionnaire includes demographic questions on the participants, they can be used to correlate performance and satisfaction with the test system among different groups of users (O'Leary, 2004:58).

Self-administered questionnaires are instruments in which the respondents are required to complete the questionnaires themselves. In this specific study, the questionnaires were administered and collected by the researcher. Survey instruments were distributed to a group of respondents gathered at the same place at the same time. Although anonymity could not be guaranteed while the research was in progress, confidentiality was ensured throughout the process. As part of the introduction to the administration of the questionnaire, both the researcher and the purpose of the study were introduced and the process was explained in English (O'Leary, 2004:90).

4.6.5 Measurement Scales

The survey was in the form of the well-known Likert scale, which was developed by Rensis Likert (Likert, 1932:1-55), which use item analysis to select the best items (Remenyi et al., 2003:284). The respondents were asked to respond to questions or statements. The reason most important reason for choosing the Likert scale, is the fact that the scale can be used in both respondent-centered (how responses differ between people) and stimulus-centered (how responses differ between various stimuli) studies, most appropriate to glean data in support of the research problem in question (Emory & Cooper 2007:180-181).

Birley and Moreland (2000), maintain that the Likert scale is an effective method for obtaining consistent survey response. It allows participants to provide feedback that is slightly more expansive than a simple close-ended question, but also much easier to quantify than a completely open end response. The advantages in using the popular Likert scale according to Emory and Cooper (2007:180-181) are: easy and quick to construct; each item meets an empirical test for discriminating ability; the Likert scale is probably more reliable than the Thurston scale, and it provides a greater volume of data than the Thurston differential scale; The Likert scale is also treated as an interval scale; and Interval scales, have the benefit that the scale data can be analysed by virtually the full range of statistical procedures.

According to Remenyi et al. (2002:224), interval scales facilitate meaningful statistics when calculating means, standard deviation and the Pearson correlation coefficients.

Based on the Lickert scale the dichotomous scale and open-ended questions. Respondents were asked to respond to each of the statements by choosing one the five agreement choices on the Lickert scale according to Emory and Cooper (2007:179) the five agreement choices are shown in Table 9:

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

Table 4.1: Lickert scale, (Emory & Cooper, 2007:179)

4.7 CONCLUSION OF CHAPTER FOUR

This chapter has provided two main areas and objectives of focus. The first one was to present the research instruments that were used for data collection on the study, which pertained to the socio macro-economic impact of privatisation in the Western Cape with specific reference to the township of Khayelitsha. After identifying the research tools that were used (namely a questionnaire), the steps were taken to avoid bias. The second objective of this chapter was to present the data collected and analyse the results thereof. The methodologies and purpose of the study were all placed in a central position by testing their relevance, and

eventual reliability, in respect to the study. The following chapter deals with the findings, resolutions and recommendations of the research study.

CHAPTER 5

5. KHAYELITSHA CASE STUDY

5.1 INTRODUCTION

Cape Town initially opposed implementing the Group Areas Act passed in 1950 and residential areas in the city remained unsegregated until the first Group Areas were declared in the city in 1957 (Saff, 2009:4). When Cape Town did start implementing the Group Areas Act, it did so more severely than any other major city; by mid 1980s it became one of the most segregated cities in South Africa (Saff 2009:9). During the Apartheid era, the South African government did not want black people to settle permanently in Cape Town. Men were needed for labour in the white city of Cape Town and therefore allowed into the city during working hours. Townships were merely set up as dormitories for the labourers (Curry, 2011).

Women were banned from seeking employment in the city and wives could not join their husbands. However, Apartheid failed to prevent the influx of job-seekers and families, and when no legal accommodation could be found, shacks were erected in Old Crossroads which is one of the oldest informal settlement. This was the first illegal settlement and during the 1970's and early 1980's, the government attempted to demolish the shacks and destroy the residents' property, but as soon as the police disappeared, the shacks re-appeared (Housdon, 2002). They are now a permanent fixture.

Figure 5.1: Khayelitsha view toward Table Mountain (http://upload.
/commons/1/1e/Khayelitsha_pano.jpg*, 2011)*

In 1983 the government realised that the informal areas were growing and attempted to control urbanisation by creating "Khayelitsha" translated in English meaning "New Home". This was for all illegal black settlers who had been living in the area for ten years or longer. The discrimination and black population control by the apartheid regime did not prevent blacks from settling in the outskirts of Cape Town (Country reports on human rights practices, 1987:287).

After the scrapping of pass laws in 1987 many blacks, mainly Xhosas, mainly from the Eastern Cape such as the former Ciskei and Transkei moved into areas around Cape Town in search of work (Field, 2001). By this time many blacks were already illegally settled in townships like Nyanga, Guguletu, KTC, Crossoads etc. As the black population grew, the apartheid regime sought to solve the "problem" by establishing new black neighbourhoods. Khayelitsha was established in 1985 and large numbers of people were forcefully relocated there according to Country reports on human rights practices, (1987:287), mostly peacefully according to Field, (2001:23), but occasionally accompanied with violence (Country reports on human rights practices, 1986:294).

The Western Cape was a preference area for the local coloured population and a system called influx control was in place preventing Xhosas from travelling from the Eastern Cape without the required permit. After the historic year (1994) elections hundreds and thousands moved to urban areas in search of work, education, or both. Many of them erected shacks made of tin, wood and cardboard.

5.1.1 Khayelitsha Population Background

According to Ndingaye, (2009:3) the Western Cape faced a serious housing crisis in the early 1980's. This was because the population of Africans in Cape Town increased. This was aggravated by the stipulations of the Group Areas Act No 36 of 1966, the Coloured Labour Preferential Policy and the freezing of the erection of new houses in the townships of Langa, Nyanga and Gugulethu, all of which created overcrowding in the existing settlement areas and the large, burgeoning squatter settlements. Harsh influx control measures were imposed and later Khayelitsha Township was established (Mangwana, 1990) cited by (Ndingaye, 2009). Khayelitsha is part of the City of Cape Town's Metro South East Region; commonly know as Cape Town's poverty trap also known as the Cape Flats area. It is estimated that 50.81% of the economically active population is unemployed and that 90% of households earn less than R3500 a month (Maverick, 2006).

Today Khayelitsha has an estimated population between 391, 749 and 406,779 and runs for a number of kilometres along the N2 (Census, 2011) and (Maverick, 2006) respectively. The census of 2005 reaffirmed the national census of 2001 ratio between male and female in Khayelitsha township as 48:52 (Maverick, 2006:4-7). The ethnic makeup of Khayelitsha is approximately 98.6% Black African, 0.6% Coloured, 0.1% White, and 0.1% Indian/Asian with Xhosa being the predominant language of the residents (Census, 2011), (citing Maverick, 2006), Khayelitsha has a very young population. Fewer than 7% of its residents are over 50 years old and over 40% of its residents are under 19 years of age. About 75% of residents consider themselves Christian while about 20% follow traditional beliefs and a negligible amount consider themselves Muslim (Khayelitsha Report, 2004).

5.1.2 Khayelitsha Post 1994

Since the democratic elections in 1994 where the African Nation Congress came to power in the country government, the ruling party claims that living conditions in the township have improved markedly. There have been many developments such as new brick housing and new schools being built, and the creation of a central business district in the Township. However many residents strongly dispute the claim that the quality of life has improved.

They claim that crime rates remain very high and that only a small portion of residents see improvements as a result of infrastructure and welfare interventions (Khayelitsha Report, 2004). Some part in Khayelitsha has gained prominence due to their high-profile conflicts with government including protest actions such as road blockades.

Khayelitsha is a combination of old and new houses, formal and informal and well-off and poor. There are housing projects which are continuously on the go, to alleviate the housing problems such as the Harare community which do "Stockfellas" and building each other brick houses, but shacks are continuously being erected by the steady stream of people arriving from mainly the Eastern Cape and other areas, even foreigners especially African foreigners from Zimbabwe and other neighbouring countries (Khayelitsha Report, 2004).There are shopping centres, clinics, fire stations, schools, police stations, a magistrate court, traffic department, social and welfare department, labour department, recreation centres, churches and post offices. There are also shipping containers which serve as shops, schools and hair salons. Anything goes and it is not strange to see goats or cattle roaming freely. The roads are in good condition and the government is trying to deliver services to all the areas as soon as possible. Most people have electricity and access to fresh water and toilets (Housdon, 2002).

Figure 5.2: Ship Containers use in Market place in Khayelitsha

The residents are warm, friendly and welcoming. The population harbours an untapped wealth of artists and craftsmen, actors and musicians. Tools of the trade are extremely innovative. There is a strong community spirit and once you are welcomed into the community, you become part of an extended family, which is an honour (Housdon, 2002).

Figure 5.3: Cattle and other domestic farming animals roaming freely in Khayelitsha

5.1.3 Khayelitsha Sections

Khayelitsha has been split into about 22 sub-sections or areas, depending on how one divides them (Khayelitsha Report, 2004). Khayelitsha is made up of old formal areas and new informal/formal areas. The old formal areas built originally by the apartheid government are known as Bongweni, Ikwezi Park, Khulani Park, Khanya Park, Tembani, Washington Square, Graceland, Ekuphumleni and Zolani Park (Ndingaye, 2009). These areas are mostly made up of bank bond housing and are home to middle-class / upper working class populations. The newer areas have been built up around the older areas. They include Site B, Site C, Green Point, Litha Park, Mandela Park, Makaza and Harare (Ndingaye, 2009). With the exception of Litha Park and Mandela Park these areas contain a high number of informal settlements, RDP houses, and informal backyard dwellers.

Notable informal settlements in Khayelitsha include QQ Section, TR Section, RR Section, Enkanini, Makaza and Ndlovini which have gained prominence due to their high-profile conflicts with government including protest actions such as road blockades (iolnews, 2005:9) and (Mail&Gurdian, 2010:10).

Figure 5.4, a, b, & c: Service delivery protest in Khayelitsha (Sapa, 2010).

5.2 LANDSCAPE OF KHAYELITSHA IN DETAILS

Khayelitsha covers an area of about 47km² and is home to about 500 000 – 1.5 million. It is the fastest growing township and is the largest township in the Western Cape and is situated less than half an hour from Cape Town's city centre (Nomvuyos-Tours, 2011). Khayelitsha is one of the largest black townships in South Africa. It is rated as number three biggest township following Soweto in Johannesburg and Mdantsane Township in East London. Khayelitsha is a clearly defined entity, delineated as part of the Tygerberg Substructure and falls under the jurisdiction of the Cape Town Metropolitan Council. The Cape Town Metropolitan area is divided into six sub-regional substructures (Dyantyi et al, 1998). According to Korpela, De la Harpe, and Luukkonen (2008), the "landscape" of healthcare delivery, management and funding as well as the wider societal and political history differs from one country to the next. In this study a generic "landscape model" was proposed that can be used for comparative purposes (Korpela, Soriyan, Olufokunbi, & Mursu, 2000).

5.2.1 Khayelitsha Map
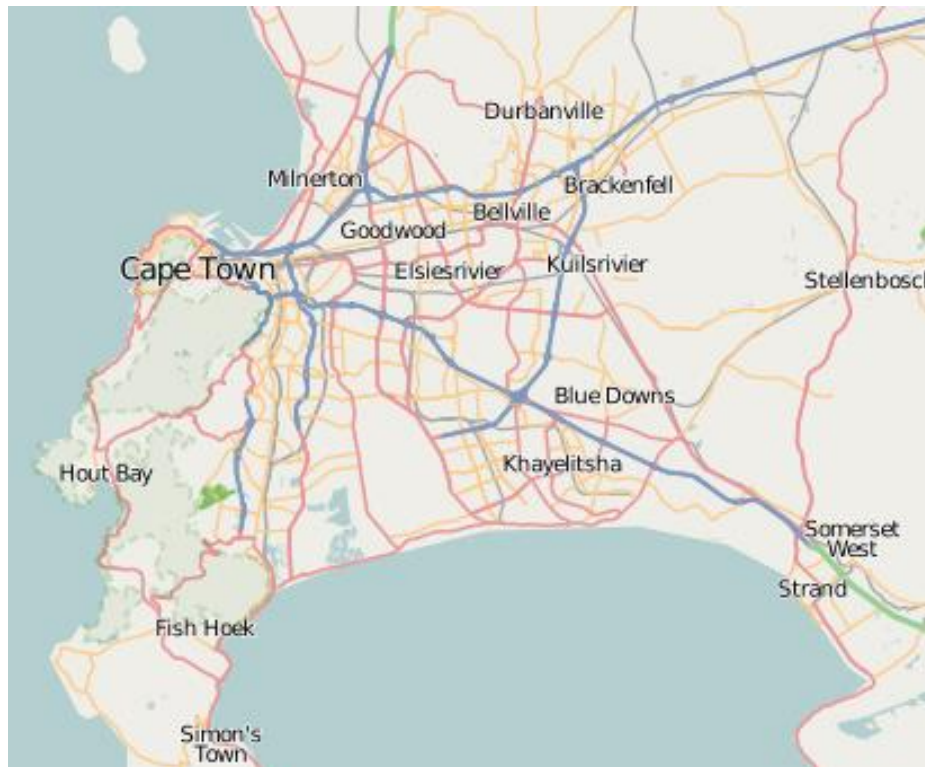
Figure 5.5: Cape Town and its outskirts including Khayelitsha (OpenStreetMap maps of South Africa, 2011)

Khayelitstha was established as a mono-functional dormitory town and consequently there is virtually no significant economic base other than in the service sector (Ndingane, 2009). The area is predominated by female-headed households and a very large youth population.

The majority of people that are staying in Site C are Xhosa, Sotho and Zulu speaking people with a very low percentage of Coloureds (Lingelethu West City Council, 1992) cited by (Ndingaye, 2009).
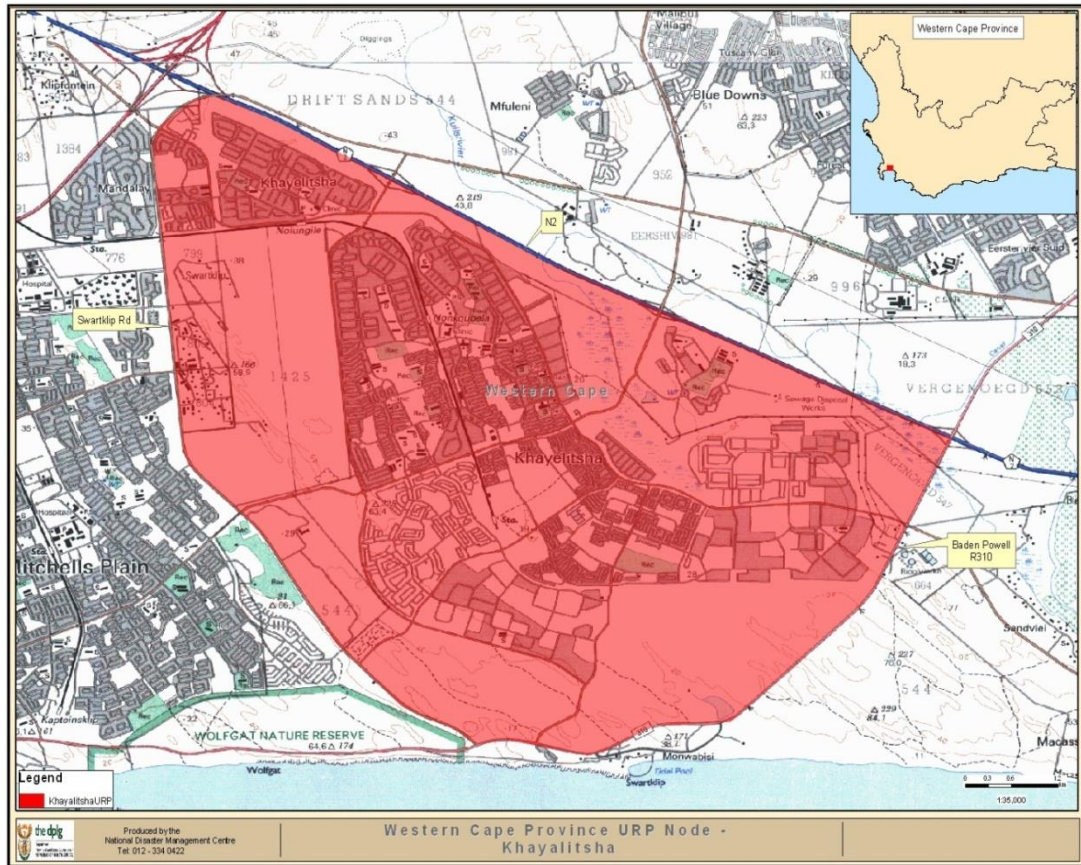
**Figure 5.6: Khayelitsha Landscape in full including parts of Mitchells Plain
(**www.http://URP_Khayelitsha_Map.htm**, 2010)**

Khayelitsha is South Africa's fastest growing township and is one of Cape Town's leading tourist's attraction and destinations. It is a large and predominantly informal settlement. The impression from outside is pretty severe with many shacks lining the outskirts and giving no indication of the vibrant culture within. It is located in the Western Cape region some 26km from the central business district of Cape Town on the white dunes of the Cape flats and is bordered by the N2 highway to the North and the False Bay Coast to the South with Mitchell's Plain to the West (Lingelethu West City Council, 1992) cited by (Ndingaye, 2009).

The formal settlements are known as Bongweni, Ikwezi Park, Khulani Park, Khanya Park, Tembani, Washington Square, and Zolani Park. The formal settlements are located in the original area of Khayelitsha that was built by the government in order to entice people to move to the area, whereas informal settlement areas were built by the residents themselves as a way of dealing with overcrowding in their households; these include Site B, Site C, Green Point, Litha Park, Makaza and Harare.

Later the government was forced to provide services to these areas. This research focuses on Site C, which as indicated above, is one of the informal settlements in Khayelitsha.

Figure 5.7: Khayelitsha as part of Cape Flats Metropolitan
(www.http://URP_Khayelitsha_Map.htm**, 2011)**
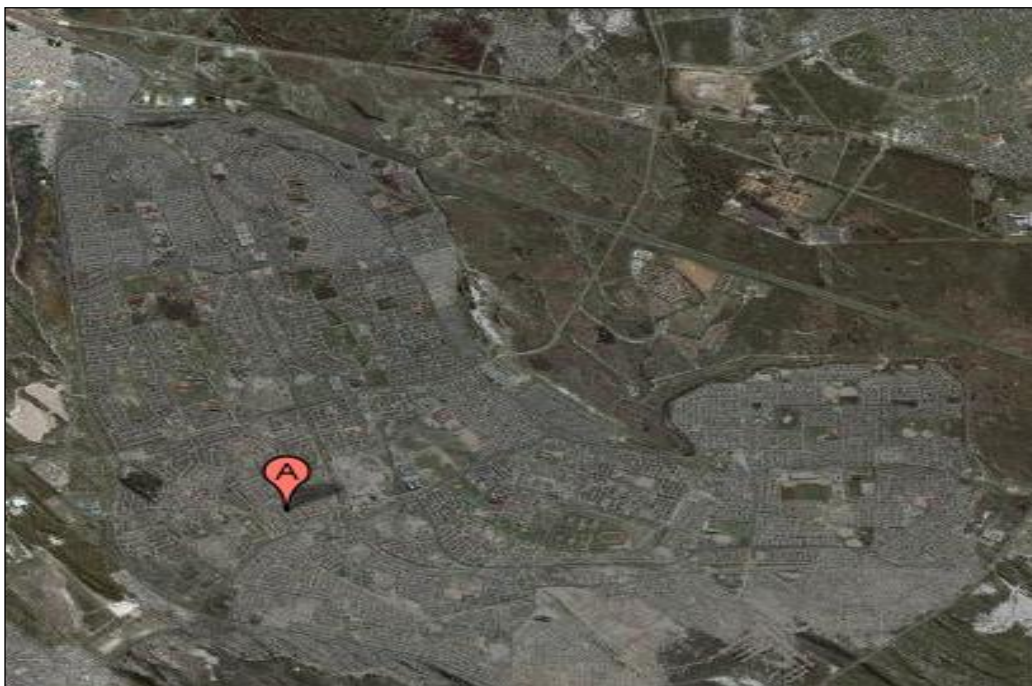
Figure 5.8: Khayelitsha District (www.http://URP_Khayelitsha_Map.htm**, 2011)**

Figure 5.9: Khayelitsha Site B Clinic (www.http://URP_Khayelitsha_Map.htm**,
2009)**

Since the ANC came to power in the country in 1994, the ruling party claims that living conditions in the township have improved markedly. There have been many developments such as new brick housing being built, new schools being built, and the creation of a central business district in the Township. However many residents strongly dispute the claim that the quality of life has improved. They claim that crime rates remain very high and that only a small portion of residents see improvements as a result of infrastructure and welfare interventions which I also agree as I am citizen of Khayelitsha township myself. The 2001 census recorded that two in three residents lived in shacks. By 2011 the number of people living in formal housing had increased to almost half due to the construction of roughly 25,000 new houses being built between 2001-2011. Around 70% of residents still live in shacks and one in three people has to walk 200 meters or further to access water.[2]Around 53% of Khayelitsha's total working age population is employed. The five most common forms of employment are domestic work (19.4%), service work (15.2%), skilled manual labour (15.2%), unskilled manual labour (11%), and security services (10.4%) and 89% of households in Khayelitsha are either moderately or severely food insecure (Curry, 2011) and (Battersby and Jane, 2011).

5.2.2 Khayelitsha Healthcare Sub-district Landscape

Sub-district	Facility	Class
Khayelitsha Health sub-District	Khayelitsha (Site B) CHC Khayelitsha (Site B) CHC (After hours) Khayelitsha (Site B) Clinic Khayelitsha (Site B) MOU	Community Health Centre Community Health Centre (After hours) Clinic Midwife Obstetrics Unit
	Khayelitsha Environmental Health Service	Environmental Health Office
	Khayelitsha Health Promotion Service	Clinic
	Khayelitsha Mobile	Mobile Service
	Khayelitsha Oral Health Service	Dental Clinic
	Khayelitsha RHC	Reproductive Health Service
	Kuyasa Clinic	Clinic
	Luvuyo Clinic	Clinic
	Matthew Goniwe Clinic	Clinic
	Mayenzeke Clinic	Clinic
	Michael Mapongwana CHC Michael Mapongwana MOU Michael Mapongwana Oral Health Service	Community Health Centre Midwife Obstetrics Unit Dental Clinic
	Nolungile CHC Nolungile Clinic	Community Health Centre Clinic
	Site B Youth Clinic Site C Youth Clinic	Clinic Clinic
	Town 2 Clinic	Clinic
	UCT/Khayelitsha RHS	Reproductive Health Service
	Zakhele Clinic	Clinic

Table 5.1: Khayelitsha Healthcare centre facilities (Provincial Health Dept, 2009)

There are three Provincial Government clinics in Khayelitsha. Khayelitsha (Site B) CHC (Community Health Clinic) is the principal clinic, and is the only 24 hour trauma and emergency unit in the township.

Michael Mapongwana (Harare) CHC and Nolungile (Site C) CHC and Kuyasa Children's Clinic which was built in 2012 are the other provincial government clinics are the other Provincial Government clinics. These three government clinics normally transfer patients to Jooster hospital in Manenberg, Tygerberg Hospital in Tygerberg and Groot Schuur Hospital in Observatory (Provincial Health Dept, 2009).
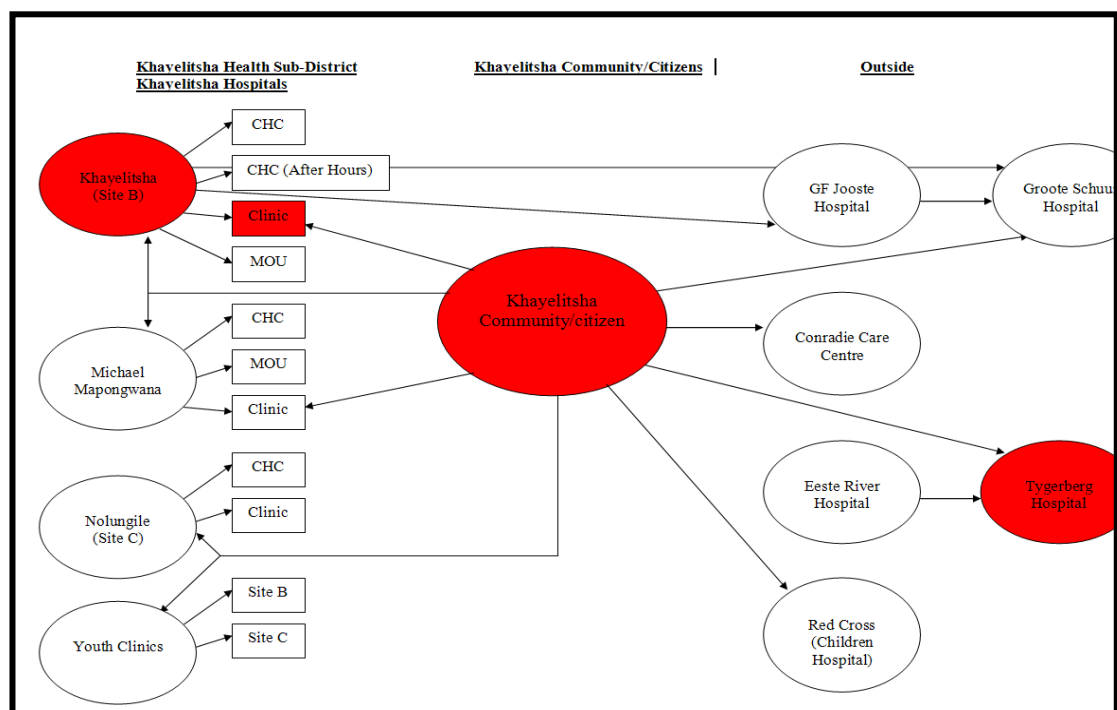
Figure 5.10: Khayelitsha has three main Public Clinics and connect with Outside Hospitals.

The ones that are marked with red are going to be my field of concentration. There are also numerous small municipal clinics throughout the township, as indicated from the table. Services offered at these municipal clinics include Child Health, Family planning, TB treatment, HIV testing, Pap Smears and treatment and diagnosis of Sexually Transmitted Infections (Provincial Health Dept, 2009). There are no private hospitals and private clinics in Khayelitsha. Khayelitsha District Hospital was opened in February 2012.

It offers district level care including a large 24-hour emergency centre, medical wards, surgical wards, obstetric wards, gynaecology wards, paediatric wards and nursery. There are also numerous small municipal clinics throughout the township. Services offered at these include child health, family planning, TB treatment, HIV testing, Pap smears and treatment and diagnosis of sexually transmitted infections.

Figure 5.11: Flo
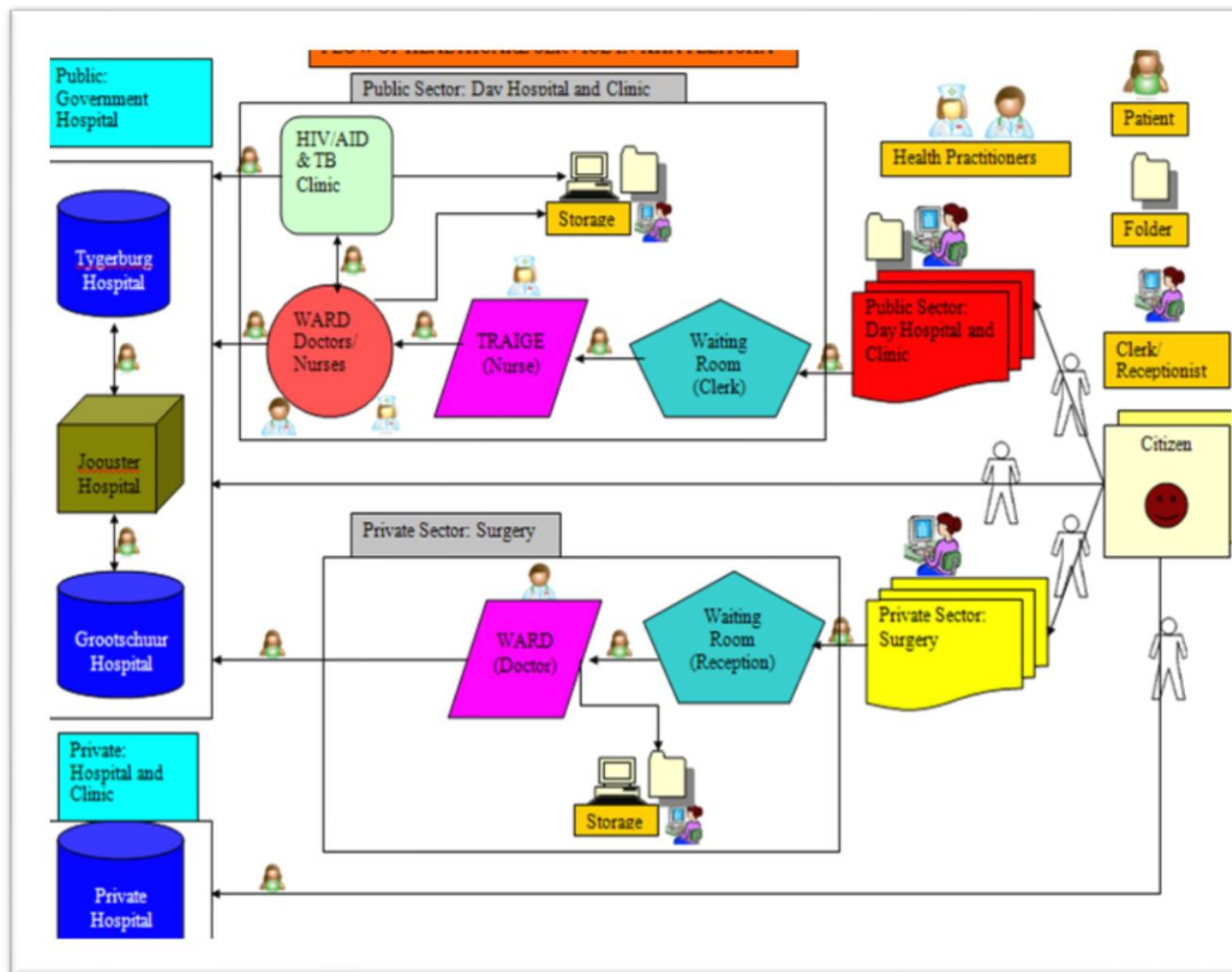
Figure 5.11: Flow of Information on Healthcare facilities in Khayelitsha.

As you can see in the figure above the most healthcare in Khayelitsha use paper based which is called 'Folder', which contains all the details of the patient and are also get recorded electronically using a PC. Most of citizens who will go for private healthcare centres are those with medical aid or who can afford to pay the more expensive private healthcare centre services. 90% of the people who can't afford private services will go for public healthcare centres as their first choice. Most case will go into clinics around Khayelitsha since the Provincial government is still busy building a new hospital that will be open mid 2012.

5.2.3 Patient journey to Healthcare Centre and ICT type in stages
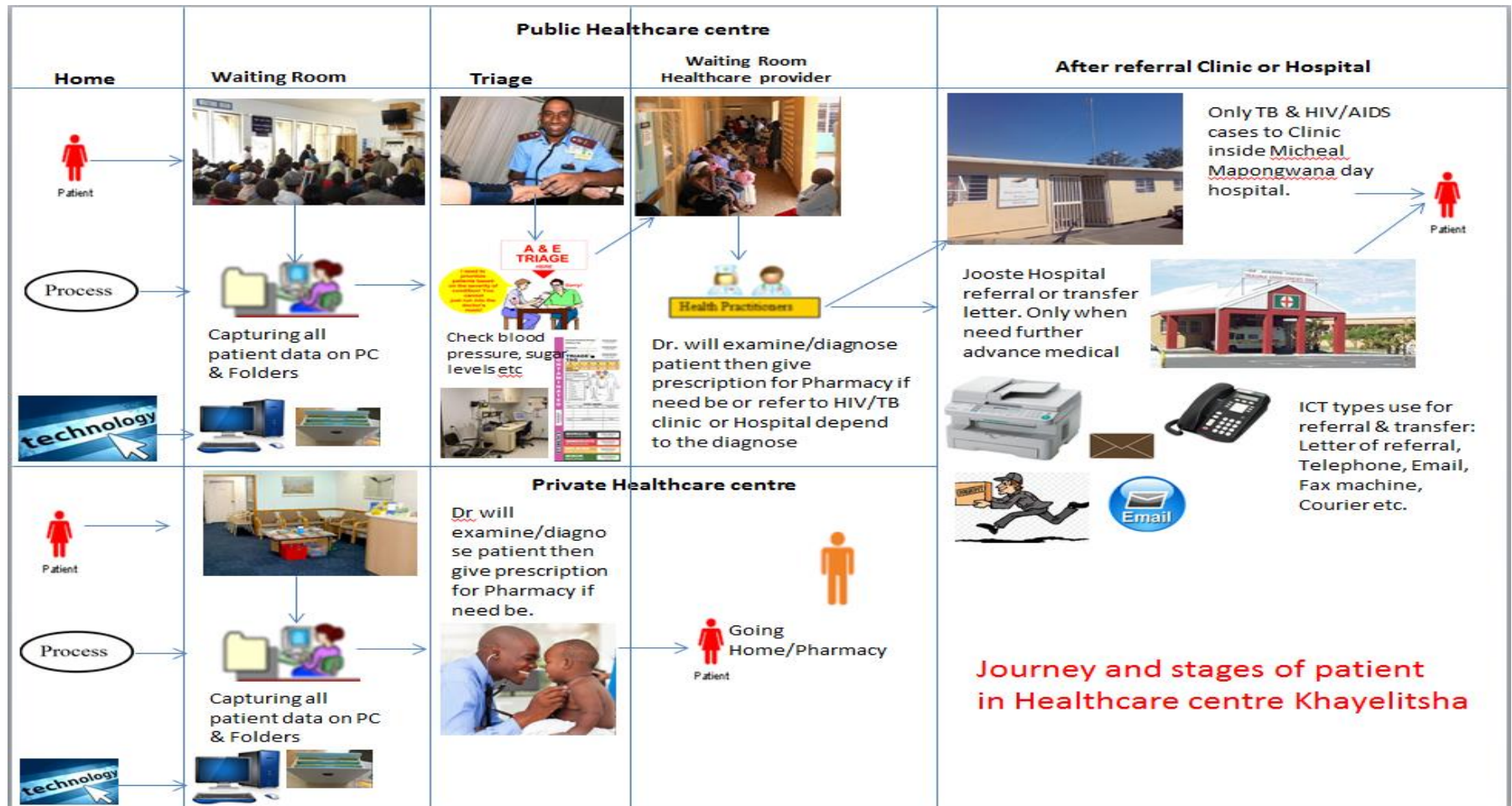
Figure 5.12: Flow of Information and ICT use at what stage on Healthcare facilities in Khayelitsha.

5.3 FACTORS AND STATISTICS OF HIV/AIDS IN WESTERN CAPE (INCLUDE KHAYELITSHA)

One of the challenges facing the South African community is the HIV/AIDS epidemic. The epidemic not only disrupts families directly or indirectly but also affects the healthcare, education, economy etc.   The children who are left orphaned, mine workers or teachers for example who are infected have to go for treatment during working hours (Rashe, 2006). The HIV/AIDS epidemic in the Western Cape is low or lags far behind compared to the epidemic in other provinces by a number of years the figure graph below indicates that:
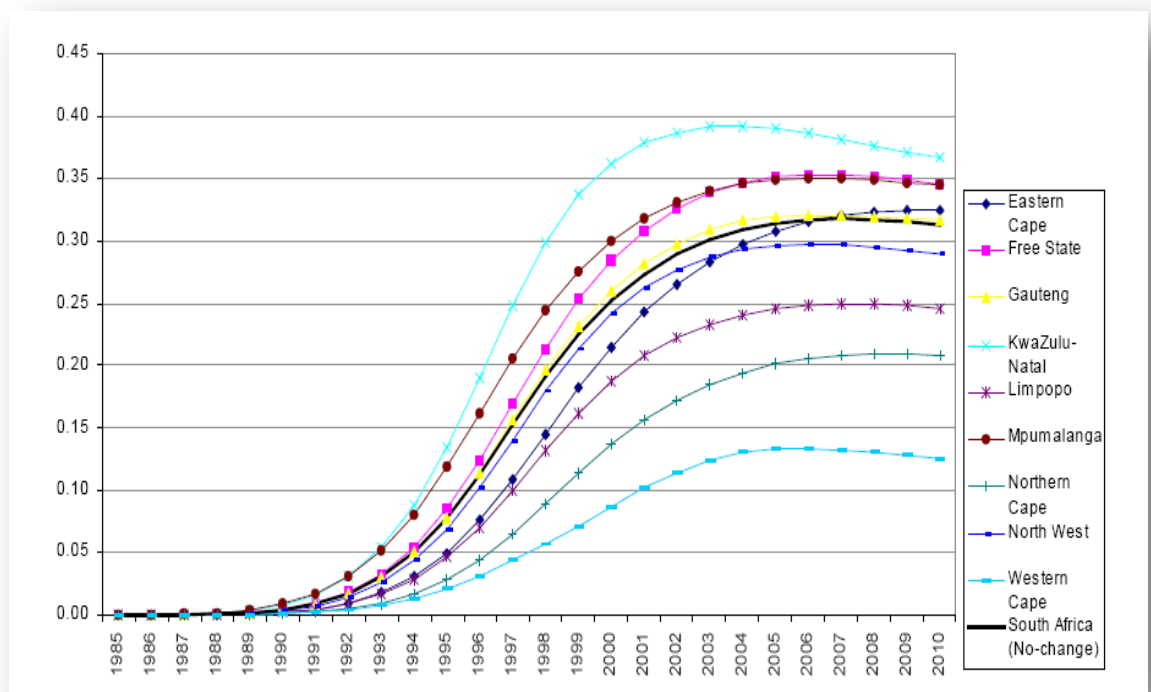
Graph 5.1: HIV/AIDS comparison by Province (Bekker and Swar, 2002)

The Western Cape also offers a better quality of life in terms of education, healthcare and services delivery than any other provinces in the country far better than its neighbouring provinces, the Eastern and Northern Cape, the two provinces from where most of the in migrants come (Dorrington, Bradshaw & Budlender, 2008:2-4).

The Western Cape has just less than 300 000 HIV positive people. Around 6% of the population, the lowest HIV prevalence rate in any single province and one in every 10 adults were estimated to be HIV positive in 2008 (Sunter, 2008:920-921). The epidemic in the Western Cape has not reached a mature phase yet and is still growing with new infections much higher than the number of AIDS related deaths. The Western Cape has the highest estimated take-up rate on antiretroviral treatment. Around 55 000 people were in need of antiretroviral treatment in 2008 of whom 74% took up treatment (Nicolay, 2008).

	Western Cape
Whole Population	6%
Antenatal Clinic estimate	16%
Adults (age 20 – 64)	9%
People living with HIV/AIDS	298,000
New HIV/AIDS infection (over a year)	27,000
AIDS deaths (over a year)	14,000
Total People in need of ARV (mid year)	55,000
Total people accessing ARV (mid year)	41,000
Accumulated AIDS deaths	79,000
New infections per day	74
New deaths per day	39

Table 5.2: Western Cape HIV/AIDS statistics (Nicolay, 2008)

According to Maverick (2006:1), social welfare across all sections in the Khayelitsha township on average 19% of Khayelitsha's population was receiving grants from old age pension, disability grant, war veterans pension, grant in aid, child support grant, foster child grant and care dependency. The largest chunk went to child support nearly 82% with equal number of beneficiaries in terms of males and females observed for most wards (Social Welfare Dept Report, 2005).

According to Levy, Miksad, and Fein (2005:1-6), the prevalence of HIV/AIDS is measured by the annual antenatal HIV surveys conducted at public sector services in Khayelitsha. Over 95 % of pregnant women are tested for HIV at antenatal clinics as part of the Programme for the Prevention of Mother to Child Transmission (PMTCT).

The Khayelitsha, Western Cape Province and National HIV rates for the past 3 years from (2000 – 2002) are presented in following table:

Year	National	Western Cape	Khayelitsha
2000	24.5% (23.4-25.6%)	8.7% (6.0-11.4%)	19.3% (18.0-20.6%)
2001	24.8% (23.6-26.1%)	8.6% (5.6-11.6%)	23.2% (21.1-25.3%)
2002	26.5% (25.5-27.6%)	12.4% (8.8-15.9)	24.7% (22.6-26.8%)

Table 5.3: HIV/AIDS prevalence in South Africa, in Western Cape Province, at Khayelitsha district with 95% confidence intervals (Khayelitsha Active Report, 2003).

The antenatal rate in Khayelitsha is one of the highest in the Western Cape as shown in the following graph; the rates in Khayelitsha reflect national levels of infection rather than those of the Western Cape. As the prevalence has increased in the Western Cape overall, the rate of increase has slowed nationally and in Khayelitsha.
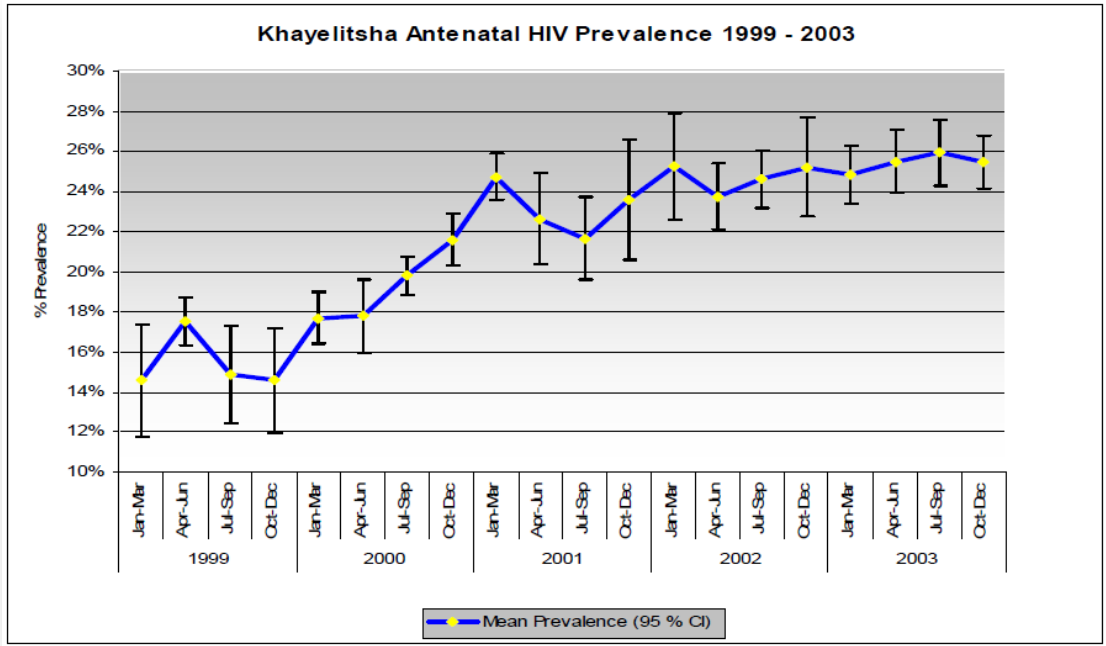
Graph 5.2: HIV Prevalence rate as measured by the PMTCT programme from 1999 to 2003 (Khayelitsha Active Report, 2003).
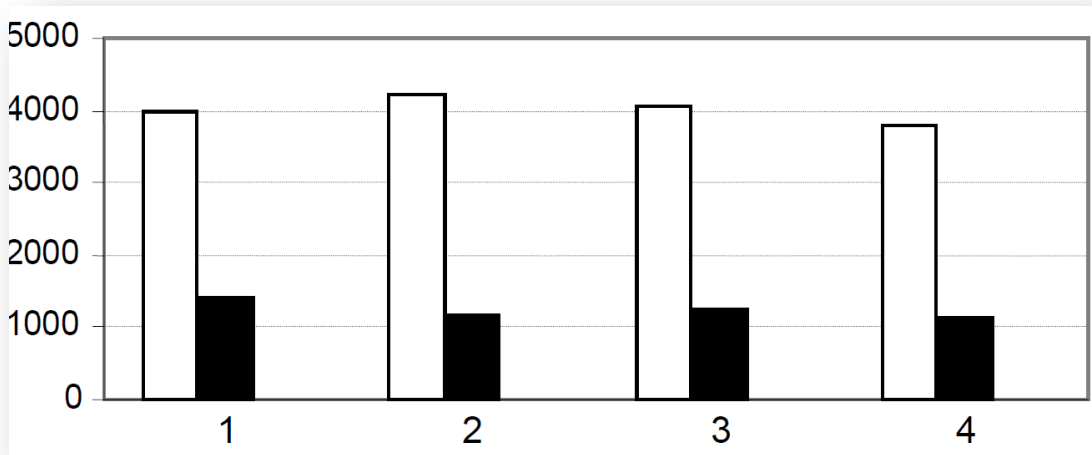
		1	2	3	4
☐	**Number Tester**	3981	4213	4057	3773
■	**Number positive**	1416	1157	1232	1123
	Percent positive	36%	27%	30%	30%

Graph 5.3: Number of tests conducted at VCT services and the number of positive tests in Khayelitsha in 2003 (Khayelitsha Active Report, 2003).

5.4 CHALLENGES THAT CORRELATE WITH HIV/AIDS IN KHAYELITSHA

Key challenges facing Khayelitsha in the light of high incidents of chronic diseases such as the rapid spread of HIV/AIDS and TB etc, high rate of unemployment, over crowded living conditions and a lack of land for formal housing. The existing high level of HIV/AIDS and TB, linked to the deterioration of the physical living conditions need to be addressed by communities at large and government (healthcare related programme as well a housing programme). Although there is a year on year increase in the budget for Khayelitsha, there remain challenges in achieving a fair distribution of health care services in the area (Rashe, 2006).

Although there are lot of problems in Khayelitsha, the Urban Renewal Projects and the building of new District Hospital will go a long way in improving the healthcare services and bridging the inequity gaps. The Department of Health's social capital project will contribute towards addressing some of the social determinants of poor healthcare to the improvement of the healthcare indicators (Department of Health Report, 2008).

5.4.1 Poverty biggest problem factor in Khayelitsha

Poverty in a broader perspective is more than the extent of low income or low expenditure in the country. It is defined as a denial of opportunities and choices most basic to human development to lead a long, healthy, creative life and to enjoy a decent standard of living, freedom, dignity, self-esteem and respect from others (Leibrand & Woolard, 1999:80) cited by (Ndingaye, 2009).

The legacy of apartheid in South Africa still lives on, resulting in the majority (mainly black people) living below the poverty line. There are various dimensions to poverty in this country such as racial, geographic, and gender dimensions (Ndingaye, 2009). Khayelitsha is a historically black township situated on the margin of Cape Town in the Western Cape Province of South Africa. It is made up of different types of dwellings. It is the area which has a number of

experiences where people developed survival strategies of living in poverty (Dyantyi, 1998). According to Ndingaye (2009), (citing Holman, 1998) women are poor because they are alone with children as single parents and many of them at times are also unemployed. Poverty in Khayelitsha entails restricted lifestyles where poor people frequently are constantly worrying about their ability to survive (Ndingaye, 2009). According to Ndingaye (2009), (citing Holman, 1978) women are poor because they are alone and also unemployed.

There is evidence from several studies, (such as those reviewed below), that indicates high levels of poverty in the numerous informal settlement areas of Khayelitsha in the Western Cape. Various reasons such as lack of skills, unemployment and retrenchment have been pointed out as the cause. In Khayelitsha, most people live in corrugated iron shacks where they are often unable to get basic needs such as food and clothing (Pick et al., 1990) cited by (Housdon, 2002). This condition is further exacerbated by environmental factors such as the lack of proper toilet facilities and the absence of employment opportunities that result in feelings of helplessness, which in turn leads to drug and alcohol abuse (Ndingaye, 2009). Thus the family and home in this environment becomes dislocated which in turn affects the wider community and society as a whole (Holman, 1998).

The informal squatter areas have practically no services of any kind and water is obtained from taps at serviced sites. Many sites are unsuitable for housing and the location of shacks changes in response to flooding or drifting sand (Ndingaye, 2009). According to (Gilbert et al., 1990:81) "housing is a highly visible dimension of poverty.
Perhaps that is why it represents such an emotive issue in many Third World cities". Poverty has multiple dimensions, which are poor access to healthcare and food, poor housing conditions, and homelessness, which deeply affects people's healthcare (Ndingaye, 2009). Studies done on families who experience these bad living conditions, indicate that poverty is a daily struggle, which interacts with family life (Blackburn, 1991:100) cited by (Jadad & Enkin, 2006).

According to Ndingaye (2009), (citing Dinitto & Dye, 1983: 55), "poverty is a way of life passed on from generation to generation in a self-perpetuating cycle. This culture of poverty involves not just a low income, but also attitudes of indifference, alienation and apathy".

Bebbington, (2006), (citing Leinwand, 1968) gave us another version of understanding the cycle of poverty that it is related to the casualties of society, such as:

- inadequate parents,

- children who are in varying degrees abused at home resulting in emotional disturbance,

- socially and intellectually deprived people,

- unskilled or unemployed persons not earns enough to move out of social deprivation,

- People trapped in unstable and unsatisfying marriages and those living dysfunctional family lives.

All these interact with various linkages to keep one in the trap of the cycle of poverty.

5.4.2 Lack of Education in Khayelitsha

Generally, high standards of living per capita income are associated with high standards of nutrients, education, housing, health and other components of the level of living (Soliman, 2007:1-2). Ndingaye (2009), (citing Wilkins, 1998) relates to the correlation between level of education and standard of living. The poverty rate among people with no of education is 69%, compared with 54% among people with primary education, 24% among those with secondary education, and 3% among those with tertiary education.

Under nutrition, insufficient access to food is one of the most devastating aspects of children not going to school because they lack concentration. This is not only a compromise of the present situation; it is also a compromise of the future because it limits the potential of children to grow and learn to further their studies (Ndingaye, 2009). Ndingaye (2009), (citing Heintz et al., 1998), explained that due to lack of education women perform the largest amount of unpaid work, that is household production, care of the children, old and the sick. Women face discrimination in the formal labour market, in an income they can earn and the

lack of economic opportunities. Reconstruction and Development Programme (RDP), (1995) discussed that women's experiences show low level of education in South Africa is linked with impoverishment, malnutrition, hunger, unemployment, lack of access to healthcare and basic services and also disintegration of families. Lack of education plays a big role in the distance and difference between the rich and the poor in South Africa which is immense (Cosatu Report, 2010).

5.4.3 Inequality "Rich versa Poor" to much gap

Inequality is rooted in the structure of economic life, Wilkins (1998) explains that 'inequality' can be defined in terms of being the opposite of 'equality', a state of social organization that enables or gives equal access to resources and opportunities to everybody. The distribution of income and wealth in South Africa is among the most unequal in the world. Only Brazil has a higher Gini coefficient, a standard measure of income inequality, than South Africa (Wilkins, 1998) cited by (Ndingaye, 2009).

The gulf between the day-to-day experience of South Africa's affluent and the daily lives of the South African poor is wider than any statistical analysis can reveal. According to Ndingaye (2009), (citing Woolard et.al, 1994), the Gini coefficient is a number between 0 and 1, which indicates the level of income inequality within a population. The bigger the number the more inequality exists.

This inequality makes it difficult for the poor to utilise the opportunities for upward mobility that may be available to them. Increasing the income of the poor may not affect joblessness, lack of incentives, and lack of education opportunities, unstable family life, or the high incidence of crime, delinquency, and other social problems among the poor (Dinitto & Dye, 1983) cited by (Ndingaye 2009).

5.4.4 Increase "Emigration and Migration" in Khayelitsha and Province

According to Bekker (2001:7), the principle of cooperative government established by the 1996 SA Constitution refers to local, provincial and national spheres of government. This principle implies that when these spheres of government plan and act, they should do so in complementary fashion and should share responsibility for the outcome of state action, in particular for service delivery.

There has been a measure of emigration of skilled and experienced Whites and Coloureds out of the province and the country. There has been sustained large-scale in-migration of unskilled Black Africans from rural areas of the Eastern Cape on a coastal route through the Southern Cape and Overberg to the Cape Metropolitan Area (CMA); a sizeable in-flow of Whites from other provinces, and a measure of southward migration of Black African entrepreneurs and other skilled persons. The large majority of Coloured provincial residents have remained in their province. The phenomenon of foreign Africans has also become visible, particularly in the CMA and large provincial towns (Bekker, 2001:9).

According to Ndingaye (2009), the majority of Khayelitsha's present population consists of people who have recently been located to the urban environment and are in a state of changing and acculturation. Persons who have moved from the older residential areas of Langa, Nyanga and Gugulethu are in most instances third and fourth generation Capetonians inhabiting the formal housing areas (Lingelethu West City Council, 1992) cited by (Ndingaye, 2009). The townships of Langa, Nyanga and Gugulethu were allocated to black Africans by the Minister of Co-operation and Development in 1980. These areas were made up of single quarters for black Africans and contract migrant workers who were registered by the Western Cape Administration Board (Lingelethu West City Council, 1992) cited by (Ndingaye, 2009).

The single quarters were built to accommodate exclusively male migrant labour from Trankei and Ciskei. Later the contract workers invited their families to stay with them in their single quarters and in the process influxes of women and children have resulted in serious overcrowding in the area 1980 (Volume 3 of the

Surplus People Project Report, 1983) cited by (Ndingaye, 2009). It was within this context that Khayelitsha emerged as an informal settlement area to cater for the needs of families migrating from the Eastern Cape and other areas and those that the authorities did not cater for in terms of descent dwelling units (Ndingaye, 2009).

5.4.5 Unemployment and Low income household

According to Ndingane (2009), the sustainability of income source of the majority of families in Khayelitsha is sustained through access to pension funds, disability grants and single parent maintenance grants. If there is a member of the family receiving such a grant, the entire household will in due course become dependent on that grant. Few working people have even got temporary jobs and they consequently do not make enough money for a basic standard of living. Unemployment in this area clearly contributes to poverty. People without stable employment are likely to be underpaid. The extreme poverty prevents the population from making positive contributions to the development of their communities. People who are experiencing poverty are affected physically and mentally. The youth generally experience a higher rate of unemployment than adults, partly because of lack of experience in the work field. Young people leaving a job that is casual, boring or stressful, find difficulty in obtaining re-employment. Increasing the income of the poor may not affect joblessness, lack of incentives, lacks of education opportunities, unstable family life, or the high incidence of crime, delinquency, and other social problems among the poor (Dinitto & Dye, 1983) cited by (Ndingane, 2009).

5.4.6 High rate of Crime in Khayelitsha

Crime is a prominent issue in South Africa. South Africa has a high rate of murders, assaults, rapes, and other crimes compared to most countries. Many emigrants from South Africa state that crime was a big factor in their decision to leave (Independent Newspapers, 2011). The government has been criticised for doing too little to stop crime. According to Provincial Legislators Report, (2005) a lack of sufficient equipment has resulted in an ineffective and demoralised South African Police Service also Police Survey, (2006) concurred.

Crime Category	April 2003 to March 2004	April 2004 to March 2005	April 2005 to March 2006	April 2006 to March 2007	April 2007 to March 2008	April 2008 to March 2009	April 2009 to March 2010	April 2010 to March 2011
CONTACT CRIME (CRIME AGAINST THE PERSON)								
Murder	358	213	219	198	171	121	124	125
Total Sexual Crimes	588	390	331	284	269	218	259	252
Attempted Murder	395	187	102	96	78	60	91	98
Assault with the intent to inflict grievous bodily harm	3089	1522	893	669	617	556	554	615
Common assault	2020	1136	998	786	680	650	670	516
Common robbery	824	680	279	210	161	160	193	190
Robbery with aggravating circumstances	1484	1021	788	1083	1018	747	711	606
CONTACT RELATED CRIME								
Arson	100	41	30	27	20	14	19	17
Malicious damage to property	1161	643	478	537	347	361	333	390
PROPERTY RELATED CRIME								
Burglary at non-residential premises	62	24	11	104	62	66	88	91
Burglary at residential premises	1621	849	441	313	359	404	385	326
Theft of motor vehicle and motorcycle	272	153	98	138	135	96	114	110
Theft out of or from motor vehicle	215	136	62	112	51	54	76	141
Stock theft	3	1	0	0	0	0	0	0
CRIME HEAVILY DEPENDENT ON POLICE ACTION FOR DETECTION								
Illegal possession of firearms and	242	109	73	94	111	88	93	85

ammunition								
Drug related crime	380	233	235	377	468	448	549	625
Driving under the influence of alcohol or drugs	99	72	44	36	49	42	47	221
OTHER SERIOUS CRIMES								
All theft not mentioned elsewhere	2 601	1165	802	935	656	501	359	393
Commercial crime	103	52	44	36	49	42	47	71
Shoplifting	159	98	26	21	23	71	115	105
SUBCATEGORIES FORMING PART OF AGGRAVATED ROBBERY ABOVE								
Carjacking	126	73	59	52	42	33	22	22
Truck hijacking	8	2	0	0	3	2	0	0
Robbery at residential premises	8	25	31	121	65	62	73	51
Robbery at non-residential premises	6	1	11	50	41	40	62	82
OTHER CRIME CATERGORIES								
Culpable homicide	76	66	43	59	53	54	37	42
Public violence	24	8	22	24	14	14	19	31
Crimen injuria	449	168	83	54	33	27	37	37
Neglect and ill-treatment of children	113	52	25	19	18	7	20	9
Kidnapping	62	20	7	1	1	4	1	14

Table 5.4: Crime in Khayelitsha (WC) for April to March 2003/2004 to 2008/2010 (South African Police Service, 2011)

5.5 'PUBLIC' AND 'PRIVATE' SECTOR IN HEALTHCARE IN GENERAL (KHAYELITSHA)

5.5.1 Introduction

As with many other countries in demographic transition, South Africa faces the quadruple burden of disease. The health status of the population does not reflect the gains of an improved health system. South Africa is ranked low in health system performance compared to other middle income countries and even some lower income countries. The past South African Demographic and Health Survey (SADHS), 2003) found that South Africans are not very healthy, even though we are classified as a middle income country (South African Health Review Health Systems Trust, 2005:8-9).

South Africa's healthcare system consists of a large 'public sector' and a smaller but fast-growing 'private sector'. Healthcare varies from the most basic primary healthcare, offered free by the state, to highly specialised hi-tech health services available in the private sector for those who can afford it (South Africa.info, 2011). According to South Africa info, (2011) 'public sector' is under-resourced and over-used, meanwhile the mushrooming 'private sector', runs largely on commercial lines, caters for middle- and high-income earners who tend to be members of medical schemes (18% of the population), and to foreigners looking for top-quality surgical procedures at relatively affordable prices. The private sector also attracts most of the country's health professionals (http://www.safrica.info/about/health/health.htm, 2011).

In preparation for democracy, the ruling party (African National Congress) developed a National Health Plan for South Africa (South African Health Review Health Systems Trust, 2003, 2004, 2005 & 2006). The goal was the creation of a unitary, comprehensive, equitable and integrated national health system. The challenge facing South Africans was to design a comprehensive programme to redress social and economic injustices, eradicate poverty, reduce waste, and increase efficiency and to promote greater control by communities and individuals over all aspects of their lives (National Treasury budget review report, 2004).

According to Annual reports of the Department of Health (2003, 2004 and 2005), in the healthcare sector this involved the complete transformation of the national healthcare delivery system and all relevant institutions (including the professional councils, research and health professional training institutions).

All legislation, organisations and institutions related to healthcare were reviewed with a view to attaining the following:

- ensuring that the emphasis was on healthcare and not only on medical care

- redressing the harmful effects of apartheid healthcare services

- encouraging and developing comprehensive healthcare practices that were in line with international norms, ethics and standards

- emphasising that all healthcare workers had an equally important role to play in the health system, and ensuring that team work was a central component of the health system

- recognising that the most important component of the health system was the community, and ensuring that mechanisms were created for effective community participation, involvement and control

5.5.2 'Public sector' versa 'Private sector'

Although the state contributes about 40% of all expenditure on health, the public healthcare sector is under pressure to deliver services to about 80% of the population. Despite this, most resources are concentrated in the private healthcare sector, which sees to the healthcare needs of the remaining 20% of the population (Zuma, 2011:13). In 2000 about R8.25-billion was spent on drugs in South Africa, with the state spending only 24% of this. Thus, R59.36 was spent on drugs per person in the state sector as opposed to R800.29 on drugs per person in the private sector (Zuma, 2011:15). Drug expenditure per person varies widely between the sectors. Of all the country's pharmacists, 40% work in Gauteng in the private sector (Pharmaceutical Society of S.A, 2010).

The number of private hospitals and clinics continues to grow. Four years ago there were 161 private hospitals, with 142 of these in urban areas. Now there are 200 (Hospital of Associate in South Africa, 2009). The mining industry also provides its own hospitals, and has 60 hospitals and clinics around the country (Occupational Health in S.A, 2009) and (Medi Clinic Southern Africa, 2011).

Most healthcare professionals such as doctors and nurses work in private hospitals. With the public sector's shift in emphasis from acute to primary healthcare in recent years, private hospitals have begun to take over many tertiary and specialist health services (MediClinic Southern Africa, 2010). Public health consumes around 11% of the government's total budget, which is allocated and spent by the nine provinces. How these resources are allocated, and the standard of healthcare delivered, varies from province to province (Health Department Budget, 2010). "With less resources and more poor people, cash-strapped provinces like the Eastern Cape face greater health challenges than wealthier provinces like Gauteng and the Western Cape" (Zuma, 2011:16).

5.5.3 New 'Public sector' Hospital in Khayelitsha

According to the Provisional Health Department (2011), there will be a new District Hospital in Khayelitsha, which is currently in its final stages of construction and finishing, will be opened in April 2012. It will provide access to quality healthcare straight to the community of Khayelitsha, servicing the approximately 500 000 – 1.8 million people in the area. The 230-bed medical facility will provide support to the surrounding primary healthcare facilities to ensure that patients receive care at the lowest level of entry into the healthcare system (Provisional Health Department, 2011).

Patients who require more advanced levels of care will be referred to Tygerberg Hospital. Services that will be available include:

- In-patient services, including surgery, medicine, paediatrics and obstetrics.

- A referral out-patient service which includes a medical day ward, predominantly for ARV referrals.

- A large accident and emergency unit; it is 30% larger than that of a standard district hospital trauma unit to cater for the high incidence of trauma and homicide in the area.

- A large maternity ward; it is 30% larger than that of a standard district hospital maternity ward to cater for the high population growth and birth rate in the area. The obstetrics unit also includes a nursery and kangaroo mother care facility.

- An EMS/ambulance station with heliport that will serve as the divisional headquarters of the Khayelitsha sub-district and the Helderberg basin.

This will be a major milestone in improving the access of the local community to a wide range of health services. The hospital will be a modern, world class facility that the Department and the community can be proud of and will go a long way in improving the patient experience of our services and also provide a pleasant working environment for staff. The hospital will be served by a complement of more than 500 staff members; this includes medical and non-medical staff as well as staff from soft services tenders such as catering, landscaping and cleaning. Currently, there are 240 staff members in the hospital's establishment and the recruitment and the filling of posts is ongoing (Provisional Health Department, 2011).

5.6 CONCLUSION OF CHAPTER FIVE

Further shifts in the rhetoric of community development surfaced in the mid-1990s with a move towards capacity building. The further defines capacity-building as developmental work which strengthens the ability of community organisations and groups to build their structures, systems, people and skills so that they are better able to define and achieve their objectives; and engage in consultation and planning; manage community projects and participate in partnerships and community enterprises. The capacity-building model of development includes aspects of training and organisational development; personal development and resource building. The approach of organising in a planned, self-conscious manner reflects the principles of empowerment and equality (Skinner, 1997:91) cited by (Ndingaye, 2009).

Bota's response during an interview (2006) indicated that a lack of financial resources limits the types of mechanisms communities can use to hold corporations accountable to the community citizens.

Most researchers emphasise the need to empower the entire workforce in order for quality to survive. Sunter (2008), (citing Spretzer, 1995:1442-1465), believes that inadequate response by frontline service employees could be caused by many factors, one of which is the lack of empowerment. Thus organisations should regularly train employees especially on issues related to quality. Evans and Lindsay suggested Deming's five of fourteen points for management relating directly relates to the notion of empowerment. The five points are as follows:

- Institute training

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- Teach and institute leadership.

- Drive out fear. Create trust. Create climate for innovation.

- Eliminate exhortations for the workforce.

- Encourage education and self improvement for everyone.

CHAPTER 6

6. DISCUSSION AND DATA COLLECTION RESULTS

6.1 INTRODUCTION

As discussed in the Chapter 3 Research Design Methodology, data was collected from questionnaires completed by participants. The answers were both numeric and text data. The research population selected for the completion of the questionnaire constituted the ordinary people of Khayelitsha, educated as well as uneducated, employed and unemployed, from eighteen years up to sixty-five years.

One hundred and forty-eight completed questionnaires were collected from individual respondents and in collecting data to analyse the effectiveness of utilisation of ICT and the flow of information in Khayelitsha. The data collection method used in the survey, falls within the context of a survey described by Collis and Hussey (2009:79), as: "A sample of subjects being drawn from a population and studied to make inferences about the population." According to Dawson (2009:56), the survey method is generally used when the researcher wishes to elicit opinions.

6.2 DATA ANALYSIS AND INTERPRETATION OF RESULTS FINDINGS

Data from the interviews and site visits suggest that there is still a lot that needs to be done and achieved to provide sustainable ICT utilisation in healthcare centres for the vast majority of people in Khayelitsha. The researcher and respondents share the same ethnicity, cultural values and language. However, the researcher paid special attention to his own role as an impartial academics researcher and made sure to aim for objectivity and adherence to research guidelines was observed in order to adhere to research guidelines and in terms of objectivity.

The data from the questionnaires were summarised to enable the reader to understand the responses without having to consult the questionnaires (O'Leary, 2004). The data is presented in sequential order, according to the questions in the questionnaire. Each question is analysed individually, as per questionnaire, as this provides a logical progression of questions that eventually lead to the research question, namely, the utilisation of ICT in Healthcare centre in Khayelitsha to assist HIV/AIDS patients. The design of the questionnaire reflects the desired outcomes of the research. The flow of the questions reveal a climax to the eventual purpose of the research findings (Du tolt, 2002:74) cited by (Welman, Kruger & Mitchell, 2005). Leedy and Ormrod, 2010:57, define interpretational analysis as examining the data for constructs, themes and patterns that can be used to describe and explain the phenomena being studied.

6.3 DISCUSSION AND RESULTS OF HEALTHCARE PROVIDER AND PATIENT QUESTIONNAIRES

A number of private healthcare centres and Site B Clinic as a public healthcare facility were visited during this research study. In general, healthcare providers have the same perceptions on ICT utilisation in both private and public sector. In both private and public sector healthcare providers perceive ICT as being very important to be utilised especially for medical services.

Examples of utilising ICT in healthcare centres for medical services range from utilising on data capturing for patients; being utilised on referral patients to an outside hospital in Khayelitsha; internet to research new healthcare information in the medical field; use of ICT tools in the theate and basic utilisation of ICT-based information and communication devices to communicate with other healthcare centres and healthcare providers (e.g. Doctors on call perceived the utilisation of a telephone, cellphone/Mobile and pager device very crucial for communication). Observation and formal questionaires survey was done amongst the healthcare supporter staff (e.g. clerks, data capturing, and pharmacists) and healthcare providers (e.g. nurses and doctors, their services are ranked second as it is perceived very important for ICT to be applied). However, in general most healthcare providers viewed that it is very important to use ICT for healthcare service. A all the data survey analysis is further explained with results further down.

6.3.1 Analysis of questionnaire survey for Healthcare Providers (HP)/ Healthcare staff

This question dealt with the current use of ICT in the health facility. According to the collected result about two third of Khayelitsha citizen said the Site B Clinic has been establish more than 10years. From this we can clearly suggest that most of our respondents have been working at the clinic for long and might be residing in Khayelitsha for over 10 years.

The second question dealt with the utilisation of ICT by healthcare service providers. Half of the responded said 'Yes', and according to this results and also viewing the clinic operation and environment research has notice that some ICT equipment are being utilised.

The third question dealt with the existence of an IT unit in the Site B healthcare centre. Over two thirds of the respondeds said 'Yes' they know that an IT unit exists. According to these results and also viewing the Site B clinic operation and environment, research has noticed that Information Technology section or unit does exist where healthcare providers are able to get assistance on the daily use of ICT equipment such as laptop, personal computer (PC), cellphone/mobile, printer etc. The fourth question dealt with the use of the different types of technologies. The most commonly utilised technology by most healthcare providers are: CD/DVD, radio, television (TV), papers, telephone, fax machine, computer/PC, cellphone/mobile, emails, printer and social network. The reason for this is that most of them have utilised most of these technologies either in their personal capacity or for work related tasks. Technologies that were introduced more than ten years ago are: paper, computers, printer, telephone, cellphone/mobile, fax machine and cd/dvd. According to the survey data collected, a summary of the respondents' reasons for utilising technologies in the different functional areas are:

- *Fax Machine:* For administrative duties e.g. sending faxes to other healthcare institutions centres, other government departments and private sectors.

- *Papers:* Used to keep records in (folders) for patients and keep track of medication Antiretroviral (ARVs) intake for HIV and AIDS patients.

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- **Computer/PC:** to keep patient records also for keeping administrative duties such as schedule for HIV/AIDS patients for their next date for ARVs.

- **Scanner:** is used for computer images. The scanner is a device that optically scans images, printed text, handwriting, or an object, and converts it to a digital image. In the biomedical research area, detection devices for DNA micro arrays are called scanners as well. These scanners are high-resolution systems (up to 1 μm/ pixel), similar to microscopes.

- **Printer:** are used as a peripheral which produces a hard copy of text and/or graphics of documents stored in electronic form, usually on physical print media such as paper or transparencies. In most of healthcare centre they are use for photo copying documents like a identification document (ID) for patients because without an ID patients cannot be assisted. In some cases a printer is also used for scanner and fax machine in one printer.

- **Projector:** is used to display images to an audience in conferences or meetings and at times for presentation for patients or in staff meetings.

- **Email:** Communication with other healthcare centre facilities and other government departments or private companies by exchanging digital messages from an author to one or more recipients.

- **Social Network:** used for new ads and support structures for HIV/AIDS patients which are tied (connected) by one or more specific types of interdependency, such as friendship, common interest, or relationships of beliefs, knowledge or prestige.

- **Telephone:** is used for communication with other healthcare centres, other government departments and private sectors, used for consultation, making appointments with patients or doctors, for ordering medication from pharmacies, calling ambulances, and doctors in an emergency case, and communicating with district office in cases of urgent documents.

- **Cellphone or Mobile:** A mobile phone can make and receive telephone calls to and from the public telephone network which includes other mobiles and fixed line phones across the world. It does this by connecting to a cellular network provided by a mobile network operator which can help to connect and communicate with other healthcare centres and other healthcare provider staffs. It also calls for an ambulance for emergency cases.

- **Television:** Displays videos on health education and diseases such as HIV and AIDS, TB etc.

- *Radio:* Used for personal reasons. The radio has developed in parallel with developments within the field of communications and can be seen to have three distinct phases: electromagnetic waves, experimentation, and wireless communication.

- *CD/DVD:* used as an audio or video display of health education on diseases such as HIV and AIDS, TB etc.

- *Community Newspaper:* best invention of their time for communication especially with a large number of people who can be reached in a given geographic area with news concerning that area such as current news on healthcare, editorials, feature articles, and usually advertising etc. Newspapers are cheap to purchase. They are also available almost everywhere and have a lot of information all rolled up in one.

- *Billboards:* Billboards are used for communication on healthcare such as an ad of "Safe Sex use condom". The are very popular and they are cost effective, capture attention easily, available around the clock etc compared to other ICT equipment such as TV, internet, newspapers etc.

- *Pagers:* To page doctors on call for emergency.

Thew question dealing with the purposes for utilising computers or PCs indicate that: Over thirty percent using it for capturing of data for patients; twenty one percent making reports for healthcare manage and for district healthcare report; forteen percent making graphic reports of patients who visited the healthcare centre for presentations; thirteen percent utilising PC for data entry for records of patients and for stationery and other healthcare systems such as medicine. This section identifies the specific use of ICT in the different departments of health institutions in Khayelitsha at Site B Clinic/ Day hospital. ICT utilisation in functional areas of healthcare facilities has different functions. The majority of ICT tools used varies across different functional areas. Colleced results shows departments in which different ICT is being utilised for healthcare services. The commonly used ICT for health services across all the functional areas was the telephone. The commonly utilisation of ICT is in the referral services and hospital admission areas of healthcare centre facilities. For clinical support services most respondents state 'Agree', Diagnosis state 'Agree' and for medical services some very 'Strongly agree' while other respondents state 'Agree'.

According to the research survey results respectively state that communication with other healthcare centres is mostly done by utilising telephone, fax machine, courier/send healthcare work, internet and VOIP both at, email at, postal services and cellphone/mobile respectively. The reason why cellphone use is low is indicated by most that they use it for personal use and not for work related tasks and that it is also expensive to utilise the cellphone/mobile.

The research survey results indicate that communication with patients is mostly done through radio awareness programs and sending sms through cellphone/mobile and telephone. The research survey results indicate that communication with other healthcare centres is mostly done through meetings, cellphone/mobile, telephone, television (TV), radio, email, postal services, and courier. Communication with higher level of authorities of healthcare such as district health department is mostly done through the fax machine, sending delivery employee person, telephone, postal services, emails, courier, and meeting respectively. The reason for meeting as a communication option is low is because this is only for management meetings.

The research survey results indicate that ICT related constraints in the healthcare centre mostly are: lack of technical support; low ICT skills internally to the healthcare centre; shortage of IT employees (skill); low priority of ICT investment; budget constraints and load shedding of electricity; and political interference.

Next the specific use of ICT in different departments of health institutions in Khayelitsha at Site B Clinic/ Day hospital are indicated with the important key issues identified by the respondents that need attention in enhancing ICT results. The healthcare providers strongly agree that enhancing flow of information utilising ICT is a very important key that needs attention and some also strongly believe that it is important to utilise ICT for improving healthcare centres. Some agree to make ICT more widely available, obtain free/cheaper software and to make ICT easier to utilise. The importance of utilising ICT in the healthcare centre are indicated with the healthcare centre providing the following: the majority of healthcare providers agree that it is important to utilise ICT in healthcare service provision because without ICT equipment such as computer/PC, telephone, etc. patients will not be able to get quality of healthcare that they deserve, especially the HIV/AIDS patients.

According to the results, almost every respondent state that they are not aware of any government regulations that restrict the utilisation of ICT in your healthcare centres. The respondents indicate that according to them the estimated amount the healthcare centre has spent during a year on ICT equipments is between R1000 and R15,000 but most respondents did not know how much was spent.

According to the results most of the healthcare providers listed the following as future utilisation of technology by the healtcare centre, namely: computers/PC, printers, telephone, fax machine, radio, television (TV), cellphone/mobile, email, pager, billboards, social network, community newspapers, scanner and CD/DVD and projector. The specific use of ICT in different departments of healthcare centre in Khayelitsha at Site B Clinic/ Day hospital are indicated as ICT assists in interacting with other healthcare service providers (e.g. hospitals, nurses, doctors). They indicate that the government must do more to provide ICT for healthcare centres to enhanced service delivery to patients. Some respondents indicate that ICT is helping with access to healthcare information; ICT provide ways to improve healthcare services; more training in ICT utilisation in healthcare centres is needed; and privacy is of importance when it comes to personal healthcare information.

According to the results most healthcare providers indicate which computerc literacy programmes they would recommend to the Minister of the Department of Health in South Africa if they were given a chance to do so to add to the existing healthcare services. This should lead to improved ICT utilisation to facilitate better healthcare service delivery in healthcare centres. They listed the following: television (TV) awareness, social network awareness, billboard, sms through cellphone/mobile awareness.

6.3.2 Analysis of questionnaire survey for Patients

More than half of the patients indicate that they have recently visited the healthcare centre and their folder state when was the last time they have been to the healthcare centre. According to the results most respondents' ages were between 21 and 40 and persons under 18 years have a separate Community Clinic that looked after children with HIV/AIDS. There were slightly more female than male respondents who participated in the study.

Of the respondents 53% have an educational level of high school and 31% primary school. The race of 95% of the respondents is African. The income per month is mostly below R3,500. According to the results most patients indicate which healthcare centre they have attended. They listed the following: clinics, hospital, surgery (most surgery are done at private healthcare centres around Khayelitsha). Some patients prefer Sangomas or Witch-Doctors because they believe that they help when doctors cannot help. Some prefer to go to church to be prayed for since most patients believe that when doctors cannot help only God can help them. Some patients go to missionary healthcare clinics where these healthcare clinics are mostly NGOs.

According to the results most patients state the technology with which they are familiar as: radio, television, papers, computers/PC, telephone, CD/DVD, fax machines, billboards, emails, printers, social networks, cellphone/mobile, community newspapers and pagers. They also utilise these technologies.
According to the results most patients state that the technologies they have at home are: cellphone/mobile, television (TV), radio, community newspaper, telephone, computer/PC , emails, printers and social networks.

According to the results most patients state that the technology for their personal use as: Cellphone/mobile phone, radio, television (TV), billboards and community newspaper. They use computer/PC, printers and fax machine for work purposes. There is limited technology use for educational purposes. According to the results most patients state that the sources they utilised as their main source for health information as the radio. About 10% of the respondents indicate that their main sources for health information are: newspapers and cellphones (SMS). Healthcare workers and community newspapers are used as information sources by less than 10% of the respondents.

The results indicate that most patients state that the technologies they can operate are: radio, telephone, television (TV), cellphone/mobile phone and CD/DVD. They are unable to operate: computer/PC, billboards, projector, printers, pagers, fax machines and scanners. According to the results all the respondents indicate their willingness to improve their ICT skills. This is an indication of a positive perception towards ICT. They indicated that they need more skills to utilise: Fax machine, scanner, printer, email, social networks and TV.

According to the results the respondents indicate their willingness to share information with healthcare centre but indicate their concerns about the information being personal and that their privacy is important. The feel strongly that the standard of healthcare needs to improve; that the government must do more to provide ICT to healthcare centres; and the cost of ICT services is a major hindrence to healthcare service provision. They agree that more training in ICT utilisation is needed and that ICT can facilitate better healthcare services. They feel neutral about the fact that ICT could help them to interact with healthcare service providers and that it could help to access new healthcare services. According to the results the respondents indicate that they would like the Minister of Health to add to the existing healthcare centres services to facilitate ICT utilisation in healthcare centres in Khayelitsha or nationally. The majority suggested that healthcare services should be improved utilising ICT since this could result in lower costs.

6.4 SUMMARY DISCUSSION AND RESULTS OF ALL DATA ANALYSIS

In this section, we will look at overall findings that we have obtained, as they give insight on views held by all healthcare stakeholders (patients, healthcare providers, healthcare adminstration, healthcare givers and government) on ICT employment in the delivery service in the healthcare field for HIV/AIDS patients in Khayeltisha township. The data collection results provide an understanding of the main factors driving ICT adoption by patients in Khayelitsha. Enhancement of the healthcare landscape model for Khayelitsha was carried out to obtain a better understanding of the healthcare services' delivery of ICT. The landscape was enhanced based on the literature review and a survey done by the Western Cape Health Department. Information of the data collected from the Western Cape Health Department in chapter five of the Khayelitsha case study and chapter two of literature reviewed, assisted in analysing and interpreting the results the from survey data collection. Descriptive discussion and results from the healthcare provider (HP) divulge that ICT is being used to support the healthcare service delivery to patients in Khayelitsha. The main ICT equipment respectively utilised was: papers, telephone, fax machine, computer/PC, cellphone/mobile, emails, printer and social network for personal use major usage of ICT across major healthcare functional areas in most of the healthcare centre are being utilised to assist healthcare service delivery to patients.

The research survey results respectively state that communication with patients is mostly done through: radio, television (TV), cellphone/mobile, telephone, internet, email, postal services and courier respectively. It is important to note that the results demonstrated that healthcare providers (HP) were really utilising radio as the main communication channel for healthcare information provision, as stated by patients.

According to the research survey results most patients stated which ICT they utilised as their main source in healthcare information source. The researcher has listed the following results respectively according to their percentages: media such as radio, television (TV), community newspaper, cellphone/mobile, community healthcare worker and commercialise newspapers, billboards, internet, social network respectively. Radio was the commonly utilised ICT for healthcare services followed by TV. A study by (Kenny, 2002:153) reported similar results namely that radio was a major source of healthcare information and that it was found to be a powerful tool for development. This meant that most healthcare programmes and healthcare services were broadcasted on the radio and television as second source of broadcast. This actually proved from our literature review that for a healthcare system to function effectively there are two requirements: appropriate services should be made available to the people and the services should be accessible to all (Report of the Health ICT Industry Group, 2009:18-23). According to Harris (2004:27), the role played by ICT in healthcare centre in a nutshell main source of information is from radio, television and newspapers. ICT has increasingly become more and more specialised in publicising information and information collection such as storage equipement such as PC, management and dissemination, and it is this which lends it indispensable to all development efforts, including public healthcare.

Even though radio, TV and community newpapers were commonly utilised for publicising information in healthcare services by healthcare providers, they did disclose that they utilised the radio and TV occasionally to broadcast their messages on programmes such as "UGONYO LWABANTWANA" or "AWARENESS OF TB" or "HIV/AIDS AWARNESS AND TESING" to inform the young mothers who have kids younger than five years to make sure that their kids get polio injection, TB awareness is a anual campaign especially on TB annual date making people aware and how to prevent pandemic spreading.

HIV/AIDS awareness its always done to alert people about HIV/AIDS, also to take away the stigma people associate with those who have HIV/AIDS so that more and more people could come out and live in a HIV/AIDS free society. The radio programmes are widely utilised during the campaigns every year. This involved broadcasting programmes that would educate the nation on the prevention rather than cure. Despite the fact that appointment meeting is perceived as the traditional way, it is still widely utilised as a communication tool between healthcare providers and patients, according to Shivute, (2007:43-78). The research survey results respectively state that communication between healthcare providers and patients is mostly done through meetings; cellphone/mobile and email; postal services; and courier.

The research survey results respectively state that communication with other healthcare centres is mostly done through staff meetings; emails, telephone, cellphone/mobile, fax machine, and VOIP respectively. In our literature review some reseachers consider higher email. Mobile phones also played a major role in the process of delivering health services to patients. According to the research survey results most healthcare providers (HP) stated which ICT they would personally recommend to the Minister of Health Department in South Africa if they were given a chance to do so, to add to the existing healthcare services to facilitate ICT utilisation for healthcare service delivery in healthcare centres.

They listed the following respectively accordingly: computers/PC; emails; radio, printers; television (TV), telephone, fax machine; social network; billboard; papers; cellphone/mobile; projector, and scanner. PC's also served a major role in the providing health services, as these aided in administrative duties of capturing healthcare related information, particularly that of patients. In Khayelitsha Site B clinic it also helped to keep track on HIV/AIDS and TB patients taking treamment of ARV treament and TB treament. Khayelitsha Site B Clinic for HIV/AIDS and TB only accomodates adults from eighteen (18) years of age up to sixty five (65) years. This has enhanced the delivery services offered to HIV/AIDS and TB patients because it effectively brings supports groups such as Treament Action Campaign (TAC) for HIV/AIDS patients.

From the literature review most African countries continue to suffer from major healthcare threats, constantly diminishing healthcare resources, inadequate medical infrastructure, and multiple healthcare problems such as HIV/AIDS, malaria, dysentery, cholera, typhoid, yellow fever, diarrhoea, and many more. In a bid to find permanent solutions to the growing healthcare challenges on the continent, the government and healthcare experts are exploring the role of ICT in healthcare centre delivery (African Development Bank and OECD, 2009:4).

In our data collection we see good results for such a decision in terms of bringing ICT such as PC and other ICT equipment. Even though ICT has been utilised for healthcare service delivery, there were constraints involved in this process. Some healthcare centres, especially those in the private sector such as surgery and others, found it very hard at times to work because of load shedding mostly in certain areas in Khayelitsha and they could not use electronic ICT for healthcare services which needed electricity to operate for example a PC's.
Although ICT was widely utilised for healthcare service delivery, at the time of this research, there was no ICT policy in place as it was still in the formulation process (Munjuu, 2006).

According to the research, descriptive results from patients indicate that ICT is a powerful instrument in bringing about efficient and effective changes to the quality of healthcare services delivery. It is evident from the research survey results that ICT utilisation in healthcare centres in Khayelitsha; 'private and public'; was higher and even patients utilised most of the ICT instruments for their persona use with mobile phones being utilised almost every household in Khayelitsha. This implies that there is a high penetration of mobile utilisation in urban areas such as Khayelitsha when we view research survey results for patients in Khayelitsha township.

A multinomial model was further conducted to investigate factors affecting awareness of multiple ICT utilisation in the healthcare service delivery. Functional literacy, multiple sources of healthcare services information and patient's ages were identified as the key factors affecting the utilisation of multiple and individual ICT channels (Shivute, 2007:43-78). For instance, this means that the functional literacy (i.e. ability of one to operate various ICT) is critical for ICT adoption.

Functional literacy plays a major role in the use of these technologies and those people who are highly literate were more likely to use high technology or mobile technology (Shivute, 2007:43-78) Education was also statistically significant implying that patients that are more educated were more likely to utilise a PC or Laptopn or smart phone. Therefore patients that were more literate were more aware of ICT instruments and were utilising ICT instruments more than the illiterate patients. The number of ICT related personal contact details (e.g. their mobile number, email address) patients were willing to share was also a significant factor. Research survey results show that from both 'public' and 'private' sectors, all patients were questioned on their willingness to share information with healthcare centres.

Patients mostly state 'Personal' and 'Not necessary' as reasons and they strongly believes on those two reasons. This means that patients with a predisposition to share their personal contact details with healthcare service providers were more likely to be aware of multiple ICT-based technologies. Key findings from the multinomial model. Indicate that functional literacy, sources of healthcare services information, level of education and age are the major factors influencing ICT awareness for healthcare service delivery in Khayelitsha township.

According to the research survey results, patients respectively stated that they agreed mostly with: government must do more to provide ICT for healthcare service delivery; standard for healthcare services should be improved utilising ICT; they wish that ICT skill could be develop for them so able to utilise more of ICT; cost of ICT service is a major hindrance to the utilisation of ICT benefits in healthcare centre in Khayelitsha; and privacy is very important when it comes to personal healthcare information. Majority of patients stated 'Strongly Agree' at 43%, 'Agree' at 28%, Neutral at 16%, Disagree at 7% and Strongly Disagree at 6%.

In our literature review we have metioned the commitment of South African government in improving healthcare service delivery. According to research questionnaires, from both 'public' and 'private' sectors the research interview survey results all patients were questioned on their opinion what they would like the Minister of Health to add to the existing healthcare centres services to facilitate ICT utilisation in healthcare centres in Khayelitsha or nationally.

The majority stated that the standard for healthcare services should be improved utilising ICT and the cost of healthcare services to be cheaper because they felt it is too expensive especially at the private sector healthcare centre. Those were the answers most patient felt they wanted to express to the minister of Health and Government of South Africa.

6.5 SUMMARY OF EMPIRICAL DATA

Below is a summary of the empirical data as indicated by the respondents of the healthcare centre in Khayelitsha.

ICT utilisation aspect	Responses	Key findings
Current ICT use in healthcare facilities		
Establishment of centre	Most of the respondents indicated that the facility is in use for more than 10 years.	The healthcare centre is in operation for more than 10 years and the employees at the centre are familiar with most ICT equipment but still mostly use paper, computers, fax machine, email and social media at work.

They mostly use fax machine, telephone and email to communicate with other stakeholders.

Computers are mostly used for data capturing and entry and less for reporting.

Other media such as television, CD/DVD, bill-board, social media and community newspapers are used for informing persons from the community as well as for health promotion purposes. |
Current utilisation of ICT	The majority (79%) indicated that they utilise ICT at the healthcare centre.	
ICT section or unit	The majority (81%) indicated that there is no ICT section or unit at the facility.	
ICT equipment being heard of	The following equipment: CD/DVD, radio, television, cell phone, printer, computer and paper (folder)are known to more than 50% of the respondents. Pagers, bill-boards, community newspapers, social networks, email and fax machines are known to 20%-50%. Projector and scanner are known by <20% of the respondents.	
ICT equipment use at the healthcare centre	The following equipment are used by more than 50% of the respondents: cell phone, telephone, Social networks, email, computers, papers and fax machine (telephone and paper the most). The following equipment is used by between 20% and 50%: bill-board, community newspaper, CD/DVD, radio, television, and printer. The following equipment are used by less than 20% of the respondents: pager, projector and scanner.	
Introduction of ICT equipment	The following equipment were indicated by the respondents to be introduced more than 10 years ago: paper, computer, telephone and CD/DVD. The following equipment were introduced more than 7 years ago: fax machine, printer, cell phone, television and bill-board. The following equipment were introduced less than 7 years ago: scanner, email, social media and community newspaper.	

ICT utilisation aspect	Responses	Key findings
Main purposes of ICT utilisation in the healthcare centre	The following equipment are used to mostly communicate with other healthcare service providers: fax machine, email and telephone. The following equipment are mostly used for education and promotion purposes: television, radio, CD/DVD, community newspaper and billboard. The following equipment are mostly used for recording purposes: paper (folder), computer/PC and scanner. The projector is mostly used for informing purposes. Social media is used for supporting purposes and the radio for personal use.	
Purposes for which respondent use computers	Computers are mostly used for data capturing and recording (46%) and less for reporting (21%) and graphs (14%). Computers have a limited use for financial, text processing and analysis of data (<10%).	
Computer literacy programmes	Most of the respondents indicated that there is some form of computer literacy programmes available to help staff.	
Areas of ICT use	Most of the respondents strongly agreed that for the following areas the use of ICT is important: referral service unit and hospital administration. Most agreed that emergency, medical, diagnosis/nursing and clinical support services are important areas. Most respondents felt neutral about the use of ICT for knowledge management and research support. Very few respondents disagreed or strongly disagreed with the importance of ICT use for the indicated areas.	

Collaborations with other healthcare centres around and outside Khayelitsha, e.g., referrals		
Main means of communication with other healthcare centres	a) They mostly communicate with other healthcare centres using telephone and fax machine and to a less extent using the Internet, courier, VOIP and email. Cell phones and postal services have limited use. b) Communication with patients is predominately during meetings (36%) followed by radio, email, telephone, cell phone and radio (12-14%). There is limited use of postal services, courier, radio and television. c) Communication with other healthcare providers or employees are mostly during meetings (42%) followed by telephone and Cell phone. There is limited use of email and Internet and basically no use for VOIP, postal services and fax.	Face-to-face consultations and meetings are still the main mean of communication between healthcare professional with patients and other healthcare providers. Communication between healthcare centres is mostly via telephone and fax machine.

Collaborations with other healthcare centres around and outside Khayelitsha, e.g., referrals		
Means to send reports to other healthcare centres	Reports are sent to other healthcare centres mostly by fax (29%) followed by hand delivery (20%). The following means are used to some extent (11%-14%): courier, postal services, email and telephone.	
Factors that influence the use of ICT in healthcare centres		
ICT related constraints	The following constraints were indicated that the healthcare centre faces: lack of technical support (20%) mostly followed by (12%-16%)low ICT internal skills; low priority of ICT investment; load shading of electricity; and shortage of IT employees. The following constraints have a lesser influence (5%-8%): political influence and poor service provision.	There is a strong agreement that the enhancing flow of information utilising ICT is a key issue whilst mostly constraint by the lack of technical support.
Key issues for enhancing ICT utilisation	There is a strong agreement that the enhancing flow of information utilising ICT is a key issue that needs attention. There is agreement that utilising ICT for improving healthcare centres; to make ICT more widely available; free/cheaper machines/software; and make ICT easier to be utilised are also key issues. There were many neutral responses for the last three key issues and about no disagreement or strong disagreement.	
Importance of ICT utilisation	Of all the responses 68% of the respondents agreed that ICT is important for healthcare service delivery and 20% were in strong agreement. Only 9% of the respondents were neutral and about none disagreed.	
Government regulations restrictions on ICT utilisation	Most of the respondents (98%) indicated that they were not aware of any government regulations that restrict ICT utilisation in their healthcare centre.	

Future investment in ICT		
Expenditure on ICT equipment	Most of the respondents were not sure about the expenditure on ICT equipment, support and service delivery.	Future utilisation should still be on computers, printers and telephones with the more modern ICT not being regarded as that important.
Future utilisation of ICT	Most of the respondents indicated that future ICT utilisation should be on computers, printers and the telephone. Fewer respondents indicated that fax, papers, email, social networks, cell phones, television, radio and bill boards should be considered for future ICT utilisation. Scanner, projector, CD/DVD, community newspapers and pagers were indicated by very few respondents for future utilisation.	Most respondents agreed that ICT is needed to interact with other healthcare

Future investment in ICT		
Benefits of healthcare centre investment in ICT	Most respondents strongly agreed and agreed with the statements that ICT is needed to interact with other healthcare centres and that the government must do more to provide ICT to enhance healthcare service provision. The respondents mostly agreed or were neutral about the following statements: ICT is helping with access to health information; that more training is needed for ICT utilisation; and that privacy is important when accessing personal health data. Only very few respondents disagreed or strongly disagreed with the statements.	centres with computers being regarded as the most important means.
Additions of ICT recommendations to Minister of Health	Of the respondents the ICT indicated as most important to be recommended to the Minister of Health is computers (68%). The following ICT that should be added in future are (20%-35%): fax, printer, email and telephone. The addition of paper, scanner, social media, cell phone and bill boards are recommended by 5%-20% of the respondents. Radio, CD/DVD, projector and bill boards are recommended by less than 5% of the respondents.	

Table 6.1. Summary of empirical data collected from healthcare professionals

Aspect	Responses	Key finding
Patient demographics		
Age group	between 21-40, younger than 18 a separate clinic	The patients participating in this study are mostly between 21 and 40 with most having high school and about all primary school education earning <R3,500 per month
Gender	slightly more females	
Highest level of education	High school mostly and 31% primary school	
Race	African	
Income range	< R3,500 per month	

Summary of the patients' responses appears in the next table.

Healthcare facility		
Visiting healthcare facility in past three months	Of the patients 60% indicated that they have visited the healthcare center during the previous three months on the date of the survey.	The healthcare facility seems to be recognized as the healthcare service provider to the patients
Facility visited for healthcare services	Hospitals and clinics are mostly preferred by the patients for their healthcare services with less patients preferring surgeries. Very few patients preferred Sonoma's, witch doctors, missionary healthcare clinics or churches.	
ICT utilisation		
ICT heard of	The ICT equipment mostly known to the patients are: CD/DVD, radio, television, telephone, computer and paper (folders) (75%-100%). Pagers, bill-boards, community newspapers,	The ICTs utilised by the patients are typical of the context with the less sophisticated ICTs and even paper-based technologies, still mostly used
ICT utilised before	Cell/mobile phone, TV, radio, community newspaper, telephone, PC, email, printers, social networks	
ICT currently being used	Radio, TV, papers, PC, telephone, CD/DVD, Fax, billboards, emails, printers, social networks, cell phones, community newspapers and pagers	
ICT used at their homes	Cell phones, TV, radio, Community newspaper, telephone, PC, emails, printers and social networks	
ICTs used for personal and work purposes	Personal use: cell phone, radio, TV, billboards and community newspaper. Work purposes: PC, printer and fax. Limited for educational purposes	
Health information sources		
Main sources for health information	Radio (main) and limited newspapers and cell phones (SMS)	Limited modern ICT use to inform patients
ICT literacy		
Wish to develop ICT skills	Positive attitude towards ICT and willing to improve their ICT skills	Patients are keen to improve their ICT skills
Ability to operate ICTs	Can operate: radio, telephone, TV, cellphone and CD/DVD. Unable to operate: PC, billboards, projector, printers, pages, fax machines and scanners.	The patients' ICT skills are limited
Attitude towards ICT		
Main reasons for using ICTs	Positive attitude towards ICT use	Patients have a positive attitude towards the use of ICTs
Patient information		
Willingness to share patient information	Willing to share with healthcare facility but are concerned about their personal data and privacy	Patients are willing to share their information with the facilities but with privacy concerns

Role of government and private sector in healthcare service provision		
Responsibility of the government to provide healthcare services	Government must do more to provide ICT to healthcare centers; cost a major hindrance; more training in ICT utilisation is required; ICT can facilitate better healthcare service provision. They feel neutral about the role of ICT to interact with healthcare service providers and access of new services	The government has an important role in healthcare service provision and should take the responsibility to deal with the challenges experienced by the healthcare service providers
The role of the Minister of Health to add to the existing healthcare services to facilitate ICT utilisation in healthcare centers	Minister of Health to add to existing healthcare centers to facilitate ICT utilisation because it could lower costs	The Minister of Health should take the responsibility to implement ICT to facilitate better healthcare services
The role of private healthcare service providers to add to the existing healthcare centers		

Table 6.2. Summary of empirical data collected from patients

6.6 CONCLUSION OF CHAPTER SIX

This chapter has provided two main areas and objectives of focus. The first one was to present the research instruments that were used for data collection in the study, which pertained to UTILISATION OF ICT TO SUPPORT HIV/AIDS INFORMATION AND HEALTHCARE CENTRE SERVICE IN KHAYELITSHA. After identifying the research tools that were used such as questionnaires, the steps were taken to avoid bias. The second objective of this chapter was to present the data collected and analyse the results thereof. The methodologies and purpose of the study were all placed in a central position by testing their relevance, and eventual reliability, with respect to the study. The following chapter deals with the conclusion in resolutions and recommendations of the research study.

According to Creswell (2003:32-46), "analysis is a reasoning strategy with the objective of taking a complex whole and resolving it into relevant parts or chunks of meaning, social scenes or events". In other words, qualitative analysis transformed data into findings. Coding was also a form of analysis to identify the

properties of identified categories and themes in data. Thus, analysis was essentially making sense of data collected and using the results of this process to answer the research questions which in the case of this study were articulated and outlined (Saunders, Lewis, and Thornhill, 2009).

The purpose behind selecting data analysis procedures was to represent the data fairly and to communicate the given purpose of the study (Watkins, 2008). The management of data was therefore very important to provide a holistic description of the entire research process and findings at the end of the study (Pope and Mays, 2006). Distribution of ICT utilised by healthcare centres (healthcare provider) 'public' and 'private' and by patients from Khayelitsha where analysed. There was a high use of ICT in Khayelitsha at healthcare centres and also by patients.

The utilisation of ICT in Healthcare. A holistic perspective of utilisation of ICT on mainly two approaches that is where ICT is the lead and the other where ICT plays a supporting role in Healthcare service to support HIV/AIDS information flow to be provided. ICT utilisation challenges to enhance healthcare centre services for HIV/AIDS patients; information flow from all stakeholders and compared with 'public' and 'private' sectors;. types of ICT equipments that are used for data capturing and for the information flow of patients; comparing ICT in developing, developed and new industrial countries; will discuss and do comparative study on the flow of Information in healthcare centres; outline reason for the difficulties encountered include not only the obvious such as lack of the equipment; poor infrastructure and lack of the required skills but all stakeholders involved such as rigid managerial control over ICT financial budget. The research will include effects and the reason why ICT projects failure in developing countries in Healthcare sector compare with developed countries and BRICS countries, also look at the role that utilisation of ICT plays in the economy, other government departments and life expectance.

CHAPTER 7

7. CONCLUSIONS AND RECOMMENDATIONS

7.1 INTRODUCTION

The term "recommend" has more than one meaning: firstly, it suggests as fit for some purposes, or advice as a course of action, or making acceptable or desirable. The recommendations of the study regarding the evaluation of care and support centres for HIV/AIDS orphans in Khayelitsha have to be viewed as advice for a cause of action for the purpose and objectives of this study. The previous chapter focused on the results of the empirical study. This chapter integrates the findings of the literacy study with the actual results of the empirical study. Even though very little printed information was available in relation to the impact of utilisation of ICT in healthcare centres to support HIV/AIDS patients in Khayelitsha and how healthcare service delivery from healthcare providers/workers to their patients and to determine possible factors that influenced the use of ICT use for health service delivery, the researcher has reached conclusions and recommendations emanating from the study that was evaluated.

7.2 SUMMARY OF THE RESEARCH FINDINGS

This research was sought to investigate factors affecting the utilisation of ICT in healthcare centres to support HIV/AIDS patients in Khayelitsha and healthcare service delivery from healthcare providers/workers to their patients. Chapter one was an overview of the research which provided a brief introduction and background to the key factors as identified, which have contributed to the scope of the research. The research process was explained and further detailed in chapter three and four. The formulation of the research problem, the research question and supporting investigative questions were vividly stated by the researcher. Research assumptions and limitations of the research were listed, feeding into the overall research design and methodology, the demand for qualitative research strategy and overview of the dissertation structure.

The findings have also shown the use of ICT has enhanced communication between lower and higher levels of healthcare providers, and the communication between healthcare centres to patients. ICT is utilised in the 'private' and 'public' healthcare sectors to support HIV/AIDS patients and other various healthcare services. The landscapes comprise key stakeholders in health services delivery, their linkages and administrative information flows was further detailed in chapter two.

In Chapter two and three, outline a holistic perspective of utilisation of ICT on mainly two approaches that is where ICT is the lead and the other where ICT plays a supporting role in Healthcare service to support HIV/AIDS information flow will be provided and the following aspects were also discussed: ICT utilisation challenges to enhance healthcare centre services for HIV/AIDS patients; Information flow from all stakeholders and compared with 'public' and 'private' sectors; Types of ICT equipments that are used for data capturing and for the information flow of patients; a comparative study on utilisation of ICT in developing, developed, and new industrial countries; Research have outline and did comparative study on the flow of information in healthcare centres; reasons outline for the difficulties encountered include not only the obvious such as lack of the equipment; poor infrastructure and lack of the required skills but all stakeholders involved such as rigid managerial control over ICT financial budget. The research will include effects and the reason why ICT projects failure in developing countries in Healthcare.

Chapter four outlined the research design and methodology used in this research dissertation. A survey method was used to identify how utilisation of ICT in healthcare centre can improve service delivery in the context of Khayelitsha. Research looked at a research action plan, research case study, ethnography, field experiments, future research, grounded theory, cross-sectional studies and hermeneutics. The research methodology was further detailed and elaborated.

Chapter five was a data collection design. The move towards data collection was explained and the target population was defined. Assessment and understanding of data collected from both participative observation and the survey conducted within the range of research was analysed in detail and understood, in terms of the primary theme of the dissertation. The chapter was winded up with a list of questions that were projected to the target population.

Two questionnaires were constructed and were administered to healthcare providers in healthcare 'private' and 'public patients.

- The first questionnaire sought to obtain healthcare providers' perceptions on ICT utilisation, deployment and constraints in delivering healthcare services to patients.

- The second questionnaire aimed to obtain patients' opinions on ICT utilisation and what they perceived important in improving healthcare services provided to them.

The questionnaire also helped to determine the factors that influence the utilisation of ICT in the healthcare flow of information service delivery in Khayelitsha.

In chapter six, Khayelitsha Case Study was done by research focusing and elaborating upon the landscape and challenges that correlate with the HIV/AIDS such as TB, poverty, crime, lack of education, migration etc. We compare the 'public and private' sectors in the township of Khayelitsha and zoom into the current technologies and other resources they are utilising.

Based on the literature reviewed and data collected from the survey, a healthcare landscape model was developed to depict healthcare centre service provision from healthcare providers to patients in 'public' and 'private' healthcare sectors in Khayelitsha. The health landscapes for Khayelitsha were developed to obtain a better understanding of the organisation of healthcare service sectors and ICT health service provision in Khayelitsha Township.

Discussions and data analysis results, in this chapter (seven), the research discussed in more detail the data collected from all the research questionnaires was analysed further and the results analysed. In addition, the results of the survey were mapped to the literature review conducted in chapter two. Results of the main findings from the analysis of the data were presented. Descriptive statistics were conducted on primary data collected from 70 patients and 70 healthcare providers. The study demonstrated that radio, television (TV), community newspaper, billboards and mobile phone utilisation is the major ICT utilised in Khayelitsha. The study reveals that 97% of patients took part in the survey indicated that they own cellphone/mobile phones.

The study provides evidence that cellphone/mobile phones were highly used in the study areas. A large number of patients indicated that they mostly use radio, community newspaper and television (TV) for healthcare related information.

Mostly television (TV) and radio were both utilised as healthcare education tools whereby videos, CD/DVD on healthcare information on diseases such HIV/AIDS and TB are shown to patients in health facilities. Community newspaper and radio were also commonly used as a source of healthcare information.

However, only a few healthcare providers in public sectors mentioned that they utilised radio as a way of communicating with patients.

The research concluded and recommended in chapter eight a summary of the research and all the finding recommendations for future research.

7.3 RESEARCH OBJECTIVES

This research sought to investigate factors affecting the utilisation of ICT in healthcare centres to support HIV/AIDS patients in Khayelitsha, healthcare service delivery from healthcare providers/workers to their patients and to determine possible factors that influence the use of ICT use for health service delivery. It was mentioned in the problem statement in chapter one, that it is not clear to what extent ICT has been utilised in the health delivery and whether available ICT effectively supported the delivery of health service to the HIV/AIDS patients in Khayelitsha Township.

Establish what information is required for a healthcare service and how this is exchanged and utilised to care for HIV/AIDS patients
Identify the stakeholders and the information flows for a HIV/AIDS healthcare service
Develop a landscape model to depict the stakeholders and information flows and the ICT to support the receiving, sending and transmission of information
Determine how ICT is used in healthcare services in different countries and other contexts.
Establish how the healthcare stakeholders use ICT to support the care of HIV/AIDS patients
Determine how ICT could be utilised to support sufficient information flows between stakeholders in a healthcare context.

Determine the information and ICT requirements specific to a HIV/AIDS healthcare service.
Determine the information and ICT needs in a real-life context using a healthcare centre in Khayelitsha.
Establish ICT principles to improve ICT utilisation and improve information flows
Establish the ICT principles that can be applied in a healthcare centre at Khayelitsha to improve ICT utilisation and information flows.

Table 7.1: Research objectives

In finding results to the research questions posed, literature was reviewed to get a better understanding of the status of ICT utilisation in Khayelitsha. From the study results it was discovered that there were constraints in healthcare services delivery.

Next the research questons are answered.

The first sub research question is: "How does information flow between the different stakeholders to support care of HIV/AIDS positive patients from the patient's home through all the referral points?" The answer to this question is obtained from the discussion in Chapter 5 which provides the context of the study and the flows as depicted in Figures 5.10, 5.11 and 5.12. The Khayelitsha site is typical of an under-served community and Site C typically has informal settlements. People in this context are facing the following challenges: poverty, lack of education, inequality and many citizens migrated from rural areas from other provinces; unemployment and low income; and high crime rate.

People in Site C of Khayelitsha can go to any of the smaller clinics or specialised clinics such as midwife obstretic unit for pregnant women; Oral Health Service for dental problems; etc. the three provincial government Community Health Clinics (Khayelitsha, Michael Mapongwana or Nolungile); or directly or with a referral to a hospital (Grootte Schuur, Tygerberg or CF Jooste Hospitals). The patient information is stll mostly paper based but are also captured electronically as part of a patient folder. When patients need medication the doctor will provide prescription that the patient takes to the pharamacy and if a patient is referred to a hospital the patient is given a referral letter.

The patient folder remains at the Public Healthcare Centre and it is not clear to what extend the patient information flows back to the referral clinics from the referral hospitals. The answer to the second sub research question is given next. The second sub research question is "How is ICT used by healthcare stakeholders for information exchange and utilisation in Healthcare service provision?" The answer is derived from the empirical data summarised in the tables presented in Chapter 6.5. The healthcare professionals and healthcare workers indicate their preference for ICT at work as still mostly paper but also computers, fax machines, email and social media. Computers are still mostly used for data capturing and less for reporting. Media such as television, CD/DVD, billboards, social media and newspapers are used to inform people from the commpunity and for health promotion purposes. Face-to-face consultations are still the norm for communication between healthcare professionals and patients but the telephone and fax are mostly used for communication between healthcare centres and hospitals. The respondents indicate that ICT could enhance information flows that is mostly constraint by the lack of technical support. Future utilisation should still be on computers, printers and telephones with more modern ICT not regarded as that important. The respondents indicate that ICT is needed to interact with other healthcare centres. The patients use the healthcare facilities for their healthcare needs and there is limited utilisation of ICT by patients which is typical of the context.

The patients' ICT skills are limited but they are keen to improve these skills and they have a positive attitude towards the use of ICTs. Patients are willing to share their data but are concerned about the privacy of the data. The patients indicate that the government needs to take the responsubility of dealing with the challenges experienced by the healthcare service providers with the minister of health to take the responsibility to implement ICT to facilitate better healthcare services. The third sub research question is discussed next and is: What are the gaps between information and ICT requirements and the information and ICT available to the stakeholders of a Healthcare centre in Khayelitsha that provide a healthcare service to HIV/AIDS patients? It follows from the findings that there is a gap between what and how ICT could be utilised to facilitate better healthcare services for improved communication between patients and healthcare servide providers; between healthcare services providers at different healthcare facilities; for improved information flows, storage, reporting and utilisation for health promotion.

This can only be possible if the government assumes the responsibility to implement suitable ICT to facilitate healthcare services; train the relevant people to utilise the ICT; and implement programmes to increase the ICT literacy skills of the people in Khayelitsha supported by awareness drives about the possibilities of ICT. The main research question is: What is the current status on ICT utilisation in healthcare centres to enhance service delivery and information flows support healthcare service provision to HIV/AIDS? The answer to this research question is derived from the findings of the three sub research questions. The current state on ICT utilisation in healthcare services are still only have limited utilisation of ICT to enhance service delivery and to support information flows. The healthcare professonals and patients are willing to utilise ICT but then the government needs to take the responsibility to implement suitable ICTs and provide training for the users and technical expertise to maintain the ICTs. There is also a gap between the current ICT literacy level of the people from Khayelitsha and what it should be to benefit from the use of ICTs to facilitate healthcare service provision. The current state is typical of an under-served context and the factors contributing to the problems experienced need to be carefully considered to reach a desired situation where ICT can increase healthcare service delivery and information flows.

7.4 RESEARCH SIGNIFICANCE

The healthcare sector is an information intensive sector. ICT presents challenges but has numerous potential benefits. ICT should therefore be employed as a valuable tool to enhance healthcare delivery in order to contribute to modernisation and development of the country through improved healthcare and productivity of the communities.

ICT has the potential for explosive growth but more importantly in the delivery of better healthcare that eventually reduces the spread of HIV/AIDS and improved healthcare service delivery and flow of information. The South Africa government must demonstrate their commitment to the implementation of ICT policies and promote both concept and practical application through participation, allocation of resources and open communication. The anticipated outputs for this research are:

> A landscape model depicting the information flows and technologies that support HIV/AIDS healthcare services in Khayelitsha.

A needs analysis of the information and technology needs at the different points of care of the HIV/AIDS healthcare path in Khayelitsha.

A summary of the problems that hinder the flow of information and suggestions for improvement

A summary of the technology currently used and recommendations for improved technology at the different points of healthcare service.

The outcome of the research will contribute towards the improvement of utilisation of ICT, government invest on ICT and information flows and to better support HIV/AIDS healthcare in Khayelitsha.

7.5 RECOMMENDATIONS

According to Ntonzima (2004:150), the term "recommend" has more than one meaning: firstly, it suggests as fit for some purposes, or advice as a course of action, or make acceptable or desirable. From the study results it was discovered that there were constraints in delivering healthcare services and they were namely:

Budgetary constraints: whereby finances are not enough to buy all the necessary ICT to assist in the process of service provision to patients.

Lack of basic infrastructure to support health service delivery: some health facilities, especially those in the rural areas, lacked basic infrastructure such as electricity and this was a constraint in using ICT such as personal computers.

The recommendations of the study regarding the evaluation of care and support centres for HIV/AIDS orphans in Khayelitsha have to be viewed as advice for a cause of action for the purpose and objectives of this study. The following observation outcomes inform the recommendations made in the study:

Khayelitsha has the potential of embracing care and support centres within the community, based on the establishment and operation of a community driven care and support centre for children orphaned by HIV/AIDS.

The community's residents are mainly from the Eastern Cape, where tradition is very dominant and the concept of ubuntu is still applicable.

Community members have undertaken initiatives to assist orphaned children and awareness campaigns should be created in raising awareness of the plight of these children.

Care and support centres are offering the best service to orphaned children but with an increase in community involvement more initiatives can be created.

More care and support centres should be created but should not be exclusively government or community driven as families cannot cope to assist children who are orphaned due to financial constraints.

Both of these care and support centres have great potential in providing care and support to children orphaned by HIV/AIDS. The centres' approaches should be combined in order to accommodate and be accommodated by community members and community driven care and support centres could benefit from the resources available from government. The major intention with these recommendations is the realisation of the inter/inked objectives for effective care and support centres available to children orphaned by HIV/AIDS in Khayelitsha for more generations and the best possible care that children can have outside family care. Such recommendations propose to justify the significance of care and support centres and the need for that community to be actively involved.

7.6 LIMITATIONS AND SUGGESTIONS FOR FUTURE RESEARCH

This research did not require viewing any individual patient data and therefore the privacy of patients was not be compromised. Any results or comments of participants were treated with care and permission was obtained before any references were made in any publications resulting from this research study. The study covered detailed ICT utilisation by both patients and the healthcare providers. Further, utilisation of ICT it is based in interactions between 'private' and 'public' sector healthcare centres were explored. Factors that influence the utilisation of ICT in the healthcare service delivery to patients were examined.

Research studies probe ICT utilisation in private or public healthcare focusing on a specific patient group or functional area, e.g. HIV/AIDS, maternity, emergency services etc. The research studies alternatively also looked at assessing the willingness to utilise modern technologies such as cellphone/mobile phones and social network such as facebook and Mxit, as there are likely future platforms for health services delivery, and some risks benefits associated with such applications. The research study data collecting was done in 2009 in mostly private and public healthcare centre in Khayelitsha township.

7.7 CONCLUSION

In conclusion, this study investigated the ***UTILISATION OF ICT TO SUPPORT HIV/AIDS INFORMATION AND HEALTHCARE CENTRE SERVICE IN KHAYELITSHA*** context. Results from the interviews with patients and healthcare providers in Khayelitsha Township highlight the potential and some of the constraints in healthcare services delivering. While insights from the potential of utilisation of ICT in healthcare centre both public and private can be obtained from high penetration levels of some of the ICT, key constraints were low ICT budgets, poor infrastructure to support healthcare services and lack of training for staff members in IT skills. Data collected from a patient's survey aimed to determine patient's access to and utilisation of ICT for healthcare delivery services. Factors that influenced ICT for healthcare delivery service were functional literacy, sources of healthcare delivery services information, age, level of education, race, tendency towards the importance to develop and improve ICT skills and the positive perception on utilisation of ICT for healthcare services.

Even though Khayelitsha township and rest of South Africa, especially the rural areas, are faced with major challenges in delivering healthcare services to patients, these challenges need to be overcome. Although it is not inevitable to overcome some if not most of the challenges faced by the healthcare sector in Khayelitsha and South Africa as a whole in particular HIV/AIDS and TB epidemic, results demonstrate high potential to utilisation of ICT to transform healthcare delivery service in Khayelitsha and to the whole South Africa. In conclusion it is necessary to take into account that government in principle has the interest of its citizens at heart as depicted in the literature review. However it is not having the expected results.

From the study results it was discovered that there were constraints in delivering healthcare services of budgetary constraints, whereby finances are not enough to buy all the necessary ICT to assist in the process of service provision to patients. Lack of basic infrastructure to support health service delivery such as: some health facilities, especially those in the rural areas, lacked basic infrastructure such as electricity and this was a constraint in using ICT such as personal computers. Khayelitsha has the potential of embracing care and support centres within the community, based on the establishment and operation of a community driven care and support centre for children orphaned by HIV/AIDS.

The community's residents are predominantly from the Eastern Cape, where tradition is very dominant and the concept of ubuntu is still applicable. Community members have undertaken initiatives to assist healthcare volunteers and awareness campaigns should be created in raising awareness of the plight of these children and HIV/AIDS & Tuborculosis (T.B) healthcare volunteer givers. Care and support centres are offering the best service to orphaned children, HIV/AIDS and (T.B) but with an increase in community involvement more initiatives can be created. More care and support centres should be created but should not be exclusively government or community driven as families cannot cope to assist children who are orphaned due to financial constraints. Therefore we urge the need to re-visit its policies and change course if it wants to render service and protect its citizens. HIV/AIDS is no longer an isolated epidemic but affects all aspects of mankind. The number of HIV/AIDS patients is increasing daily and these numbers have been projected to increase further. Sub-Saharan Africa is the most affected by the disease and this in turn has devastating effects on patients and creates orphanages as a result of HIV/AIDS.

LIST OF ACRONYSM

ICT	Information and Communication Technology
I.T	Information Technology
HIV	Human Immunodeficiency Virus
AIDS	Acquired Immune Deficiency Syndrome
WHO	World Health Organisation
UNICEF	United Nations Children's Fund
UNAIDS	Joint United Nations Programme on HIV/AIDS
NGO	Non Governmental Organisation
IMF	International Monetary Fund
IDRC	International Development Research Centre
ARV	Anti Retro-Viral
RDP	Reconstruction and Development Programme
PC	Personal Computer
TV	Television
CPUT	Cape Peninsula University of Technology
IDRC	International Development Research Centre
HP	Healthcare Provider/s
BRICS	Brazil, Russia, India, China and South Africa
HCT	HIV/AIDS Counselling Test
GDP	Gross Domestic Product
HIS	Healthcare Information Services
OSS	Open Source Software
IN	Internet
MP	Mobile Phone
NIE	New Industrial Emerging

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BIBLIOGRAPHY

Adams, A. (2004). An Investigation into leaners at Silverlea Primary School. *CPUT Dissertation Papers , 1* (1), 1-140.

African Development Bank and OECD. (2009). *African Economic Outlook.* African Development Bank (AfDB) and OECD Development Centre, AfDB Development Research Department and OECD Development Centre. Africa: African Development Bank (AfDB) and OECD Development Centre (© AfDB/OECD 2009).

Aisbett, J., Gibbon, G., Rodrigues, A.J., Migga, J.K., Nath, R. & Renardel, G.R. (2008, October 18). Strengthening the Role of ICT in Development. *Special topics in Computing and ICT research , IV* . (G. G. Janet Aisbett, Ed.) Kampala, Uganda: Fountain Publishers.

Anderson, Models of Rationing: Health Insurers' Assessment of Medical Necessity, 140 U. PA. L. REV. 1637, 1671 n.131 (1992). With experience rating, the insurer has less incentive to refuse payment because all amounts it pays are recouped in next year's premium increases.

Armijo, L. E. (2007). The BRICs Countries (Brazil, Russia, India, and China) as Analytical Category: Mirage or Insight? (L. E. Armijo, Ed.) *ASIAN PERSPECTIVE , 31* (4), 7-42.

Australian Council for Safety and Quality in Healthcare. (2005). *Clinical Handover and Patient Safety Literature Review Report.* Australian Government Health Minister, Australian Resource Centre for Healthcare Innovations. Sydney: Safety and Quality Council.

Babbie, E.R and Mouton, J. (2002). *The practice of social research.* (E. R. Mouton, Ed.) Cape Town, Western Cape , South Africa: Cape Town : Oxford University Press Southern Africa, 2001.

Bailur, S. (2007, March 3). Using Stakeholder Theory to Analyze Telecenter Projects. (S. Bailur, Ed.) *Information Technologies and International Development , 3* (3), p. 61.

Bakari J.K, Tarimo C.N, Yngstro L., Magnusson C., Kowalski S., and Joseph R. (2007). Bridging the gap between general management and technicians: A case study on ICT security in a developing country. *Science Direct (Elservier) , 26* (2007), 44-55.

Bakker, A. R. (2002). Healthcare and ICT, partnership is a must. *International Journal of Medical Informatics , 66* (1-3), pp. 51- 57.

Baliamoune-Lutz, M. (2005). An analysis of the determinants and effects of ICT diffusion in developing countries. (M. Baliamoune-Lutz, Ed.) *Information Technology for Development , 10* (3), pp. 151-169.

Bates, D. W., Ebell, M., Gotlieb, E., Zapp, J., & Mullins, H. C. (2003). A proposal for electronic medical records in U.S. primary care. *Journal of the American Medical Informatics Association*, 10(1), 1—10.

Baxter, P. and Jack, S. (2008). Qualitative Case Study Methodology: Study Design and Implementation for Novice Researchers. *The Qualitative Report December , 13* (4), 1-16.

Bebbington, A. (2006). Capitals and Capabilities: A Framework for Analyzing Peasant Viability, Rural Livelihoods and Poverty. (A. Bebbington, Ed.) *World Development , 27* (12), pp. 2021-2044.

Bekker, S. B. (2001). *Migration Study in the Western Cape 2001.* Government of Western Cape, Provincial Government of Government of Western Cape. Cape Town: Provincial Government of Government of Western Cape.

Birley, G. and Moreland, N. (2000). *A practical guide to academic research.* Cape Town, Western Cape, South Africa: British Library Cataloguing in Publication Data.

Bless, C., Higson-Smith, C. & Kagee, A. (2006). *Fundamentals of social research methods: an African perspective* (4th edition ed.). Cape Town, Western Cape, South Africa: Juta and Company Ltd.

Bokazhanova, A. and Rutherford, G.W. (2006,). The Epidemiology of HIV and AIDS in the World. *HIV/AIDS in the World, Coll. Antropol. 30 (2006) Suppl. 2: 3– 10* , 3-10.

Borgman, C. L. (2009). The digital future is now: A call to action for the humanities. (C. L. Borgman, Ed.) *Digital Humanities Quarterly , 3* (4), 1-45.

Bota, L. 2006. Interview with a faith-based development worker in Philippi. Cape Town

Busse, M. and Hefeker, C. (2007). Political risk, institutions and foreign direct investment. (M. B. Hefeker, Ed.) *European Journal of Political Economy , 23* (2), pp. 397–415.

Clark, R.C. and Mayer, R.E. (2011). MR. In a. R. Ruth C. Clark, *E-Learning and the Science of Instruction: Proven Guidelines for Consumers and Designer of Multimedida Learning* (3rd ed., pp. 29-62). San Franscisco: John Wiley and Sons.

Cohen, L., Manion, L. & Morrison, K.R.B. (2000). *Research methods in education* (5th ed.). (L. C. Manion, Ed.) Cape Town, Western Cape, South Africa: RoutledgeFalmer, 2000.

Collins, P. Y. (2006). Challenges to HIV prevention in psychiatric settings: Perceptions of South African mental healthcare providers. *Social Science & Medicine 63 (2006) 979–990 , 63* (4), pp. 979–990.

Collis, J. and Hussey, R. (2009). *Business Research: A Practical Guide for Undergraduate and Postgraduate Students* (3rd ed.). Cape, Western Cape, South Africa: Palgrave Macmillan.

Committee on Data Standards for Patient Safety. (2003). Key capabilities of an electronic health record system. Washington, DC: *Institute of Medicine of the National Academies.* 35 pages | 8.5 x 1, DOI: https://doi.org/10.17226/10781

Cooper, D.R. and Emory, C.W. (2007). *Business research methods* (5th edition ed.). (R. D. Irwin, Ed.) New York, USA: McGraw-Hill. Dusit Niyato, Ekram Hossain, and Jeffrey Diamond.(n.d.).

Cotter C.M, Making the case for a clinical information system: the chief information officer view, J. Crit. Care. 22 (1) (2007) 56–65.

Creswell, J. W. (2003). *Research design: qualitative, quantitative, and mixed method approaches* (2 ed.). (J. W. Creswell, Ed.) Cape Town , Western Cape, South Africa: SAGE Ltd.

Curry, E. (2011). New, Assertive Women's Voices in Local Elections. *New, Assertive Women's Voices in Local Election* . (E. Curry, Ed.) Cape Town, Western Cape, South Africa.

Curry, E; Schreinera, A.S;Taylor-Richardson, K. (2011). *What Matters Most: An Investigation of Predictors of Perceived Stress Among Young Mothers in Khayelitsha* (3rd ed.). Cape Town, Western Cape, South Africa, Southern Africa: Taylor and Francis Group.

Dasgupta, S., Lall, S. & Wheeler, D. (2005). Policy Reform, Economic Growth and the Digital Divide. (S. L. Susmita Dasgupta, Ed.) *Oxford Development Studies , 33* (2), 229-243.

Dawson, C. (2009). A Practical Guide to Research Methods: A User-friendly Manual for Mastering Research Techniques and Projects (4th ed.). (C. Dawson, Ed.) Cape Town, Western Cape, South Africa: How To Books Ltd.

Department of Health. (2009). *National Antenatal Sentinel HIV and Syphilis Prevalence Survey in South Africa.* Department of Health. Andries Street, Pretoria: National Department of Health, Civitas Building, corner Struben and Andries Street, Pretoria © 2010 Department of Health.

Donald R. Cooper and Pamela S. Schindler. (2008). *Business Research Methods* (10th edition ed.). Florida, Miami, USA: McGraw-Hill Higher Educationl; (January 2008).

Dorrington, R., Bradshaw, D. and Budlender, D. (2008). HIV/AIDS profile in the provinces of South Africa Indicators for 2008. (D. B. Rob Dorrington, Ed.) *Medical Research Council and the Actuarial Society , 1* (1), 1-15.

Dusit, N., Ekram, H., and Jeffrey, D. (2007). Wireless access and its Application for Telemedicine/e-Health services. *IEEE 802.16/WIMAX-Based Broadband , 14* (1), pp. 72-83.

Education, P. D. (2010). *Report from Provincial Government.* Cape Town: Provincial Deparment Government.

Faulkner, D. & Loewald, C. (2008). *Policy Change and Economic Growth: A Case Study of South Africa.* National Treasury of the Republic of South Africa, National Treasury of the Republic of South Africa. Pretoria: Government of the Republic of South Africa.

Ferreira, K. N. (2009, October 17). Programming the World with Philosophy. (Illustrated). Delaware, Mid-Atlantic region , USA: iUniverse.

Filippetti, A. (2011, July 21). The Patterns of Technological Capabilities of Countries: A Dual Approach using Composite Indicators and Data Envelopment Analysis. (A. Filippetti, Ed.) *World Development , 39* (7), pp. 1108–1121.

Forman, L. (2004). Both Medium and Message: HIV/AIDS, Information and Communication in Africa. (C. S. Cohen, Ed.) *A Journal of Law and Policy for the Information Society* , 1-48.

Gammeltoft, P. (2008). Emerging multinationals: outward FDI from the BRICS countries . (P. Gammeltoft, Ed.) *International Journal of Technology and Globalisation , 4* (1), 5-22.

Gay L.R. & Diehl P.L, (2011, May 31). Research Methods for Business and Management. *Research methods for business and management* (illustrated). Pennsylvania , USA: Macmillan Pub. Co., 1992.

Gerster Consulting. (2008). ICT in Africa: Boosting Economic Growth and Poverty Reduction. *10th Meeting of the Africa Partnership Forum* (pp. 1-31). Toyko: Africa Partnership Forum.

Gohlke JM, Hrynkow SH and Portier CJ. (2008, June 1). Health, economy, and environment: sustainable energy choices for a nation. *Environ Health Perspect. , 116* (6), pp. 116(6):A236-7.

Grainger, R. and Tolhurst, D. (2005). Organisational Factors Affecting Teachers' Use and Perception of Information & Communications Technology. *South East Asian Regional Computer Confederation (SEARCC) , 46*, 1-10.

Groenewald, T. (2004). A Phenomenological Research Design Illustrated. (T. Groenewald, Ed.) *International Journal of Qualitative Methods , 3* (1), 1-26.

Gupta, B. Dasgupt, S. and Gupta, A.. (2008). Adoption of ICT in a government organization in a developing country: An empirical study. *The Journal of Strategic Information Systems , 17* (2), pp. 140–154.

Hanrahan L.P, Foldy S, Barthell E.N, Wood S, Medical informatics in population health: *Building Wisconsin's strategic framework for health information technology*, WMJ 105 (1) (2006) 16–20.

Hadenius, A. & Uggla, F. (2006). Making civil society work, promoting democratic development: What can states and donors do? (A. H. Uggla, Ed.) *World Development , 24* (18), pp. 1621–1639.

Halewood, N. and Kenny, C. (2007). *Young People and ICT's in Developing Countries.* World Bank. Washington DC: World Bank Organisation.

Harris, R. (2004, September 27). Information Technology and Communication for Poverty Alliviation. *ePrimers for the Information Economic, Society and Policy* . Kuala Lumpur, Malaysia: United Nations Development Programme's Asia-Pacific Development Information Programme (UNDP-APDIP.

Hassol, A. Gaumer, G., Grigsby, J., Mintzer, C.L. & Brunswick, M. (2006, June 16). Rural Telemedicine: A National Snapshot. *TELEMEDICINE JOURNAL , 2* (1), pp. 1-6.

Haughney, J. Price, D. Kaplan, A. & Chrystyn, C. (2008, December 1). Achieving asthma control in practice: Understanding the reasons for poor control. (D. P. John Haughney, Ed.) *Respiratory Medicine , 102* (12), pp. 1681–1693.

Haux, R. (2006, March - April). Health information systems – past, present, future . *International Journal of Medical Informatics , 75* (3-4), pp. 268-281.

Health and Development South Africa (Pty) Ltd. (2010). *Progress Report on the Declaration of Commitment on HIV/AIDS.* Research, Monitoring and Evaluation Task Team of the South African National AIDS Council, National Department of Health. Republic of South Africa: UNGASS Guidelines on Construction of Core Indicators for 2010 Reporting.

Hossain, J. (2010, November 3). Role of ICTs in the Health Sector in Developing Countries: A Critical Review of Literature. (J. Hossain, Ed.) *Journal of Health Informatics in Developing Countries* , pp. 197-208.

Housdon, J. (2002, August 8). Nomvuyos-Tours . *Nomvuyos-Tours* . (J. Housdon, Ed.) Cape Town, Western Cape, South Africa: Nomvuyos-Tours .

International Development and Reseach Centre (IDRC). (2005). *Information and Communication Technologies for Rural Development.* An Evaluation of Telecenters in Indonesia, Rural Development and Natural Resources Sector. Jarkata: International Development and Reseach Centre (IDRC) and The World Bank.

Irani, Z., Ezingeard, J.N., Grieve, R.J., & Race, P. (2004). A case study strategy as part of an information systems research methodology: a critique . (J. E. Z. Irani, Ed.) *International Journal of Computer Applications in Technology , 12* (2-5), 190-198.

Jadad A.R. & Enkin M.W, (2006, August 3). The Path towards ehealth: Obstacles along the Way. *IMIA Yearbook of Medical Informatics 2006* , pp. 84-87.

James, J. and Versteeg, M. (2007). Mobile phones in Africa: how much do we really know? (J. J. Versteeg, Ed.) *Social Indicator Research , 84* (1), 117-126.

Joint United Nations Programme on HIV/AIDS (UNAIDS). (2010). *UNAIDS REPORT ON THE GLOBAL AIDS EPIDEMIC.* n/a: WHO Library Cataloguing-in-Publication Data.

Leedy, P.D. and Ormrod, J.E. (2010). *Practical Research: Planning and Design* (9th Edition ed.). New Jersey: Pearson Education Inc, Publishers.

Levy N. C., Miksad, R.A., and Fein, O.T. (2005). From Treatment to Prevention: The Interplay Between HIV/AIDS Treatment Availability and HIV/AIDS Prevention Programming in Khayelitsha, South Africa. (R. A. Nomi C. Levy, Ed.) *Journal of Urban Health: Bulletin of the New York Academy of Medicine , 83* (3), 1-12.

Kalua, F.A., Awotedu, A., Kamwanja, L.A. and J.D.K. Saka. (2009). *Science, Technology and Innovation for Public Health in Africa.* NEPAD Office of Science and Technology, Monograph. Pretoria, Republic of South Africa.: DS Print Media, Johannesburg.

Kanyane, M. (2005). *Conflict of Interest in South Africa: A Comparative Case Study .* Falcuty of Economic and Management Sciences , Public Management and Administration Pretoria: University of Pretoria .

Kaushal, R., Blumenthal, D., Poon, E. G., Jha, A. K., Franz, C., Middleton, B., et al. (2005). The costs of a national health information network. *Annals of Internal Medicine,* 143(3), 165—173

Korpela, M., Mursu, A., Soriyan, H.A., & Olufokunbi, K. (2000). Information systems development in a developing country: Theoretical analysis of special requirements in Nigeria and Africa. In M. Korpela (Ed.), *System Sciences, 2000. Proceedings of the 33rd Annual Hawaii International Conference . 2*, p. 10. Hawaii: IEEE.

Korpela, M., De la Harpe, R. and Luukkonen, I. (2008). Depicting the Landscape around Information Flows: Methodological Propositions. In R. d. Mikko Korpela (Ed.), *Proceedings of SIG GlobDev's First Annual Workshop, Paris, France December 13th 2008* (pp. 1-21). Paris, France: Proceedings of SIG GlobDev's First Annual Workshop.

Kuhn K.A., Giuse D.A., (2009) From hospital information systems to health information systems problems, challenges, perspectives, in: R. Haux, C. Kulikowski (Eds.), *Yearbook of Medical Informatics 2009*, Schattauer, Stuttgart, 2009, pp. 63-76.

Kvedar, J. C. (2008). *Connected health: Using patient-centric technologies to improve quality, access, and efficiency*. Presented at the seminar entitled Patient-Centered Computing and eHealth: State of the field, Boston, MA.

MacGregor, R.C. and Vrazalic, L. (2007). *E-commerce in regional small to medium enterprises* (illustrated ed.). (R. C. Vrazalic, Ed.) London, Hershley, UK: Idea Group Inc (IGI), 2007.
Majija, A. (2009). Assessing the impact of asset-based community development in Philippi. (P. W. Ntonzima, Ed.) *CPUT Theses & Dissertations , 1* (1), 1-127.

Manhart, A., Schmitt, K. Stahl, H., & Grießhammer, R. (2008). *Emerging Economies: New Challenges for International Co-operation and Development.* Institute for Applied Ecology, Öko-Institut e.V. Freiburg, Darmstadt, Berlin: Öko-Institut e.V.

Maverick 358 cc. (2006). *The Population Register Update: Khayelitsha.* Sub-Directorate Population Development in the Research and Population Directorate, Department of Social Services and Poverty Alleviation. Cape Town: Maverick 358 cc.

Maxwell, J. A. (2005). *Qualitative research design: an interactive approach* (2nd ed.). (J. A. Maxwell, Ed.) Cape Town, Western Cape, South Africa: SAGE.

Mengesha, N.T. (2010). Technology Capacity Development through OSS Implementation: The Case of Public Higher Education Institutions in Ethiopia. (N. T. Mengesha, Ed.) *The African Journal of Information Systems , 2* (1), 1-25.

Meschi, E. and Vivarelli, M. (2009). Trade and Income Inequality in Developing Countries. (E. M. Vivarelli, Ed.) *World Development , 37* (2), 287–302.

Middleton, B. (2008). EHRs, PHRs, and HIE: Impact on patient safety, healthcare quality, and costs. *Presented at the seminar entitled Patient-Centered Computing and eHealth: Transforming Healthcare Quality*, Boston, MA.

Mlitwa, N. (2005). e-Learning and learning management systems (LMS) in a changing higher education environment. *Conference: "Transforming IS & CS Education and Research in a Changing Higher Education Environment"* (pp. 1-14). Cape Town: e-Innovation Academy Cape Peninsula University of Technology.

Mohsen, K. and Kenny, C. (2009). *The Next Decade of ICT Development: Access, Applications, and the Forces of Convergence.* World Bank, Communication Technologies Department. Washington D.C.: Creative Commons Attribution NonCommercial-NoDerivativeWorks Unported 3.0 license.

Mori, A. R. (2010, November 20). Co-operative development of the healthcare infostructure for Europe. (K. Dean, Ed.) *Thought Leaders Essays from health innovators* , 90-106.

Mwakaje, A. G. (2010). Information and Communication Technology for Rural Farmers Market Access in Tanzania. *Journal of Information Technology Impact , 10* (2), 111-128.

Myers, M. D. (2009). *Qualitative Research in Business & Management* (1 ed.). London, Carlifonia, New Delhi and Singapore, UK, USA, India and Malayasia: SAGE Publisher Ltd.

Nakano, D. and Pedroso, M.C (2009). Knowledge and information flows in supply chains: A study on pharmaceutical companies. *International Journal of Production Economics , 122* (1), pp. 376–384.

Ndingaye, X. Z. (2009). An Evaluation of the effects of Poverty in Khayelitsha. (S. P. Scher, Ed.) *Abahlali baseMjondolo of the Western Cape , 1* (1), 1-102.

Nebeker, C. (2006, October 4). *SDSU Graduate and Research Affairs* . (C. Nebeker, Editor, & C. Nebeker, Producer) Retrieved January 14, 2007, from Basic Research Concepts : http://ori.hhs.gov/education/products/sdsu/index.html

Nemeth, C., Wears, C.L., Patel, S., Rosen, G. & Cook, R. (2010). Resilience is not control: healthcare, crisis management, and ICT. (R. L. Christopher Nemeth, Ed.) *Cognition, Technology & Work , 13* (3), 189–202.

Nenty, H. J. (2009). Writing a Quantitative Research Thesis. (H. J. Nenty, Ed.) *International Journal Education Science , 1* (1), 19-32.

Nicolay, N. (2008). *Summary of Provincial HIV/AIDS Statistics for South Africa.* Metropolitan. Cape Town: Nathea Nicolay for Metropolitan.

Nielinger, O. (2003, May 20). ICT-utilisation by Non-Governmental Organisations (NGOs) in Tanzania. *Fact Sheet* , 1-16.

Niyato, D., Hossain, E., & Diamond, J. (2007). IEEE 802.16/WiMAX-based broadband wireless access and its application for telemedicine/e-health services. *IEEE 802.16 , 14* (1), 72-83.

O'Donnell, S., Milliken, M., Chong C., & Walmark B., (2010). Information and Communication Technologies (ICT) and Remote and Rural First Nations Communities : An Overview. (pp. 1-15). Montreal, Québec: 2010 Canadian Communication Association Annual Conference (CCA 2010), pp. 1-15, 2010-06-03.

O'Leary, Z. (2004). *The Essential Guide to Doing Research.* (Z. O'Leary, Ed.) Cape Town, Western Cape, South Africa: Sage Publication Ltd.

Osterwalder, A. (2004). Understanding ICT-based business models in developing countries. (A. Osterwalder, Ed.) *International Journal of Information Technology and Management , 3* (2-4), 333-348.

Palank, J. (2006, July 27). Microsoft purchases patient-data tracker. *The Washington Times*, p. C8.

Parliamentary Office of Science and Technology (Postpone). (2006). *ICT in developing Countries.* UK, Parliament, Parliamentary Office of Science and Technology. London, UK: Postpone.

Peffers, K., Tuunanen, T., Rothenberger, M.A & Chatterjee, S. (2008). A Design Science Research Methodology for Information Systems Research. (T. T. Ken Peffers, Ed.) *Journal of Management Information Systems , 24* (3), 45-77.

Pillania, R. K. (2009). Competitiveness and emerging markets. (P. R. K., Ed.) *Business Strategy Series , 10* (2), 90-95.

Poggenpoel H.M. and Myburgh C.P. (2005). Obstacles in Qualitative Research: Possible Solutions. (P. M. H., Ed.) *Guides - Non-Classroom; Journal Articles; Reports - Research , 126* (2), 304-311.

Pope, C. & Mays, N., (2006). Qualitative methods in health research. *Qualitative methods in health research* . (C. P. Mays, Ed.) Cape Town, Western Cape, South Africa.

Provisional Health Department. (2011). *Western Cape Provisional Health Department Report 2010/2011.* Western Cape Government, Health Department. Cape Town: Western Cape Provisional Health Department.

Ramparsad R, (2007). A strategy for teacher involvement in curriculum development. (R.Ramparsad, Ed.) *South African Journal of Education, , 21* (4), 287-292.
Ragab, A. R. (2010). *Country Case Study: Egypt.* Al-Azhar University, Center for Global Development. Cario: Center for Global Development.

Rashe, S. A. (2006, November 30). An evaluation of care and support centres for HIV/AIDS orphans in Khayelitsha. *CPUT Theses & Dissertations* . (S. Pekeur, Ed.) Cape Town, Western Cape, South Africa.

Rehle, T.M., Hallett, T.B., Shisana, O., Pillay-van Wyk, V., Zuma, K., (2010). A Decline in New HIV Infections in South Africa: Estimating HIV Incidence from Three National HIV Surveys in 2002, 2005 and 2008. (E. U. Pieter H. M. van

Baal, Ed.) *PLoS ONE 5(6): e11094.doi:10.1371/journal.pone.0011094* (Received: February 10, 2010; Accepted: May 11, 2010; Published: June 14, 2010).

Remenyi, D., Williams, B., Money, A. & Swart, E. (2003). *Doing research in business and management: an introduction to process and method* (4TH Edition ed.). London, California and New Delhi, UK, USA and India: SAGE Publications Ltd.

Report of the Health ICT Industry Group. (2009). *ICT's Role in Healthcare Transformation.* Irish Computer Society, Health Informatics Society of Ireland. Dublin: Prorec Ireland and the Irish Computer Society.

Rizo, C., Enkini, M. & Jahad, A. (2009). What is ehealth?: a systematic review of published definitions. *World Hospitals and Health Services , 41* (1), pp. 32-39.

Rubin, H.J. and Rubin, S.I. (2007). Qualitative Interviewing: The Art of Hearing Data. *Organizational Research Methods , 10* (1), 184-187.

Sachs, J. D. (2009). *Macroeconomics and Health: Investing in Health for Economic Development.* Harvard University, Center for International Development. Geneva: World Health Organization.

Saff, G. R. (2009). *Changing Cape Town: Urban Dynamics, Policy and Planning During the Political Transition in South Africa.* (G. R. Saff, Ed.) Cape Town, Western Cape, South Africa: University Press of America.

Saunders, M., Lewis, P. and Thornhill, A. (2009). Research methods for business students. *Business & Economics* (5 edition). London, South East of England, UK: Financial Times/ Prentice Hall.

Sekaran, U. (2007). *Applied business research: qualitative and quantitative methods.* (S. Uma, Ed.) Cape Town, Western Ccape, South Africa: Wiley and Sons.

Shamu, S. (2010). Heath Systems, Public Health and Research Capacity Strengthening in South Africa: Ongoing Literature Search and Review. Cape

Town, Western Cape, South Africa: PEPFAR through CDC, CDC-RFA-PS07-719.

Shazia, M. (2006). Factors Affecting Teachers' Use of Information and Communications Technology: a review of the literature. *Journal of the Association of Information Technology in Teacher Education (ITTE) , 9* (3), 1-25.

Sherrer, R. (2004). Microeconomic Loans and Health Education to Families in Improverished Communities: Implications for the HIV Pandemic. *Journal of the International Association of Providers of AIDS Care (JIAPAC) , 3* (4), 1-25.

Shivute, M. I. (2007). The use of information and communication technology for health service delivery in Namibia. *CPUT Theses & Dissertations* . (Professor S.M. Maumbe and Professor. R. Dela Harpe.) Cape Town, Western Cape, South Africa

Shoniregun, C.A., Dube K. & Mtenzi, F. (2010). Introduction to e-Healthcare Information Security. *Electronic Healthcare Information Security , 53* (1), pp. 123-150.

Singer, S.J., Falwell, A., Gaba D.M., Meterko, M. (2009). Identifying organizational cultures that promote patient safety. *Health Care Management Review , 34* (4), pp. 300-311.

Soliman, A. M. (2007). The role of counseling in developing countries . (A. M. Soliman, Ed.) *International Journal for the Advancement of Counselling , 14* (1, 3-14), 1-12.

South African Police Service. (2011). *Crime in Khayelitsha (WC) for April to March 2003/2004 - 2010/2011.* South African Police Service, Crime Research and Statistics. Cape Town: South African Police Service.

Ssewanyana, J. K. (2009). ICT Usage in Microfinance Institutions in Uganda. (J. K. Ssewanyana, Ed.) *The African Journal of Information Systems , 1* (3), 1-24.

Ssewanyana, J. and Busler, M. (2007). Adoption and usage of ICT in developing countries: Case of Ugandan firms. *International Journal of Education and*

Development using Information and Communication Technology (IJEDICT) , 3 (3), 49-59.

Statistics South Africa. (2010). *Mid-year population estimates.* Minister in the Presidency, National Planning Government . Pretoria: South African Government and Statistic South Africa.

Struwig, F.W. and Stead¸ G.B. (2007). *Planning, designing and reporting research* (4th ed.). (A. Nattrass, Ed.) Cape Town, Western Cape, South Africa: Maskew Miller Longman.

Stump, R.L., Gong, W. & Li, Z. (2008). Exploring the Digital Divide in Mobile-phone Adoption Levels across Countries. (W. G. Rodney L. Stump, Ed.) *Journal of Macromarketing December , 28* (4), 397-412 .

Sunter, C. (2008). Business Lights HIV/AIDS after burnes as recession looms. (C. Sunter, Ed.) *SA Medical Journal , 1* (1), 920-924.

Tang, T. T. (2010). *Information, Communication, Technology: Market Opportunities in China.* Gartner, Gartner Client Department. Shangai: Gartner.

Tang, C & Carpendale, S. (2009). *Support Nurses' Information Flow by Integrating Paper and Digital Charting.* Proceedings of the 11th European Conference on Computer Supported Cooperative Work. Viena: Austria.

The Goldman Sachs Group, Inc. (2009). *Annual Report on form 10-K for the Fiscal Year ending December 31, 2009.* Securities and Exchange Commission United States , State jurisdiction of incorporation organization. New York, N.Y.: The Goldman Sachs Group, Inc.

United Nations. (2005). *The Millennium Development Goals Report 2005.* United Nations. New York: United Nations.

Vosloo, S. (2008). E-Government and the E-Readiness of Non-Profit. *Provincial Government of the Western Cape, South Africa. ,* 5-7.

Wallace, C. (2010). *An Investigation of Factors Affecting the use of ICT for Teaching in the Western Cape Schools.* University of Cape Town, Department of Information Systems. Cape Town: European Conference on Information Systems.

Ward, R. and Moule, P. (2007). Supporting pre-registration students in practice: A review of current ICT use. (R. W. Moule, Ed.) *Nurse Education Today , 27* (1), pp. 60-67.

Watkins, P. D. (2008). These/Dissertation/Research Reports: A practical guide for students for the preparation of written presentations of academics research (6 ed., Vol. 1). (A. Watkins, Ed.) Cape Town, Western Cape, South Africa: Andre Watkins.

Weber, A. S. (2011, April 15). The role of education in knowledge economies in developing countries. *Procedia - Social and Behavioral Sciences , 15*, pp. 2589–2594.

Welman, C., Kruger, F. & Mitchell, B. (2005). *Research methodology* (3rd ed.). (F. K. Chris Welman, Ed.) Pretoria, Gauteng, South Africa: Juta Oxford University Press, 2005.

World Health Organisation (WHO). (2011). Building healthy and equitable workplaces for women and men: a resource for employers and worker representatives. *Protecting workers' health series, 11* , 4-29.

World Health Organisation (WHO). (2008). *Report on Global HIV/Aids Epidemic.* Joint United Nations Programme on HIV/AIDS. UNAIDS Head Quarters: UNAIDS.

Yao, X. & Liu, J. (2011). The potential of economic growth and technology advancement in the BRICs. In X.-N. Y.-Y. Liu (Ed.), *Proceedings of the 2011 International*
Conference on Machine Learning and Cybernetics, Guilin, 10-13 July, 2011 (pp. 1067 - 1071). Guilin: ©2011 IEEE.

Yao, X., Watanabe, C. & Li, Y. (2009, February 6). Institutional structure of sustainable development in BRICs: Focusing on ICT utilization. (C. W. Xuening Yao, Ed.) *Technology in Society , 31* (1), pp. 9-28.

Yácubsohn, V. (2008, April 4). Hospitals without boundaries: HIS and primary healthcare in developing countries. (V. Yácubsohn, Ed.) *International Journal of Bio-Medical Computing , 39* (1), pp. 169–173.

Yin, R. K. (2003). *Case Study Research: Design and Methods* (Vol. 5). (S. R. Karen Wiley (Editorial), Ed.) London, Carlifonia and New Delhi, UK, USA and India: SAGE Publication Ltd.

Zainal, Z. (2007, June 9). Case study as a research method. (Z. Zaidah, Ed.) *Jurnal Kemanusiaan bil.9* , 1-6.

Zuma, J. G. (2011). State of the Nation Address By His Excellency Jacob G Zuma, President of the Republic of South Africa, at the Joint Sitting Of Parliament. Republic of South Africa, Parliament, Republic of South Africa, Government. Cape Town: Multimedia.

APPENDINCES

APPENDIX 1

Healthcare Provider Questionnaire

Section 1: Personal Particular

NAME OF HEALTH:	
Type of Healthcare centre:	
Name of Person interviewed:	
Title of individual interviewed:	
Department:	
Date of Interview	

Key Definitions:

> ***Information and Communication Technology (ICT)*:**"A set of activities that facilitate or make it easy to capture, store, process, transmit and display information using electronic means, this includes computers, software, telephones, fax, Internet, email, mobile phones etc.

> **Healthcare providers (HP)**: services provided to patients e.g. diagnosis, treatment. Healthcare provider's services also involve Communication with patients in different ways e.g. using mobile phone to make appointments.

Section 2: Current ICT use in the health facility

Q1. When was this facility established?

(Please tick one box)

☐ Less than 5 years

☐ 6-10

☐ 11-15

☐ 16 and more

☐ Not sure

Q2. Do you currently utilise any ICT at your healthcare centre?

(Please tick one box)

☐ Yes

☐ No

☐ Not sure

Q3. Does your healthcare centre have an Information Technology section/unit?

☐ Yes

☐ No

☐ Not sure

Please answer **Q4** and **Q5** by ticking in the shaded areas.

	Q4: Which if any of these have you heard of?	**Q5**: Which ICT equipment do you use at your healthcare centre
Fax Machine		
Papers (Folder)		
Computer		
Scanner		
Printer		
Projector		
Email		
Social Network (Facebook, Mxit, Twitter, BBM, SMS etc)		
Telephone		
Cell phone/Mobile		
Television		
Radio		
CD/DVD		
Community Newspapers/		
Bill-boards		
Pagers		
None		
Other (*please*		

	specify) e.g. Blood pressure		

Note: if you answered 'None' to **Q4** please got to Section B.

Q6. When were the technologies introduced at your institution? [Please tick one for each option]

	<1year ago = 1	1-3 years ago= 2	4-6 years= 3	7-9 years ago= 4	>10 years ago= 5	Do not know= 6
Fax Machine						
Papers (Folder)						
Computer						
Scanner						
Printer						
Projector						
Email						
Social Network (Facebook, Mxit, Twitter, BBM, SMS etc)						
Telephone						
Cell phone/Mobile						
Television						
Radio						
CD/DVD						
Community Newspapers/ Bill-boards						
Pagers						
None						
Other (*please specify*) e.g. Blood pressure						

Q7. What are the main purposes of ICT utilisation in healthcare centre? (*Please state your purpose of ICT utilisation for the functional areas*)

ICT	Admission	Consulting/ Clinic Support	Maternity	Family Planning	Emergency	Referral Service	Other areas (please specify
Fax Machine							
Papers (Folder)							
Computer							
Scanner							
Printer							
Projector							
Email							
Social Network (Facebook, Mxit, Twitter, BBM, SMS etc)							
Telephone							
Cell phone/Mobile							
Television							
Radio							
CD/DVD							
Community Newspapers/							
Bill-boards							
Pagers							
None							
Other (*please*							

specify) e.g. Blood pressure						

Q8. For what purposes are you using the computer for? (*Please tick all the purposes you use a computer for*).

Text processing	
Make reports	
Analyse data	
Make Graphs	
Data entry	
Financial programmes	
Other specific:	

Q9. Are there any computer literacy programmes or other programmers to help staff in ICT use?

☐ Yes

☐ No

☐ Not sure

Q10. In which areas of your healthcare centre is it important to use Information and communication technology (ICT)? (*Please Rank in order of importance areas that require ICT most*)

	Strongly Agree= 1	Agree=2	Neutral=3	Disagree=4	Strongly disagree
Clinical support services					
Diagnosis/Nursing					

services					
Medical services					
Emergency services					
Hospital administration					
Research support					
Knowledge management					
Referral service unit					
Other (please specify)					

Section 3: Collaborations with other healthcare centres around and outside Khayelitsha e.g. referrals.

Q11. What are there other main means of communication with other healthcare centres? (*Please tick means of communication with other healthcare centres*).

ICT	Healthcare Centre	Patients	Employees
Telephone			
Mobile			
Email			
Fax Machine			
VOIP			
Courier			
Postal services			
Internet (social network)			

Key Note: **VOIP =** Voice over internet protocol

Q12. How does this healthcare centre send reports to the other healthcare centres such as (Provincial Hospitals and District Clinics) around and outside of Khayelitsha? (*Please tick all the purposes you use a computer for*).

Email	
Telephone	
Courier	
Postal services	
Fax Machine	
Sending delivery employee person	
Other specific (*please specify*):	

Section 4: Factors that influence the use of ICT in Healthcare centres

Q13. What are some the ICT related constraints this healthcare centre face providing healthcare services to HIV/AIDS patients? (*Please tick all possible options*).

Budget Constrains	
Low ICT skill internally	
Low Priority of ICT Investment	
Political interference	
Load shading of Electricity	
Poor service provide	
Shortage of I.T. employees (skill)	
Lack of technical support	
Other specific (*please specify*):	

Q14. How important do you thing the following key issue need attention in enhancing ICT utilisation in your healthcare centre? (*Please rank in order of important).*

	Strongly Agree= 1	Agree=2	Neutral=3	Disagree=4	Strongly disagree
Make ICT easier to utilised					
Free\cheaper machines\lesson					
To make ICT more widely available					
Utilising ICT improving Healthcare centres					
Enhancing flow of Information utilising ICT					

Q15. How important do you think it is utilising ICT for healthcare centre service delivery? (*Please tick in the box).*

Strongly agree	
Agree	
Neutral	
Disagree	
Strongly Disagree	
Not sure/Do not know	

Q16. If any, what are the government regulations that restrict the utilisation of ICT in your healthcare centre? (*Please list all the possible options).*

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Section 5: Future investment in ICT

Q17. Approximately how much has your healthcare centre spent on ICT equipments, support and services delivery in last 12 months? (*Please tick one box*).

☐ R0 – R1000

☐ R1001 – R5000

☐ R5001 – R10000

☐ R10001 – R15000

☐ R15001 – R20000+ (and More)

☐ Not disclosed

☐ Don't not know

Q18. What does the healthcare centre consider on utilising ICT in the future? (*Please list them*).

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Q19. Considering the benefits of your healthcare centre investment in ICT, to what extent do you agree with the following?

	1=Strongly agree	2=Agree	3=Neutral	4= Disagree	5= Strongly Disagree	6= Not sure/Do not know
ICT is helping us access healthcare information						
ICT is helping us in interacting with healthcare service providers (e.g. hospitals, nurses, doctors)						
ICT provider ways to improve						
More training in ICT utilisation in healthcare centres is needed						

Cost of ICT service is a major hindrance to the use for healthcare services in Khayelitsha						
Privacy is of importance when it comes to personal healthcare information						
Government must do more to provide ICT for Healthcare centres to enhanced service delivery to patients						

Q20. As a healthcare provider (HP) which ICT would you recommend to the Ministry of Health to add to the existing healthcare services to facilitate ICT utilisation for healthcare service delivery in healthcare centres? (*Please comment*).

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Thanks for your assistances!!!

Patient's Questionnaire

Key Definitions:

> ***Information and Communication Technology (ICT)***:"A set of activities that facilitate or make it easy to capture, store, process, transmit and display

information using electronic means, this includes computers, software, telephones, fax, Internet, email, mobile phones etc.

Healthcare providers (HP): services provided to patients e.g. diagnosis, treatment. Healthcare provider's services also involve Communication with patients in different ways e.g. using mobile phone to make appointments.

Section 1: Screen of respondents

Q1. Have you visited a health facility in past three months? (*Please tick your answer*)

☐ Yes

☐ No

Q2. Where do you normally receive your healthcare services? (*Please tick one box*)

☐ Clinics

☐ Hospitals

☐ Community Healthcare Clinics

☐ Mission Healthcare Centres

☐ Surgery

☐ Sangoma or Witch-doctors

☐ Others (*Please specify*)…………………………………………………………………………..

Q3. Which if any of these have you heard of? (*Please tick all the options if possible*).

Fax Machine	
Papers (Folder)	
Computer	
Scanner	
Printer	
Projector	
Email	
Social Network (Facebook, Mxit, Twitter, BBM, SMS etc)	
Telephone	
Cell phone/Mobile	
Television	
Radio	
CD/DVD	
Community Newspapers/	
Bill-boards	
Pagers	
None	
Other (*please specify*) e.g. Blood pressure	

Note: if you answered '***None***' to **Q4** please go to Section 3.

Q4, Q5, Q6. (Please tick your response and leave the spaces blank for those that do not apply to you).

	Q4. Which if any of the following have you utilised before?	**Q5**. Which if any of the following are currently utilising?	**Q6**. Which if any of the following you have at home?
Fax Machine			
Papers (Folder)			
Computer			
Scanner			
Printer			
Projector			
Email			
Social Network (Facebook, Mxit, Twitter, BBM, SMS etc)			
Telephone			
Cell phone/Mobile			
Television			
Radio			
CD/DVD			
Community Newspapers/			
Bill-boards			
Pagers			
None			
Other (*please specify*) e.g. Blood pressure			

Note: if you answered '*None*' to **Q4, Q5** and **Q6.** Please go to Section 3.

Q7. Please indicate what purposes you utilise the ICT for in the following table.
(*Please tick in the shaded boxes for purpose of utilise for each ICT*).

Purpose	Computer/PC	Mobile/Cellphone	Emails	Internet/Web	Television (TV)	Fax	Telephone	Printer or Scanner	CD/DVD
Work-related									
Personal e.g. Leisure									
Healthcare services									
Education									
Other purposes (*please specify*)									

Section 2: Factors influence ICT usage

Q8. What is your main source of healthcare services information? (*Please tick only one for your answer*)

☐ Internet

☐ Community Newspapers

☐ Television

☐ Radio

☐ Billboards

☐ Community healthcare worker

☐ Newspapers

☐ Social network

☐ Mobile (SMS)

☐ Others (*please specify*)

Q9. Are you able to utilise and operate the following ICT? (*Please tick 1or 2 on shaded boxes*).

ICT equipment	1=Yes or 2=No
Fax Machine	
Papers (Folder)	
Computer	
Scanner	
Printer	
Projector	
Email	
Social Network (Facebook, Mxit, Twitter, BBM, SMS etc)	

Telephone	
Cell phone/Mobile	
Television	
Radio	
CD/DVD	
Community Newspapers/	
Bill-boards	
Pagers	
None	
Other (*please specify*) e.g. Blood pressure	

Note: if you answered '*YES*' to all the questions in **Q9.** (*Please continue with Q11*).

Q10. For those ICT you cannot utilise/operate state the main reasons why you are not using the following.

ICT Equipment	Reason why you cannot use/operate
Fax Machine	
Papers (Folder)	
Computer	
Scanner	
Printer	
Projector	
Email	
Social Network (Facebook, Mxit, Twitter, BBM, SMS etc)	
Telephone	
Cell phone/Mobile	

Television	198
Radio	
CD/DVD	
Community Newspapers/	
Bill-boards	
Pagers	
None	
Other (*please specify*) e.g. Blood pressure	

Q11. Do you wish to develop your skills in using ICT? (*Please tick only one for your answer*).

ICT Equipment	1=Yes or 2=No	3=Do not know
Fax Machine		
Papers (Folder)		
Computer		
Scanner		
Printer		
Projector		
Email		
Social Network (Facebook, Mxit, Twitter, BBM, SMS etc)		
Telephone		
Cell phone/Mobile		
Television		
Radio		
CD/DVD		

Community Newspapers/		
Bill-boards		
Pagers		
None		
Other (*please specify*) e.g. Blood pressure		

Q12. Are you willing to share the following ICT related contact details with your healthcare service providers with the trust or for purposes of improving healthcare services?

(*Please tick either **Yes** or **No** for your choice*) If your answer is **No** please give your reason in the next column.

ICT Equipment	1=Yes or 2=No	Reason: 1=Personal, 2=Security, 3=Not necessary, 4=Privacy 5=Other (please specify)
Fax Machine		
Papers (Folder)		
Computer		
Scanner		
Printer		
Projector		
Email		
Social Network (Facebook, Mxit, Twitter, BBM, SMS etc)		
Telephone		
Cell phone/Mobile		
Television		
Radio		
CD/DVD		

Community Newspapers/		
Bill-boards		
Pagers		
None		
Other (*please specify*) e.g. Blood pressure		

Q13. To what extent do you agree with the following? (*Please tick your choice*).

	1=Strongly agree	2=Agree	3=Neither agree or disagree	4= Disagree	5= Strongly Disagree	6= Do not know
ICT is helping us access new healthcare information.						
ICT is helping us in interacting with healthcare service providers (e.g. hospitals, nurses, doctors).						
ICT provider ways to improve healthcare services.						
More training in ICT utilisation in healthcare centres is needed.						
Cost of ICT service is a major hindrance to the use for healthcare services in Khayelitsha.						

Privacy is of importance when it comes to personal healthcare information.					
I am willing to share my contact details with Healthcare centres for purpose of improving healthcare service delivery.					
I wish to develop my skills in utilising ICT.					
Government must do more to provide ICT for healthcare service delivery.					
Standard for healthcare should be improved utilising ICT.					

Note: Please answer '*Q14*' only if you are a patient in the public/government healthcare facility.

Q14. In your opinion what would you like the Minister of Health to add to the existing healthcare centres services to facilitate ICT utilisation in healthcare centres in Khayelitsha or nationally. (*Please comment freely, list down your opinion*).

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Note: Please answer '*Q15*' only if you are a patient in the private healthcare facility.

Q15. In your opinion what would you like the private healthcare facility (clinics, CHCs, hospitals) to add to the existing healthcare centres services to facilitate ICT utilisation in healthcare centres in Khayelitsha or nationally. (*Please comment freely, list down your opinion*).

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Section 3: Patient Demographics

To finish off, could please tell me a little bit about you?

Q16. What age group you are or fall under? (*Please tick only one for your answer*)

☐ Under 21

☐ 21-30

☐ 31-40

☐ 41-50

☐ 51-60

☐ 61-65

Q17. Which Gender are you? (Please tick only one for your answer)

1 = Male	2 = Female

Q18. Please indicate your highest level of education (*Please tick only one for your answer*).

1=Primary school grade [1-7]	
2=High school [8-12]	
3=Tertiary College	
4=University	
5=Other (Please specify)	

Q19. Which of the following race describe you best? (*Please tick only one for your answer*)

☐ African

☐ Coloured

☐ Indian

☐ White

☐ Foreign (Please specify...

☐ Chinese

Q20. Please identify an income range that best describe yourself/household? (*Please tick only one for your answer*).

☐ Less than R1500

☐ R1501 – R2500

☐ R2501 – R3500

☐ R3501 – R5000

☐ R5001 – R6500

☐ R6501 – R8000

☐ R8001 – R10 000

☐ R10 000+ and above

Thanks for your cooperation so much!!!

Everything come from Him, Everything happens through Him, Everything end up in Him. To Him be all Glory and Praise forever. Amen!!!
(Roman 11:36)