An Assessment into The Use of ICT in Managing Health Information. A Case Study of Selected Health Facilities in Lusaka District

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Abstract—

In this digital age, information and communication technologies (ICTs) are considered to be the 'catalysts to development'. Many studies demonstrate that information systems (IS) can make significant contribution to the health sector particularly in the primary health care (PHC) in developing countries. The report was an interrogation into the use of ICT in managing health information. The study was a case study of some selected health facilities in Lusaka district. The statement of the problem was that It is generally assumed that integration of ICTs in any sector has resulted in improvements, however there is little research or available knowledge on the actual effects of the integration of ICTs in Managing patient information. It is against this background that the study seeks to investigate the effects of ICT in managing patient information at some selected hospitals in Lusaka district. The research proposed to adopt a qualitative case study design and at the same time it will borrowed from qualitative paradigm in data collection and analysis. The target population for the research was some selected hospitals in Lusaka district. The study took the sample size of 100. Data was collected through a paper-based questionnaire.

The study showed that there has been an effect of ICTs on the accessibility of medical information by medical personnel, and data management personnel in Zambia. It was revealed that ICTs are utilized in accessing medical information by medical personnel and that medical information is more accessible by medical personnel with the introduction of ICTs. On further analysis of the research findings, the study revealed an above average satisfaction level of medical personnel in the health facilities with their use of ICTs in accessing medical information. Additionally, the study has revealed that the introduction of ICTs has made medical information more accessible because they have accorded medical personnel and data management personnel with more sources from which information can be accessed from in an effective, efficient and timely manner.

Keys words: ICT, health information, health facilities

CHAPTER ONE: **INTRODUCTION**

1.0 Chapter overview

This chapter constitutes the background of the study, statement of the problem, purpose of the study, research objectives, research questions, research variables, definition of concepts, theoretical framework

1.1 Background of the study

Information and communication technologies (ICTs) have great potential to improve health in both developed and developing countries by enhancing access to health information and making health services more efficient; they can also contribute to improving the quality of services and reducing their cost. Patient information systems, for example, have the ability to track individual health problems and treatment over time, giving insight into optimal diagnosis and treatment of the individual as well as improving the delivery of services. The key to effective patient information systems is to retain the link between the individual and the data collected over time and to make those data available to multiple health care providers when needed. Following this 'data trail' that charts the health of an individual is both valuable and important: these data can be aggregated to provide data trails for communities, regions, and countries, upon which public health policy is shaped. (WHO, 2011).

Most health systems collect at least some individual patient data during clinical face-to-face encounters. Keeping these data personalized rather than anonymous is facilitated by using electronic systems which can more easily store, access, analyse, and share data. While the conventional way to collect such data are on paper forms and register books, increasingly, face-to-face encounters are being captured electronically. This trend will continue as improvements are made in computer hardware, software, and telecommunication infrastructure and as countries develop the skills necessary to implement electronic data storage and transmission systems. (Audet A. M, 2012)

However, the largest impact of ICTs has occurred in the already industrialized societies as the use of these technologies is limited to the high-income countries, and the élite in low-income countries. The exclusion of a major number of potential users in developing countries has raised concerns about a "digital divide" which is the gap between people with effective access to digital and information technology and those with very limited or no access at all (DFID, 2011, p. 26). In an attempt to shrink this gap, donors such as the UN, the World Bank, bilateral aid agencies, non-government organizations (NGOs) and universities alike are working diligently together with national governments in developing countries to incorporate and mainstream the use of ICTs in their development strategies.

Despite the digital divide, Information and communication technologies (ICTs) in developing countries have been harnessed to bring an information age in which economic and social activity has been widened, deepened and transformed. The more optimistic projections suggest that a computerized and networked world would not only ensure a more widespread and rapid growth of employment, productivity and output, but would also improve access to facilities that enhance the quality of life (Vatsa, 2010).

Furthermore, ICTs are tools used in the social system (Walsham, 1993, Kling, 1987 and Land, 1992). This implies that ICTs cannot be understood independently of the people around it, their social relationships, and the work practices that they are engaged in within everyday life. Therefore, this is an inherent process in social systems through a structuration perspective (Giddens, 2009. Structuration implies an interaction of human

action and structures and in our case mediated theory of ICTs. This reflects a dynamic process of production and reproduction of human action over time. People's behavior is influenced by the social context but this social context is also being re-produced by human agency. Social structures thus do not exist independent of human action. A central aspect of the structuration process is communication among people, processes and systems. Communication is a carrier of norms and meanings, which through their use in everyday action, help to reinforce and change social structure.

However, effective communication and interaction are outcomes of a complex process that is influenced by the personal and situational characteristics of the context and participants. Human behavior always is attached to actions individuals perform (Walsham et al, 2017).

The Government of the Republic of Zambia aims to deliver the highest quality of healthcare services to its citizenship. To this effect, it has embraced the use of Information and Communication Technology (ICT) in its service delivery channels. Information and Communication Technologies have, over the past few years, significantly impacted many aspects of society and has the potential to impact positively on the delivery of health care services. The development of the national e-health strategy comes at critical moment when the ability of ICTs to support and transform health care has been recognised. In Zambia, e-health plays a central role in facilitating the harmonisation of the previously fragmented and disjointed systems and approaches in implementation and maintenance of Health initiatives.

Equally, it is anticipated that once this e-Health strategy is implemented, it would enhance sustainability of ICT projects and would be factored in the implementation of health initiatives

thereby reducing donor dependency in ICTs. In addition, it would also assist in developing the much-needed human resource capacity as well as utilise the available staff prudently through the use of ICTs.

At the national level, the importance of ICT in national development is demonstrated by the launch of the National ICT Policy in 2007 and the inclusion of ICT as a priority sector in the Fifth National Development Plan 2006-2010. A challenge has now arisen for the country to implement the e-health strategy and therefore all stakeholders are called upon to rise to the challenge. The need for the government to develop its e-health strategy that will guide the health sector and regulate the use of its ICT resources could not be over emphasized. This e-health strategy therefore will give well defined guidelines in the manner in which all issues relating to ICT will be managed.

It is my considered view that, with appropriate levels of commitment and support from the Government, Cooperating Partners (CPs), health workers and other key stakeholders, this strategy would significantly improve the management of the public health sector and lead to improvement of the health status of Zambians and significantly contribute to national development. I therefore, urge all stakeholders involved in the implementation of this e-health strategy to fully educate themselves to this important document. The Ministry is committed to ensuring the successful implementation of it.

Surman and Bath (2013) in their study on assessment of the quality of information on stroke and speech and language difficulty Websites observed that the information needs of Patients, Carers and Families (PCF) experiencing speech and language difficulties (SLD) are substantial and change with time, according to time and period following the stroke. This study has been included

as part of the analysis as women tend to be the majority of patients, carers and concerned family members when it comes to any health problem including stroke and speech and language difficulty. In this study, Surman and Bath contend that information on this particular health condition can improve knowledge of the condition, increase levels of life satisfaction and reduce patient depression. They add that it can also improve patient's recovery process and outcome, uncertainty and anxiety levels among carers are reduced as well. Surman and Bath recognize that clinical information forms a large area of information need among PCF who have experienced a stroke. This information helps them to know about the stroke itself, the causes and risk factors, the risks and prevention of stroke occurrence as well as the consequences of the stroke on the body such as the visual field and bladder function, and the management of such effects. The consequences may be emotional and behavioural, for instance, depression or memory loss.

The second type of information according to Surma and Bath is information on medications and treatment including details on the rehabilitation process. In addition, an indication on the diagnosis is often required to gauge potential recovery. Practical information is another health information identified by Surman and Bath. This information may include details on the health care services available. Patients need to know the medical professionals they should approach for help. Coping mechanisms form another area of practical information need especially for returning home, and for care that is available. This may include assistive devices and aids around the house to help with walking, balance, etc. PCF wish to know about leisure activities and exercise following a stroke, including sexual activity. PCF may also need to access information on local community and support groups and clubs, which can provide

psycho-emotional support for people. Information is also needed on the experience of others, which offers the re-assurance that they are not alone Patients may need information on advice and support for their partner and carer. Financial information, including available benefits, help with tax and legal matters, may also be needed. Patients may also wish to return to work, and may need to know about driving. Carers have concerns about the impact of the stroke on their own lives, such as their relationship with the stroke survivor. Surman and Bath conclude by stating that the most important information need for all is that information is accurate, up-to-date and accessible.

1.2 Statement of the problem
It is against this background that the study seeks to investigate the effects of ICT in managing patient information at some selected hospitals in Lusaka district.

1.3 Purpose of the study
The study aims at investigating the effects of ICT in managing patient information at some selected hospitals in Lusaka District.

1.4 General Objective
To assess the effects of ICTs in managing patient information in some selected hospitals in Lusaka district.

1.4.1 Specific objectives
1. To examine if hospitals in Lusaka utilized ICTs in managing patient information.
2. To investigate the extent to which ICTs were utilized in managing patient information in some selected hospitals in Lusaka district
3. To assess if patient information is was accessible by data management team with the introduction of ICTs.
4. To analyze the satisfaction levels of the data management team in some selected hospitals with their use of ICT.

1.4.2 Research Questions

1. Did hospitals in Lusaka utilize ICTs in managing patient information?
2. To what extent were ICTs utilized in managing patient information in some selected hospitals in Lusaka district?
3. Was patient information more accessible by data management team with the introduction of ICT?
4. What were the satisfaction levels of the data management team with the use of ICT in some selected hospital?

1.4.3 Research variables
Dependent variable

- Use of ICT in managing patient information; in this study it was measured as whether a health facility has the ICT facility that can be used in the management of patient information or not.

Independent variables

- ICT utilization in managing patient information; is measured as whether the ICT facilities are being utilized in the management of patient information.
- Extent of ICT utilization in managing patient information: is measured in terms of when and where ICT utilized in managing the patient information.
- Satisfaction levels by data management with the use of ICT; measured by the attitudes (whether positive or negative) of the data management team.
- Accessibility of patient information; measured by whether the patient information is more accessible with the use of ICT compared to the paper based.

1.5 Significance of the Study

The innovation of ICTs has resulted in changes in all aspects of human activities and processes. These changes have widely been positive but have presented various challenges in the best ways of harnessing ICTs for optimum improvement in all sectors. However, for optimum implementation and use of ICTs it is necessary to assess the effects of ICTs in each individual sector. It is hoped that the study would bring out the effects that ICTs have had on accessing patient information and reveal the ICTs that are most used. Having knowledge of effects of ICTs and the ICTs most used by medical personnel in accessing patient information will thereby provide direction for ICT policy and implementation. The findings would also add to the already existing body of knowledge for harnessing ICTs.

1.6 Definitions of Concepts
Information

Information as a concept has a diversity of meanings, from everyday usage to technical settings. Information is a basic element in any development activity. Therefore, information must be available and accessible to all, be it scientific, economic, social, political, institutional and cultural. (Mundy and Sultan, 2001).

Information Communication Technologies (ICTS)

ICTs are tools that facilitate the production, processing, transmission and storage of information (Grace et al, 2004). ICTs include telecommunications technologies such as telephone, cable, satellite and radio, as well as digital technologies, such as computers, information networks and software. Henceforth (ICT) is the convergence of computing, Information and communications technology. ICT makes it possible for the rapid and global trade of information to take place. It brings about the capacity to transform work processes, service and delivery.

Different ICTs include: Databases and Networking, Electronic Mail, The Internet, Mobile Telephone, Radio, Telephone (land line), Satellite Transmissions (for TV, Data, etc.). These ICTs can be utilized through different means including: E-mail; websites; CD-ROM, Information provision, databases, documentation and library access, List-serves & online discussions, Web-based discussion groups, workshops & symposia, Networking, Information sources, question and answer sites (e-mail or web) and chat rooms for personal support /information, Online publications, Distance education, Videoconferencing, Involvement with community organizations.

Information Access

Information access is an area of informatics in library and science which concerns ensuring free and open access to information. Information access covers many issues such as copyright, open source, privacy and security. Mundy and Sultan, 2001argue that information is useful only if it is available and users/prospective users have access to it in the appropriate form and language.

Information Provision

Information provision is based on the principles of information science, which are providing accurate and reliable information equally to all members of the society. Information provision is governed by the standards of quality, confidentiality and equity (Smith, 2003). Therefore, information provision is contingent on the extent to which potential adopters can access information from previous adopters and past experience at their local subunit.

Broadcasting A term referring to the distribution of information using radio, television, internet intranets, and other technologies used in mass communication.

Convergence The culmination of traditional services in telecommunications, online media, broadcasting and information technology into platforms and services making the ICT sector

Digital Divide A term used to reflect the technological gap between people that have fully exploited ICT and those that have not. The digital divide is often associated with the resulting development gap in terms of social and economic performance.

E-Commerce Refers to business activities involving consumers, manufacturers, suppliers, service providers and intermediaries using computer networks such as the Internet to conduct business.

E-Government Refers to the delivery by Government of products, services, policies and the engagement of stakeholders in civic and government matters through the use of Information and Communication Technologies in order to achieve Government to Consumers, Government to Business and Government to Government interaction and transactions.

Information Based Economy Refers to a country or region where ICT is used effectively to develop the economic foundation and market transactions.

Information Society Refers to a country or region where information and communication technology has been fully exploited and is part of everyday life as an enabler of socio-economic development.

Information and Communication Technology A generic term used to express the convergence of telecommunications, information, broadcasting and communications.

Internet A seamless and global network of individual, organizational and national computer systems providing services such as internet browsing to users across the globe 24 hours a day

1.7 THEORETICAL FRAMEWORK

This theoretical framework is based upon Castells' concepts of inclusion and exclusion which emphasizes an understanding of this dilemma of social systems seeing, excluded from broader network memberships (Castells, 1999). One of the primary objectives of the Ministry of Health is to interconnect the various health institutions in order to get the "real" status of the health situation of the country.

The information accessibility factor becomes central to the process and activities of health information. It is further recognized that information access given global and technological trends has its main foundation on ICTs. The basis of this theoretical framework is to regard ICTs as tools that facilitate the production, processing, transmission and storage of information (Grace et al, 2004). Consequently, ICTs are treated as modern tools that facilitate 'accessibility of information'. The implication is that ICTs will be assessed in relation to the role or extent to which they can play as aids or tools to accessibility of information.

Traditionally, access to ICTs and information has not been viewed as a basic need. However, if needs are interpreted as being dynamic and changing over time and through culture (Max-Neef, 1986), access to information and knowledge could be regarded as a basic need nowadays. Information and knowledge have become increasingly important in the contemporary globalized economy, as advancement in ICTs has enabled larger amounts of information to circulate at a much higher speed and at lower costs. This is partly because the balance between knowledge and natural resources, with regard to being the most important factor in determining the standard of living in a country, is said to have shifted in favour of knowledge. This has led many authors to claim that we now live in an information society or a knowledge-based economy (Drucker, 1993). Nowadays, it is a country's ability to assimilate, use and diffuse knowledge that will essentially determine its chances of succeeding in the new economy. The knowledge economy is defined as an economy where "the exploitation of knowledge has come to play the predominant part in the creation of wealth" (DTI, 1998).

In recent years, African countries such as Mozambique have been introducing various ICTs in different sectors. The diffusion of these technologies which to some extent shaped processes of globalization, are not monolithic and homogeneous (Walsham, 2000). Impacts of globalization vary with history, geography, infrastructure and culture.

Policy makers, taking advantage of phenomenon of globalization, have developed various projects to introduce ICTs in the country. For example: the reduced taxes on the importation of computers and other electronic ICTs and accessories, the usage of ICTs in telecommunication, and large ICTs based initiatives in the health sector such as the Health Management Information System (HIMS). While it is still relatively early to conclusively comment on the impacts of ICTs on development processes, on-going micro-level studies of new initiatives allow for the evaluation and design of strategies to help better exploit the opportunities that these new technologies provide in different sectors particularly in health. ICTs require "communication infrastructure" to operate successfully. Moreover, the infrastructure refers not only to the hardware or software but to the practices, procedures and routines which make the infrastructure work. Drawing from this, we use the term "communication infrastructure" to describe the infrastructure required to support the operations and use of ICTs Infrastructure (Monteiro and Hanseth, 1995) is viewed as part of the means of communication between all parts of the HIS [Health Information Systems]. Lack of communication infrastructures present a serious

obstacle to the flow of information in the health sector. Moreover, poor infrastructure leads to poor coordination and information sharing between sectors like health, education and contributes to an absence of coherent socio-economic development initiatives with benefits to the people. Braa et al, (2000) states that implementation of infrastructure of communication is a key to support development and to make planning effective.

CHAPTER TWO: LITERATURE REVIEW

2.1 Chapter overview

The preceding chapter presented chapter one. This chapter present the literature review. The chapter will be presented in the following order ICT and Health, ICT and improving poor people's lives, and ICT Health.

[1] 2.2 ICTs and Health

At the most specific or micro level, according to Marton (2010), health information needs could be classified by health topic, as is commonly done in the largely a theoretical field of consumer health information studies. According to Marton, even reports on the use of consumer health information centres (CHIC) classify health information needs according to health topic. And one of the findings in this study is that health information needs of women have been investigated in relation to the health topic. Marton (2010) studied how women seek health information on the Web in Canada. Marton's study looked at women's health information needs from the broader point of view. It was found out in Marton's study however, that depression, cancer, arthritis, respiratory tract infection and cancer were the frequently cited areas of information need for participants. Marton also notes from other studies that women also need information on lifestyle factors, such as diet, nutrition, and exercise as well as specific symptoms, drugs or medications and alternative therapies.

Many other research studies covering specific health conditions have been conducted in various parts of the world. Those that looked at the information needs of women pertaining to maternal (e.g. pregnancy) include studies by Das and Sarkar (2014), Larsson, (2009) and Gao, Larsson and Luo (2013). The results of these studies demonstrates that women require information on nutrition for safe delivery and child health as well as during postpartum period, pregnancy complications, sexual and family relations, fetal development, childbirth (e.g. mode of delivery, stages of childbirth, pain and pain relief, stories about giving birth, hospital choices), the expected child (e.g. products for mother and baby, breast feeding), chat forum; and parental benefit, antenatal care, exercises during pregnancy, infant care and infant feeding, and maternal recovery. According to WHO (2009), another vital area where information is lacking concerns the relationship between TB and pregnancy. WHO argues that up to 70 per cent of deaths due to TB occur during the childbearing years. The lack of information on diagnosis of TB in pregnant women, on the effects of TB on the health of the mother, fetus and infant, on the complications of treatment, on barriers to treatment, etc. may result in difficulties to diagnosis and manage TB in pregnancy. Commonly held beliefs among women, such as that pregnancy increases intolerance of TB drugs or makes them ineffective, have been linked to women interrupting their TB treatment when they became pregnant. WHO submits that women are entitled to appropriate services in connection with pregnancy, granting free services where necessary, according to the Women's Convention (CEDAW).

It has been observed that with respect to HIV/AIDS there are still large information and knowledge gaps about various HIV/AIDS related issues among women. According to Mulder et al (2000), a number of women still believe HIV/AIDS can be contracted when donating blood, affect prostitutes

only and found in cities only. Due to misconceptions, women are likely to be diagnosed in later stages of illness, shortening the duration of treatment but increasing the need for more aggressive medical and mental health interventions. There is also a tendency of strong condemnation at times and traditional moral values, conformity to traditional norms, stigmatization of persons with HIV/AIDS which may make effective HIV prevention nearly impossible among women. Thus, women require information and knowledge on HIV/AIDS issues (Mulder et al, 2000). Specifically, the information needs of women with HIV/AIDS also seem to be many. For instance, the Canadian AIDS Society (CAS) (2007) maintains that HIV-positive women need information on general support issues such as various practical, therapeutic and psycho-social supports which are key factors in helping people living with HIV/AIDS cope with their illness and the resulting issues. Albright (2007) adds that they need information on how to communicate with medical providers in order to access health information and proper medical care. These supports according to CAS can also be a force in slowing disease progression. People living with HIV/AIDS, according to CAS, tend to be healthier when they have a comprehensive network of peer, family, community and medical support. CAS further contend that women need information that can assist them to access health information, referrals, counselling, support groups, buddies, hospice care, complimentary therapies, child care, transportation and food.

ICT in HIV Management

CAS also postulates that women living with HIV/AIDS often experience an intense degree of isolation. Due to concerns over disclosure of HIV-positive status, it is often difficult for HIV-positive women to find one another and establish peer support networks. In addition, existing services might not be gender-sensitive, and even if they are,

women may not be aware that such services are available. Thus, women need information that can link them to networks so that they do not feel isolated (CAS, 2007. As noted by CAS (2007), isolation can also result from poverty, which can prevent many HIV-positive women from accessing various support and information networks that currently exist. Further, there are a number of issues that arise for HIV-positive women in the context of relationships, sexuality and family. Domestic violence, sexual and alcohol use can create high-risk environments for women, and these issues must be dealt with for women to be safe. And information is crucial in informing women on these issues (CAS, 2007). Information makes women knowledgeable and receive sensitive support to feel confident in and comfortable with engaging in healthy sexual relationships. In fact, CAS claims that too often, society treats women as "vectors" (carriers) of disease and HIV-positive women may feel they have no right to be sexual beings. Thus, according to CAS, reproductive decision-making requires increased access to information and support. Having a child is the decision and choice of HIV-positive women, and will require pre- and post-natal information and access to treatment for both mother and child. Women must also have access to legal information about treatment consent issues for their HIV-positive children. State-intervention (removal of HIV-positive children from the home, and court ordered treatment) is of growing concern for many mothers of HIV-positive children (CAS, 2007).

Women are often the primary care-givers in families. Information is needed to help HIV-positive women decide if, when and how to disclose their status to their children, family, friends, and co-workers) and this information woman need according to Huber and Cruz (2000) is known as HIV/AIDS disclosure. HIV-positive mothers also need information on how to plan and

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prepare the end-of-life for the care of their children (CAS, 2007). Additionally, HIV/AIDS health and support services play a critical role in women especially those infected. According to CAS, there are a number of specific services that would facilitate easier access to supports that can assist women in their support needs. Women need information to access affordable, quality childcare and transportation so that they can access supports such as counseling, support groups and complementary therapies. Additionally, HIV-positive women often experience difficulty finding adequate and quality health care. Information and knowledge on HIV research and treatment available is crucial for doctors to be informed of how HIV and treatments affect women and avoid prejudices about which 'types' of women contract HIV (CAS, 2007).

Violence can be a disturbingly common experience in the lives of HIV-positive women. CAS allude to the fact that women living with HIV face additional fear and threat of rejection or emotional, physical and/or sexual violence from the men who are closest to them, including husbands, lovers, family members and co-workers (CAS, 2007). There is need for women to be informed on available support services when faced with violent acts. In their study on information needs and information seeking behaviors of HIV-positive men and women, Huber and Cruz (2000) revealed additional information needs which include information on religious and spiritual topics, social activities, death and dying.

Using ICT's in Obstetrics and Gynecology management

The Women's Network of the Royal College of Obstetricians and Gynecologists (RCOG) conducted a study on health information needs of older women in the UK. The focus of the study was on women who were approaching, experiencing or who are post-reproductive age. The study was designed around seven conditions which were identified as being the most relevant to women of post-reproductive age: menopause, osteoporosis, prolapse of the womb, incontinence, depression and mood change, problems with sexual relations and gynecological cancer. It was established by the study that in addition to breast cancer and arthritis, all the seven conditions were important to older women. However, the level of knowledge on the seven conditions was quite low as revealed by the study. This was evident from the low response rate about symptoms of each of the conditions and treatment options. Thus, it was concluded in the study that consistent with the low level of knowledge about symptoms and treatment for the main conditions, there was a high proportion of respondents requesting reliable, up-to-date and consistent information.

Surman and Bath (2013) in their study on assessment of the quality of information on stroke and speech and language difficulty Websites observed that the information needs of patients, carers and families (PCF) experiencing speech and language difficulties (SLD) are substantial and change with time, according to time and period following the stroke. This study has been included as part of the analysis as women tend to be the majority of patients, carers and concerned family members when it comes to any health problem including stroke and speech and language difficulty. In this study, Surman and Bath contend that information on this particular health condition can improve knowledge of the condition, increase levels of life satisfaction and reduce patient depression. They add that it can also improve patient's recovery process and outcome, uncertainty and anxiety levels among carers are reduced as well. Surman and Bath recognize that clinical information forms a large area of information need among PCF who have experienced a stroke. This information helps them to know about the stroke itself, the causes and risk

factors, the risks and prevention of stroke occurrence as well as the consequences of the stroke on the body such as the visual field and bladder function, and the management of such effects. The consequences may be emotional and behavioural, for instance, depression or memory loss.

ICTs and information on medications and treatment

The second type of information according to Surma and Bath is information on medications and treatment including details on the rehabilitation process. In addition, an indication on the diagnosis is often required to gauge potential recovery. Practical information is another health information identified by Surman and Bath. This information may include details on the health care services available. Patients need to know the medical professionals they should approach for help. Coping mechanisms form another area of practical information need especially for returning home, and for care that is available. This may include assistive devices and aids around the house to help with walking, balance, etc. PCF wish to know about leisure activities and exercise following a stroke, including sexual activity. PCF may also need to access information on local community and support groups and clubs, which can provide psycho-emotional support for people. Information is also needed on the experience of others, which offers the re-assurance that they are not alone Patients may need information on advice and support for their partner and carer. Financial information, including available benefits, help with tax and legal matters, may also be needed. Patients may also wish to return to work, and may need to know about driving. Carers have concerns about the impact of the stroke on their own lives, such as their relationship with the stroke survivor. Surman and Bath conclude by stating that the most important information need for all is that information is accurate, up-to-date and accessible.

The studies that have looked at health information needs of women on cancer include those done by Jenkins, Fallowfield and Saul, 2001; Browall, Carlsson and Horvath, 2004; and Gopal, Beaver, Barnett and Ismail, 2005. These studies revealed that women require information on the nature of cancer, chances of cure, all possible treatments, and all possible side effects of treatment and how treatment works. Interestingly, cancer carers expressed the same information needs in the study by Beaver and Witham (2006). In addition to the above cancer health information needs, breast health and breast cancer screening were found to be important needs in a study by Watts et al (2004). Recent studies in this area include that of Gleeson et al (2013). They investigated the information needs of women diagnosed with ovarian cancer regarding treatment-focused genetic testing. The study revealed that women wanted to be informed about treatment-focused genetic testing (TFGT) in the ovarian cancer prior to their surgery focused on the potential benefits of genetic testing on treatment. Again, Spence, Morstyn and Wells (2015) conducted a study on support and information needs of women with secondary breast cancer and this study revealed five (5) major areas of information needs including: (i) Supportive care needs (i.e. coping and resilience skills, including adjustment to illness; support from specialist breast care nurses; health care practitioners who can provide emotional and practical support, such as psychologists, counsellors, psychiatrists, and social workers; survivorship needs, etc.); (ii) financial and employment needs (i.e. financial consent around all out of pocket treatment expenses, particularly for treatments that are Medicare funded; rights of women diagnosed with secondary breast cancer; support in the workplace for women who require ongoing cancer related treatments); (iii) multidisciplinary care needs where women themselves can be allowed to participate in all aspects of the decision making process pertaining to their illness; (iv) information about clinical trials

that are available to women outside their treating center; and (v) information on superannuation especially as it relates to terminal illness provisions.

Cardiovascular (heart) disease is one of the silent killers among men and women worldwide. Women need information that can help them understand the risk factors as both men and women have the same risk factors but some risk factors may affect women differently than men and are often misunderstood. So, women need to know their personal risk factors so that if possible, they can be changed, treated, or modified, and that women can as much as possibly control as many risk factors as possible through lifestyle changes, medicines, or both in order to reduce their risk of heart disease. As American Heart Association (n.d.) puts it:

> "Women need to know what causes heart disease and what can be the right information, education and care as heart disease in women can be treated, prevented and even ended".

Women also need information on the signs and symptoms of heart diseases, how diagnosis is done, how it can be treated and prevented.

In as far as violence is concerned, Kaur and Gard (2008) argue that information is necessary for women to free themselves from violence or attain dignity and be economically independent. They submit that economic dependence is a central reason for women's failure to stay away from abusive acts. Consequently, they need information that can empower them economically such as information on opportunities, benefits, resources and information on financial institutions that provide financial assistance to women. Women also need information on laws on violence against women and where they can report violent acts. Many women do not report violent acts simply because they do not know where to report. Others actually do not know that violence is a human right

abuse and violation of this right is punishable. Kaur and Gard (2008) in their study have observed that:

> "Lack of information about alternatives also forces women to suffer silently."

> "Some women may believe that they deserve the beatings because of some wrong action on their part."

> "Other women refrain from speaking about the abuse because they fear that their partner will further harm them in reprisal for revealing family secrets, or they may be ashamed of their situation."

Other areas of women's information on violence pointed out by Kaur and Gard include information which project a positive image of girl child and women in society so that they can build their strength and self-efficacy. Also, information on livelihood skills that would ensure their effective tackling of hunger, poverty, disease and unemployment challenges as well as information that can assist them access social services like education and health.

ICT and mental health information in women

On mental health, women need information on how they can look after their mental health. Traditionally, according to American Mental Health Association (n.d.), women as guardians of family health, have tended to take on the responsibility of looking after the health of members of their family as well as themselves. For instance, women often shop for their family and influence what they eat or advise their family when they feel unwell. This role makes it particularly important for women to have information so that they can understand how the choices they make in everyday life can affect their mental health and those of family members. Additionally, because of the role and status that women typically have in society, they need information on social factors as these can increase their risk of poor mental health.

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Some women find it hard to talk about difficult feelings and 'internalize' them, which can lead to problems such as depression and eating disorders. They may express their emotional pain through self-harm, whereas men are more likely to 'act out' repressed feelings, and to use violence against others. In this regard, women need information on how they can avoid depression, self-harm, anxiety, eating disorders, Post-traumatic stress disorder (PTSD), etc. as these increases their risk of developing mental health problems.

ICTs in e-filing interventions and e-governance

The South African Revenue Service's (SARS) e-filing is one of the e-governance interventions that has made strides, though its success is attributed to e-filling users being well educated and having full time employment (Naidoo, 2007). The failure of initiatives that were directed at poor citizens is blamed on adopting ICT without taking note of users' capability, especially at local government level (Mutula & Mostert, 2010). Meyer study on the impact of ICT programme conducted in Eastern cape found that ICT literacy remains a substantial barrier to citizens achieving their function. (Meyer, 2007). Between 2007 to 2012 Western Cape government, also witnessed regression in the use of ICT programme (WCG, 2012). The increased availability of e-centres across the local municipalities contributes to increased demand for effective e-governance implementation strategy; and a policy that promote ICT education (Pretorius, 2012).

Heeks (2010) suggests attention should be on evaluating developmental impact on citizens using e-government, instead of focusing on access to e-centres. At the moment, provincial government assessment of ICTs interventions emphases on the number e-centres and users instead of assessing how ICT4D intervention has improved users lives. The assessment fails to meet policy objectives which seeks to address excessive poverty among indigent citizens (Gupta & Gupta, 2008; Ruhode, 2016).

Moodley (2005) pointed out that, government investment in ICT is of great concerns since it is often done at the expense of other forms of initiatives "Higher level of emphasis on ICT project without critical analysis and consideration of the broader economic, social, and political elements that interact to improve the lives of individuals, have contributed to unanticipated failures of ICT project". Unless poor citizens are empowered to take control of their own development, promote dialogue between communities, and to see themselves as equal to other stakeholders within the web of development, ICT programme will no improve their lives (Moodley, 2005). In spite of the negative picture around the impact of e-government on poor citizens, the number of internet users in South Africa is about 52% (UN - Government, 2016).

Digital divide in rural areas

The World Bank report (2016) on digital dividend indicates that poor people living in rural areas, have not benefited from ICTs programmes. The report further states e-government intervention has led to economic polarisation as only citizens with ICT skills continue to benefits out of ICT intervention. In spite of the World Bank Digital dividend report, and many other scholars that have criticised the promotion of e-governance interventions without clear implementation strategy (Maumbe & Klass, 2009; Wilson, 2012;Dombeu & Rannyai, 2014), and DPME (2015) claims that government performance at all levels has not met citizens' expectations, the Western Cape Government has set aside R3.8 billion to connect all government building by 2020 (WCG. 2012; WCG, 2015).

Governments in developed countries such as United States and United Kingdom have shown incredible support for improved e-governance intervention (Pretorius, 2012). By 2015, 91 percent

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of households in UK had internet access; and 90 percent of individuals use internet at least once a week and have a broadband connection. Despite noticeable strides in e-government, the European Union Commission (2016) indicates that the UK government saw regression in the individuals using internet to interact with government, falling from 51 in 2014 against 49 percent in 2015. Similarly, the World Bank report (2016) reveals that in the EU, citizens lag behind in their use of technology for interacting with government as compared to businesses.

Countries that have been doing well in the use of e-government, such as the Republic of Korea and Singapore, rely on education, employment, urban residence, and broadband access, integrated policy development and citizen's participation in the design of ICT policy (World Bank, 2016). In Africa, e-governance challenges are highly associated with access to ICT and the divide in capability, and are attributed to lack of resources and the promotion of ICTs interventions before improving citizen's capability respectively (World Bank, 2016). Unlike in developed countries, existing research indicates that e-governance projects in many African countries have probably failed (Mouton, 2007; Albert, 2009; Shanshan, S. 2014). To conclude, e-governance comprises a wide vision of the use of ICT to fortify good governance and encouragement of all stakeholders to actively participate in running the government (Gupta, Dasgupta & Gupta, 2008; Heeks, 2010; Adegoreye, Oladejo & Yinus. 2015).

The electronic commerce global economy has been the basis for economic growth in this twenty-first century and has also been regarded as the key to future productivity and competitiveness attainment. Globalisation, the open source movement and adoption by big corporations have emerged as forerunners of electronic commerce implementation amongst SMEs.

Using ICT's in Small and medium sized enterprises (SMEs)

Small and medium sized enterprises (SMEs) are crucial for the economic performance and development of any country and are an important source of flexibility and innovation. SMEs represent between 96% and 99% of the total number of enterprises in most OECD countries (OECD, 2006). Zwass, V. (2009: pp. 1-2) states that SMEs can widely benefit from e-commerce. Here e-commerce is defined as "the sharing of business information, maintaining business relationships, and conducting business transactions by means of telecommunications networks."

E-commerce is referred to the doing of business using on-line platforms. According to the Organisation for Economic Cooperation and Development (OECD) "electronic commerce is a new way of conducting business, qualifying it as business occurring over network which use non-proprietary protocols that are established through an open standard setting process such as the internet.''

Tremendous research on adoption and use of electronic commerce by small and medium businesses has been exploratory in nature, employing a variety of approaches and theoretical frameworks. It also spans many types of businesses and industries around the globe. Research related to incentives and barriers to technology adoption is found in the literature of several different disciplines including management, organizational behaviour, communications, computer science, information systems, marketing and sociology.

Consequently, the research on the factors influencing the implementation of e-commerce by the SME sector comprise a wide range of theoretical models and foundations from these broad disciplines. Arising from the above, no single model or theory leapfrogs others. Among the more frequently applied theoretical models are:

1. Technology Acceptance Model (TAM) (McCoy 2001; Straub et al. 1995);

4. Theory of Reasoned Action (TRA) (Ajzen and Fishbein 1980);

5. Adoption, Innovation, and Diffusion Theory (Rogers 1995);

6. Social Cognitive Theory (Bandura 1996);

These models when applied in quantitative studies commonly use, as independent variables, factors which tend to influence implementation either positively or negatively. This broad range of theoretical foundations, found in the literature, probably accounts, at least in part, for the confusing, and sometimes opposing, collection of variables identified as incentives and barriers to e-commerce implementation and usage.

Education assessment and feedback in institutions of higher learning can be perceived as any information communicated to the learner as a result of learning-oriented actions. None the less, formal feedback is provided in response to students' work on formative assessment such as assignments, essays or research projects/dissertations. In order to be effective, feedback on assessments need to be accurate, timely, constructive, and personal without being generalized.

Sustainable development goal number three is to 'ensure healthy lives and promote well-being for all at all ages' (United Nations, 2015). While significant strides have been observed in increasing life expectancy, reducing some of the common killers associated with child and maternal mortality, increasing access to clean water and sanitation, reducing malaria, tuberculosis, polio and the spread of HIV/AIDS, more effort is required to fully eliminate a wide range of diseases and address many different persistent and emerging health issues. Governments, the private sector, civil society and individuals need to play a part to attain this goal. Access to reliable, relevant and useable

health information is one of the key determinants for attaining the health sustainable development goal. Randel (2013) believes that the post-2015 settlement must harness the power of information to empower citizens with choice and control over the decisions that impact their lives. As noted by Raj et al (2014) people quite often suffer unnecessary ill health or die due to lack of information to make decisions. According to Raj et al, lack of information also leads to wrong decisions. Decision making heavily depends on availability of health care-related information. The only way of dealing with information gaps is by providing reliable, relevant, complete and useable information to consumers. The 58th Session of the World Health Assembly (2005) issued a resolution urging member states to make health information available, accessible and relevant to people's health needs. Thus, understanding the health information needs of individuals is critical in order to provide access to relevant and appropriate health information specifically targeted at different groups of people in society. The EU Health Policy Forum (2005) affirms this by stating that it is universally true that to be useful, information must be relevant, appropriate, timely, up-to-date, understandable and factually accurate. It must also be tailored to the needs and abilities of specific target groups, and be accessible (easy to understand and to use/act upon.)

ICT in Health Management

For health information to effectively facilitate and reinforce performances of a desired health behavior, it should be tailored to the interests, literacy, language, cultural background, emotional state and desire (Ek, 2013) as well as needs of its intended audience. In other words, Ek submits that the quality and authority of the health-related information must suit and synchronize with the individual's expectations, preferences and needs under given circumstances. Ek (2013) claim that public health communication programmes and

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interventions have traditionally been based on the somewhat oversimplified assumption that health promoting knowledge and corresponding behavior are automatically created as people are subject to a rich flow of relevant health-promoting information. However, in reality, the case is largely that those individuals whom health promoters' information most are trying to target are hard to reach due to various forms of miscommunication; they do not, for instance, share the same presumptions and pre-understandings as those who administrate, design and operationalize the health promotion programmes (Ek, 2013).

Affirming the importance of understanding women's HIN, WHO (2009) submits that women and girls have particular health needs and that health systems are failing them. These unmet health needs include conditions that only women experience and that have negative health impacts that only women suffer. Some of these conditions, such as pregnancy and childbirth, are not in themselves diseases, but normal physiological and social processes that carry health risks and require health care. WHO (2009) further explains that some health challenges affect both women and men but, because they have a greater or different impact on women, they require responses that are tailored specifically to women's needs. Other conditions affect men and women more or less equally, but women face greater difficulties in getting the health care they need. Furthermore, gender-based inequalities – as in education, income and employment – limit the ability of women to protect their health and achieve optimal health status. This is why understanding women's health information needs is crucial in improving the health of global citizens. Thus, the need-based approach is essential where information is based on research, informed by evidence and enabled by technology to take care of the needs of various stakeholders (Raj et al, 2014).

Hyland (2000) posited that feedback is an essential component in all learning contexts and serves a variety of purposes including evaluation of student achievements, development of students' competences and understanding and evaluation of students' motivation and confidence. However, within teaching and learning in a higher education setting, assessment and feedback can be perceived as any information communicated to the learner as a result of any learning-oriented action.

System testing is important before and after the system is put in place, because it helps to resolve any errors and helps to know the system better. In this chapter we are going to test the system so that we can find out if the system meets both functional and non-functional requirements. Testing can be in two forms namely white box and black box testing. White box testing or clear box testing is a way of testing a system's internal structures or how an application is working as opposed to the functionalities (Cesare Bartolini, 2011). Black box testing is a type of testing that looks at mostly the functionalities of the system rather the workings of the system (Cesare Bartolini, 2011).

From Africa, some of the notable studies on health information needs of women include that of Adam and Lasisi (2011) who looked at health information needs of women from a general point of view. The study established that the most paramount information required by rural women is ante-natal and post-natal care, immunizations especially on the six childhood killer diseases, how to prevent and manage Vascular Virginal Fistula (VVF), how to safely deliver pregnancy. Additionally, the study established that rural women require information on hygiene, good food, family planning and clean environment. The study further identified barriers to information needs high illiteracy rates, inability to access formal channels of information due to poverty, lack of adequate and efficient information delivery mechanism, ignorance of governments responsibilities to its citizens, skepticism of the

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rural woman towards government and its information agencies, attitude of extension workers towards effective rural information service and inaccessibility of the rural areas by NGOs.

Another similar study with a focus on health information needs and information sources of pregnant women was conducted by Ogunmodede, Ebijuwa and Oyetola (2013) who obtained similar results as those mentioned above; that pregnant women need information on maternity, delivery, breast feeding, pregnancy period, ante natal, post-natal, immunization for their children and themselves, family planning and miscarriage. Women require family planning information to lower fertility rates, reduce early pregnancies, and decrease infant and maternal mortality. Investigating further on ante-natal information needs of women, Anya, Hydara and Jaiteh (2008) conducted a cross sectional survey of 457 pregnant women attending six urban and six rural antenatal clinics in The Gambia. The women were interviewed using modified antenatal client exit interview and antenatal record review questionnaires from the WHO Safe Motherhood Needs Assessment kit. In their study, Anya, Hydara and Jaiteh established that women needed information on diet and nutrition, care of the baby, family planning, place of birth, STIs and HIV/AIDS. Additionally, women need information related to danger and response to pregnancy-related problems, danger signs for the unborn child.

Reproductive Health

Nwagwu and Ajama (2011) studied the health information needs and sources of women living in a rural palm plantation community in Nigeria. The study revealed that women needed information in concerning sixteen topics: diabetes mellitus, HIV/AIDS, STD, typhoid fever, cholera, malaria, pox (small, chicken, cow), tuberculosis, infertility, hypertension, body pain, immunization, cough and cold, skin diseases, family planning and pregnancy.

Kituyi-Kwake and Adigun (2008) analyzed ICT use and access amongst rural women in Kenya. With regard to health information needs, they ranged from family planning/gynecology to tropical diseases e.g. malaria, HIV/AIDS, respiratory illnesses/coughs, cancer, Sexually Transmitted Infections, snake bites, waterborne diseases, diet/nutrition, diabetes, dentistry and fits.

The impact of technical changes in knowledge production has, therefore, received particular interest in the literature in economic growth. Many recent studies have shed light on the impact of ICT on knowledge production, economic growth, and productivity and so on. The ICT system gives the knowledge-based economy a new and different technological base which changes the conditions for the production and distribution of knowledge; ICT is playing a new role in knowledge production and distribution, but this is a re- organization of the technical and financial terms on which a resource is available.

It is a known story that ICTs have changed production of scholarly information which is being produced in digital format. There is therefore need for libraries which are the main storehouses of information to have the necessary competency and knowledge skills to be able to fully participate in the digital environment. For libraries, ICTs are changing the way the librarian acquires, processes, stores and delivers information to the users. Permanent access and storage of recorded knowledge resources has been the cornerstone of libraries for centuries. Libraries have prided themselves with having the privilege of being entrusted with the permanent storage of the results of scholarship (Chifwepa, 2006).

According to Chifwepa (2006), the postal services means of communication and interaction for learners in many countries have been found to be inefficient. He contends that ICT can serve as an alternative means of communication in alleviating

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feedback inefficiencies in communication. This, he observes, is even more crucial to learners who tend to be motivated by being in close touch with their facilitators or teachers. However, literature suggests that the growth of the digital economy or information society has brought about new challenges, as can evidently be seen in essential services such as water and electricity supply which have now resorted to using ICTs. Today Cars, traffic control, elevators, air conditioning and telephones also depend on the smooth functioning of ICT (C. Kangwe, April, 2012). The benefits of ICT in the global digital society cannot be overemphasized. Today, computer technologies have contributed in transmitting information, thereby creating favourable ICT environments that have in turn helped in fast and accurate decision-making. It is now common knowledge that the use of ICT increases the supply of information as ICT play a key role in information sharing and dissemination. ICTs remove distance and time constraint in accessing required information flows. They also reduce the cost of production as knowledge is produced, transmitted, accessed and shared at the minimum cost (Lundu, 1998).

However, literature reveals a number of factors challenging the provision of ICT in the current digital economy. Lundu (1998), for instance, observes that whilst the e-mail services can be free-of-charge in some cases, and costs of internet services being lower than traditional postal services, some remote-rural areas do not benefit from this service due to non-availability of computers and libraries or resource centers. Therefore, people do not have access to information. Lundu, therefore, seems to suggest that access to Information using ICTs is dependent on its availability. This also implies that the introduction of technology does not occur at one point in time. Some new ongoing dynamic must develop in order for a technology to spread, be kept up and renewed (Events, 1998). Another challenge

consists in the financial factor. As much as it can be appreciated that technology plays a vital role in information processing, management and utilization, there is still other needs of the user and financial factors that come in to determine how much and what type of technology will be applied effectively to the information service operations at any given place.

Other challenges experienced are problem-oriented which includes intellectual access and physical access. Intellectual access means to learn where information exists; the value and relevance of any piece of information is ascertained by the individual concerned. Physical access on the other hand, implies being able to obtain information in a usable form and/or the delivery of the record to the inquire (Ibid).

The use of ICT in economic and social development

Scholars have also highlighted some revolution in the use of ICT, a phenomenon that seems to have profound implications for economic and social development, and indeed on every aspect of human life. Shanker (2008), for instance, contends that the widespread application of ICT today makes it an essential tool for the efficient administration of any organization and in the delivery of services to clients. Schware (2003) has also observed that ICT is being integrated into procedures, structures, and products throughout businesses, governments, and communities. The use of ICT, thereby, increasing the supply of information as ICT plays a key role in information sharing and dissemination. The use of ICT has therefore, become the order of the day for most organisations as it greatly helps in knowledge production. Information and communication have an increasingly pervasive influence on almost every aspect of social cohesion and human development (Wise and Olden, 1990).

Available literature reveals that, the rapid progress in ICT and its impact on the global knowledge

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economy have intensified in recent years, leading to a new economic system characterized by intensive knowledge production that has affected a great deal of interest. It has also increased debate on the effects of ICT and the economic opportunities and challenges that ICT imposes on the production and dissemination of knowledge in the global economy, particularly for the developing countries (Ibid:19).

Indeed, the application of ICT could strengthen local educational capacity, support distance education, connect places of learning and research and reduce communications and administrative costs. It can also improve the accessibility of rare manuscripts and artifacts and preserve them electronically. Educational technology should influence educational outcomes and costs. If the most appropriate educational technology is selected by a teacher then student learning should be optimised, which means an increase in the value of the outcomes (Ibid).

Technological advancement is one of the major determinants of the provision of sustainable ICTs and e-government services in any nation. This is because the rapid rate at which technology advances and the possibility of obsolescence requires sustained investment in the systems that facilitate the delivery of e-government services. In a country like Zambia which has only recently rolled out 3G technology for example and is barely beginning to implement 4G, the fact that the rest of the global community is talking about 5G clearly puts pressure on the nation to ensure that it deploys appropriate technologies. This is especially important where services are meant to be accessed in a secure and efficient manner at a supra national level.

Further, the advances in technology have concomitant effects on the ability of a nation to provide e-government services to its citizens. The questions that begin to arise include the fundamental question whether a nation that has basic challenges such as the need to provide essential services to its citizens such as water and sanitation, basic health services and education and can afford the "luxury" of delivering e-government services when there are more basic and urgent considerations to be made in relation to their population.

It has been widely acknowledged that to be useful, information must be tailored to the needs and preferences of specific target groups. Information need is the foundation from which to develop tailored services. According to Goossens et al (2016) individuals like tailored interventions; and read, remember and discuss the content of tailored interventions more often than standardized interventions. Thus, tailored interventions can be more effective and efficient than standardized interventions in promoting good health among women. Information providers might use the findings to provide health information that support women's needs and preferences adequately. Higgins et al (2011) also affirms that summaries of existing knowledge can provide a powerful resource for practitioners to provide tailored preventive, curative, promotional or rehabilitative health care services and can assist policymakers to design appropriate policies and programs or make decisions that can effectively meet the health information needs of women. Such reviews also may also enable researchers to focus their attention on identified gaps in knowledge in the area of health information needs of women. Alzougool et al (2008) observed that comprehensive understanding of the information needs of consumers is a basic step before developing effective Health Information Systems (HIS) that target those consumers and that attempt to engage them. It also helps in the evaluation of how well these needs are fulfilled as well as understand other dimensions such as consumers' information behaviors and sources. Alzougool et al thus, argue

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that a careful identification, analysis and classification of information needs is an important foundation for the designing and functioning of health information systems. Otherwise, continuing to develop delivery mechanisms for health information, according to Wathen and Harris (2006), without first understanding the needs of various types of users as part of the delivery system, only exacerbates the problem.

Need, according to Alzougool et al (2008) is something that is essential to do or to resolve something else depending on the context. Shenton and Dixon (2004) and Adekanye (2014) noted the difficulty that investigators face in defining the nature of information needs in such a way that they can be researched. This is because the needs of individuals usually vary from time to time due to several factors. Hence, "there is no clear definition as to what the term means or how people's information needs inform and shape information provision and patient care" (Ormandy, 2010). Many theorists in the field of information science and health have attempted to provide an understanding of the concept of information need. In the field of information science, information needs are thought to arise from basic human needs that have cognitive, physiological and psychological/emotional qualities (Choo, 2000; Nicholas, 2000). At times, this takes the form of a perceived discrepancy between the current position and a more informed state to which the person aspires to complete a task (Shenton and Dixon, 2004). Other scholars define the concept of information need as a deficiency in a person's knowledge – gap (Choo, 2000; Irvall and Nielsen, 2005) in life's experience, or a state of uncertainty defined and recognized by the individual, motivating them to seek answers and form questions to find a solution for a particular problem (Wilson, 2006; Kebede, 2002; Case, 2002); a recognition that your knowledge is inadequate to satisfy a goal that you have (Case, 2007), lack of

appropriate information on which to base choice that could lead to benefits or services that may improve people's well-being (Lambert and Loislle, 2007). Despite the fact that definitions vary widely, these theorists agree that information needs arise because of an underlying dissatisfaction with their existing situation.

ICT recognized and unrecognized information needs

Alzougool et al (2008) argue that there are two broad categories of information needs recognized and unrecognized information needs. Recognized information needs is when a person is aware that information is needed. It is either articulated by health practitioner or can be inferred by an observer. It may result in a search for new information or it may not. While unrecognized information needs occur when a person is not aware of the information, he/she needs or his/her knowledge is insufficient to fulfil the needs (knowledge deficit). Alzougool et al. (2013) argue that the seeker in this category has not clearly identified, but somehow, he/she realizes certain existing but unknown information is important for the current scenario (for example concerns when taking care for a diabetes patient). Information needs triggered by passive reception (like hearing something interested) are considered in this category. Consequently, the seeker will likely explore for all relevant information to clarify exactly what information is further required.

Alzougool et al (2008) further posits that both recognized and unrecognized can either be demanded or undemanded. A person looking for detailed information about certain symptoms falls into the recognized demanded category. Conversely, people may choose to refuse or avoid information that relates to them, which can be seen as undemanded needs. For example, patients with a severe disease such as cancer may choose to deny information, possibly to avoid a negative

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psychological effect on the ongoing treatments. Most researches have focused only on one type of need: recognized information needs that individuals choose to demand (i.e. lack of information) which is visible and not those information needs not always easily visible. This is because according to Pang et al (2014) they associate with actual information seeking behaviors and thus easier to observe. Other types of information needs are often neglected. The information needs not always visible include information needs that individuals already satisfy, or that they recognize and choose not to demand, or that they have not recognized yet. These parts or dimensions according to Alzougool et al, represent the huge size of the iceberg or information needs that are hidden from view. They argue that information needs are more comprehensive and most researchers focus on lack of information and the iceberg analogy is a useful way that helps to clarify the comprehensiveness of information needs. The idea of iceberg analogy (figure 2) has been used to represent various things or situations that are not visible without paying special attention.

Additionally, Ormandy (2010) extensively explored literature in an effort to provide a working definition for the term information need that is both applicable and useful within the health- and social-care arena. He came to a conclusion that a definition of information need should encompass and fully recognize the interplay of four key dimensions: context, situation and time alongside purpose/ goals. Ormandy (2010) argued that the pivotal role of the health-care practitioner is to help the patient articulate and refine their information needs, then provide the relevant information to satisfy the need or gap in knowledge. Therefore, a comprehensive and crucial understanding of what, why and when information needs arise for the individual patient, can only be achieved by exploring the four key dimensions. Thus, to Ormandy, "information need is a recognition that

your knowledge is inadequate to satisfy a goal that you have, within the context/situation that you find yourself at a specific point in the time."

Information needs develop for different reasons: to find answers, to reduce uncertainty or to make sense of a situation, (Loo, 2007; Alzougool et al, 2008) bridging gaps, solving problems and stress and coping (Alzougool et al, 2008). Ormandy (2010) citing Coulter et al presents a broad generic framework for patient information needs in terms of the purposes for which information is used

Likewise, researchers have investigated information needs from the health perspective (Ormandy, 2010; Pang et al, 2014; Alzougool et al, 2008; 2013). These scholars agree that information need in health is also perceived to represent a gap or knowledge deficit that could be rectified by information and/or education. According to these studies, a person may not know clearly about a particular health problem, that represents a knowledge gap of the disease, so there is a need to look up detailed information on this problem. Xiao et al (2014) noted that health information needs include both cognitive needs, which include information for disease prevention and treatment, and affective needs, which include information for coping with illness emotionally.

Although the universal rollout of technology seems to be a simple thing on paper, it has massive implications especially when rolled out as part of an integrated government wide system. The considerations to be taken into account in such a situation include the need to have in place appropriate control over the hardware and software being deployed and utilised in order to ensure that the government does not suffer "monopolistic capture" that often is a danger with the use of proprietary software or hardware that is tied to specific software or licensing living in rural areas through the lens of the Capability Approach (CA). The emphases were on assessing whether the use

of ICT programme termed Cape Access has significantly contributed in improving individuals and communities' capabilities. The provincial government is providing ICT Centres with 12 -50 computers that provide free access to ICT as well as formal and informal digital literacy training. The government's e-government strategy requires citizens to have access to ICT4D and become digitally literate in order to ensure adequate usage of ICT programmes. This study is work in progress evaluating a program that has existed for more than 12 years with 70 centres. The province is currently spending up to R17.5m per annum for maintenance. For every Cape Access centre that is introduced the government is supposed to budget in advance R300 000.00 for operation cost.

According to Harris (2016) South Africa depicts the characteristics of both the developed and underdeveloped world. Despite, its strong economy, good universities, and growing ICT industry, half of the citizens live below the poverty line, and majority are uneducated. Those with relevant e-skills and agency are benefiting out of ICT programme although the majority of the citizens, have not benefited. For this reason, Harris, (2016) is of the opinion that researchers must put emphases on impact-oriented research that seek to inform policy makers whether investing in ICT is making social and economic impact in the lives of the poor citizens. This is because ICT programme can only improve citizens' lives when ICT developers and policy makers pay attention to following key elements: community ownership, appropriate technology, local content creation, promoting social inclusion and enhancing community networks, and social cohesion (Ponelis & Holmner, 2015). Similarly, the success of ICT4D is determined by what users do with opportunities entrenched in ICTs, this implies that ICTs alone cannot change the lives of rural communities (Ponelis & Holmner, 2015). This view is further shared by Hamel (2010) arguing

that ICTs alone cannot improve peoples' lives; it requires strategies that takes note of various context in which the programme will be implemented in. Consequently, from the social and economic perspectives, users and policy makers need to agree on the outcome and how the project should be sustained post implementation.

Both parties need to discuss the issue of expectations, e-skills, agency and capabilities that are needed to ensure that the programme is a success (Conger, 2015).This study investigates Cape Access centres in six villages located in two comparable rural communities, the Cape Agulhas (A) municipality and the Over strand municipality (B) both based in Western Cape Province. Due to earlier discriminatory policies, poor citizens from these selected municipalities still experiencing high level of socio-economic inequalities, this is also evident in the access to and the use of ICT programs. Goldstuck 2010 (in Dalvit, Kromberg, & Miya 2014) pointed out that in spite of the language barrier, literacy and skills, and user's attitudes, the majority of poor citizens in South Africa will be able to make meaningful use of ICT by 2020.

The Western Cape's province launched e-centres in July 2004, since then the program has been going through phases of improvement. Cape Access is a programme that provides ICT access to less privileged and rural communities across the Western Cape. Among other strategic objectives for Cape Access are; "to improve access to government services; to bring government information and services closer to the people and to promote access to opportunities; to create a platform for greater dialogue between citizens and the government; to improved good governance and to increase service excellence through technology" (Arendse, 2010). Notwithstanding, the well thought Cape Access objectives, such as creating equal access to opportunities for all communities, to foster inclusive province, control poverty and improve poor citizens' well-being (WCG, 2015),

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the intervention cannot claim that its strategic objectives have been met this is because there is not an impact study that that has been conducted within the parameters of Western Cape to systematically evaluate the impact of Cape Access on the well-being of poor citizens.

The IOS and Windows platform can be used, but according to the statistics they are the least used by people compared to the android platform, therefore Android would be one suitable platform to use but it is still one platform what about the other percentage of platforms that exist, do we just forget about them? No, that is where we use Phone Gap. Phone Gap has proved to be the best platform independent platform to use to develop CIDS, but for now Phone Gap is not compatible with the OpenCV library which will be heavily used in the development of CDIS.

Therefore, according to the statistics that have been gathered and the system that is required to be developed, the better choice of the documented platforms is to use the Android.

In this part of the chapter is we are going to look at three existing mobile systems that are fighting counterfeit drugs, it will also look at countries that have implemented these systems, and finally it will review the platforms that these systems are running on and the mobile platform that CIDS will run on.

Bright Simons, a Ghanaian, developed a phone-based system called mPedigree to tackle the problem of counterfeit drugs (USAID, 2012). mPedigree solves the problem of counterfeit drugs in such way that mobile users can send a number that they scratch off a purchased drug, then within seconds a message will be received that tells them if the purchased drug is a genuine drug or a counterfeit drug. Using this method users are able to trace the origin and authenticity of the drug. mPedigree was launched in 2007 ever since then the mPedigree network has been growing and now this system is implemented in Ghana, Nigeria, East

Africa and South Asia even India has started using this system (USAID, 2012).

The Department of health South Africa's e-health strategy (2012) indicates that health institutions in the country are implementing a national health information system but still face the challenge of data quality. Botha et al. (2015) add that, the South African health information system (HIS) use parallel data that lack integration across disease program areas, putting the Monitoring and Evaluation (M&E) system at a risk of confusion during reporting. More still, health workers responsible for data collection from patients, duplicate and mix up datasets hence causing redundancies. Friedman and Smith (2011) noted that health organizations also face the challenge of over budgets due to extra resources required for data cleansing of numerous duplications and profiling that causes wastage and ineffectiveness. They further allude that this results into inappropriate decision making that causes patients distress and loss of confidence. Mphatswe et al. (2012) also observed that even though many health institutions are using HIS, these systems are still challenged with data accuracy and reliability that impacts health service delivery.

Data quality with appropriate governance

It is essential for healthcare organizations to have and maintain data quality with appropriate governance so as to improve the operational and strategic decision-making processes. In the bid to adhere to this call, of the study Botha et al. (2015) also identified data governance as one of the most data quality challenge faced by the health sector. Their study indicated that the many elements that make up data governance positions it to be a serious challenge for data quality. These elements include but not limited to, lack of assignment of data responsibilities, administration, roles ambiguity in relation to tasks, missing written quality policies,

managers lack of emphasis on the importance of data quality, ineffective organizational procedures and assessment. The World Health organization report (WHO, 2003) also indicate that having such challenges as impediments of data quality in health institutions, lead to extra work, production problems, loss of revenue, higher costs, impacts on quality of care and leads to privacy and security issues.

Kiwanuka et al. (2015) confirm there many challenges faced by HIS despite of the fact that they are widely used in health organizations. They put it that HIS are challenged by data quality issues, poor information flow and the integration of Monitoring and Evaluation (M&E) system. From their analysis they indicated that many of challenges are as a result of lack of clarity in roles concerning data creation and use, poor management focus, lack of systematic and standard measures, poor written procedures and lack of guidance or framework for data quality. Consequently, Weber et al. (2008) also add that the missing standards for data requirements, lack of ownership and guidance has highly compromised the creation of high-quality data in organizations. According to Mutale et al. (2013), health institutions also face the challenge of lack of effective communication that cause poor coordination and cooperation among their business units and such compromise the quality of data. They alluded that un- streamlined communication also impacts on the healthcare institutions' reporting system and leads to poor decision making. Additionally, Qazi and Ali (2011) allude that health workers use a one-way reporting system and they often don't get feedback from the health management information system (HMIS). They noted that in many instances the captured data into the HMIS is either not used or misused, which leads to the risk of generating inappropriate reports for decision making and may contribute to the manifestation of errors in patient's service delivery.

It is estimated that 5% of organizations' data are of poor quality and causes 10% average cost impact on the organizations' annual revenue (Friedman, 2011:26). Poor data quality is categorized as causing direct and indirect impacts on financial losses; reduced customer, supplier, employee confidence and satisfaction; reduced productivity due to increased workload or efficiency, increased risk and compliance (Loshin, 2010). According to Murakwani and Sethi (2015), costs are as a result of nonconformance to compliance, business and data requirements. Further, these costs affect the internal and external costs of an organization.

Kahn et al. (2015) assert that in healthcare, there is misclassification of key elements for administrative billing systems, which leads to a biased estimate of treatment effects more especially when data capture process and analysis are not properly done. This negatively impacts clinical decision support, research and patient's safety. Further, they suggest the development of a cost-benefit and business case with data collection and analytics activities as well as their inherent costs for the process of data quality assessment, monitoring and governance. As a result, administrative and clinical data quality for clinical care, outcome and research could be improved. Furthermore, emphasized that a formal cost-benefit analysis could be used to model the return on investment (ROI) for data quality assessment, organizational and scientific risks associated with the use of poor data quality from different stakeholders. To counter the above challenges, Ladley (2012) suggested that there should be a culture of interdepartmental collaboration which can be achieved through business user engagement with the aim of improving data quality.

The purpose of this paper is to report on how data governance could be leverage to improve data quality in health institutions. Data for this study was analyzed quantitatively and based on the results a data governance model was designed.

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Data is defined as a representation of facts. It can be in form of digital, textual, numerical or graphical (Gomm, 2008). Further, it added that data is a raw material (unprocessed data) that is used to produce information (processed data) when put in context that gives meaning. However, processed data can be considered as a raw material by other systems or users. Data has to go through a defined process that produces an information product for example reports, file, single numbers, images or verbal phrases. Data has the characteristics of being collected, measured, analyzed and visualized.

Data quality explains the state of data that fits to be used by its consumers and conforms to the user's requirements (Mustafa et al., 2016). Data quality must be considered in relation to user's objectives, goals and in a specific context, assessed and measured using its dimension (Kahn et al. 2012; Chen et al., 2014). Data quality is critical in ensuring that appropriate conclusions are drawn from information captured and integrated into organization's reports needed for decision making (Ledikwe et al., 2014).

Management of data quality

Data quality management is a business function that develops and executes the acquisition, control, protection, delivery, storage, enhancement and presentation of high-quality data (Geiger, 2004; Wende & Otto 2007). Data quality management involves the implementation of decisions made during data governance (Alhassan et al., 2016).

Data quality improvement is shifting from the undesired to the desired new state of data quality (Batin et al., 2009). It involves the selection of quality process, plan for implementation, examining the impact and standardization. Batin et al. (2009) further noted that data quality Improvement involves two steps whereby step one includes evaluation of costs, assignment of process and data responsibilities, selection of strategies and techniques as well as identifying the causes of errors; and step two involves process control, design of data improvement solutions, process redesign and improvement, monitoring and management.

Russom (2008) defines data governance as an organization structure that can either be a committee or board that creates and enforces policies and procedures for the use of business and technical management of data across the organization. Data governance defines decisions on the roles of managing, policies and procedures that control data assets (Alhassan et al., 2016; Holmes, 2016). On the other hand, Wende and Otto (2007) noted that the policies guidelines and standards must be consistent with the organization's mission, strategy, values, norms and culture. Furthermore, Friedman (2011) argues that Data governance is a continuous improvement process which benefits every business unit and helps to ensure business information is reliable, complete, consistent, current, correctly interpreted and manifested at all levels of management (Geiger, 2004).

Data governance improves accountability, communication, coordination and allows data and application software to communicate for data integration (Dail et al., 2015). Data governance creates an environment for informal and social interaction which leads to management alignment and integration across all business units (Espinosa & Armour, 2016). Data governance gives the organisation the ability to realise value of data by getting to know the cost of that which is inappropriate or of poor quality (Khan et al., 2015). Data governance provides a well-defined approach for balancing value creation, risk exposure and cost (Tallon, 2013). Data governance creates a sense of data ownership, unites business objective, and designs information policies by making sure all stakeholders see one true version of data (Information builders Inc., 2011).

Geiger (2004) identified a data quality challenge of failure of organizations to recognize that they have a Data quality problem. Data quality issues are hidden and persistent, they can exist unnoticed for some time and even propagated to other systems or business units due to increased connectivity. For example, in the HMIS incomplete datasets from ART may affect those from Tuberculosis (TB) system or unit. Chen et al. (2014) add that Data quality issues are hidden in other areas which may lead to ignorance of data management thus creating unawareness of available data quality problems that continue to hinder public health practices. Geiger (2004) Comments that to solve any problem it has to be recognized first that it exists. Hence, organizations remain in denial about the quality of data ending up making inappropriate decisions with data that is not accurate, valid, and consistent or complete thus compromising the efficient operations of the business processes. This as the result ends up with reduced ROI in enterprises or profit-making organizations.

Khatri and Brown (2010) designed a framework that could be adapted by organisations with growing need of making their data an asset. The framework consists of five decision domains of data principle, metadata, access, quality and lifecycle. With key organisation assets of human, financial, Physical, Information product information, IT and relationship asset, can be used to ensure data quality. The framework is appreciated for its contribution to the body of knowledge and successfully used by authors like Alhasaan et al. (2016). However, it has a limitation of not being adaptable by all organisations by the virtual of the nature of environment and culture they operate in. For instance, Begg and Caira (2012) used the framework on 10 Small Medium enterprises (SME) but it could not be adaptable to their business environment and culture. So, this confirms the view of Wende (2009) who argues that one size does not fit all.

Kukemuller (2011) asserted that data quality is of value within its context of use and the value of an information product is influenced by its quality. That being the case, organizations use IT tools to fix data quality issues. IT tools used include data warehousing, customer relationship management (CRM), chain supply management, enterprise resource planning (ERP), master data and many other enterprise systems. All the above information systems generate huge amounts of data, nonetheless, it is not a matter of capturing and storing data that goes unmanaged. This is because unmanaged data results into poor quality data and increased costs of business operations (Niemi, 2013). For the case of healthcare institutions, it is the HMIS used as a tool for quality improvement. However, IT software tools just improve data quality only relevant for analytics purposes.

Young and McConkery (2012) highlight the achievements and goals of Data Governance Advisory Group. The researchers say that is responsible for providing advice to senior management on data governance policies, standards and strategic approaches; data quality initiatives; privacy; architecture and integration requirements; compliance and security; data ware housing and business intelligence priorities. They further mentioned the members that make the committee of the group include; stakeholders from planning, quality and reporting, finance, student and academic services, human resource, finance, information technology (IT), research services, library, facilities management, external relations and corporate services. The researchers found out that monthly meetings provide a forum to discuss data quality and governance issues throughout the lifecycle from collection, processing, reporting and decision making. Their study recommended data governance groups to focus on policy, standards and strategy, data quality, privacy, compliance and security, architecture and integration, data warehouses, business intelligence and management

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alignment. They caution that the metrics identified in their study may differ among institutions and sectors and need to be tested for relevancy in the respective environments. However, much as their study was exhaustive enough and provided several factors that inform data governance, it lacked an underpinning theory that could be used to guide future research.

Niemi (2013) asserts that, data is never used due to uncontrolled redundancy, lack of data use policies and procedures. Thus, making organizations to remain in confusion since managers do not know how much the available data costs and its importance. More so, data quality issues include frequently misinterpreted data that cannot be shared amongst business units.

Nahar et al. (2013) identified data quality issues such as duplication, missing information, formatting, and inaccurate profiling reflect in computational intelligence more especially when data are not pre-processed cleaned through cleansing, verification, formatting and updating. These result in clients' or patients' distress, wastage of money and increased organizational risks. Chen et al. (2014) indicate that data quality is influenced by technical, organizational, behavioural and environmental factors. However, Cappiello et al. (2013) argued that if organizations continue to rely on technology, the more data and information quality will remain a concern. However, Cappiello et al. (2013) suggests that through data governance, the above challenges can be minimized when business processes are well described in relation to the ability to identify data requirements.

Chen et al. (2014) reviewed 39 publications about data quality assessment in public health information system. Out of the review it was noted that data collection and use was given least attention. And yet according to Niemi, (2013) data collection and use are the most critical stages in data life cycle that need governance for improved data quality.

Ledikwe et al. (2014) discovered that HMIS are of complex setting where data from different sources and datasets are stored waiting to be retrieved when demanded. The complex nature of HMIS makes data integration a challenge for data quality without governance. Furthermore, in healthcare organizations, there are short term projects whose delivery focuses on programs funded at functional business unit level. The teams responsible do not account for how the program data may be used by others. As a result, the communication requires data to flow within the systems (functional business units) which have connection points that must cross strictly project boundaries due to bureaucracy. According Wittwer (2000), bureaucracy is a data quality obstacle, if there is an absence of direct authority for the accountability of timeliness, accuracy and an appropriate data integration environment.

Khan et al. (2015) conducted a research on transparent reporting of data quality in distributed data networks. The researchers found out that reporting the strength and weaknesses of data sets at each level of data life cycle, may improve transparency and trust, as well as unearthing unintended negative consequences of revealing internal data quality problems which negatively affect data contributors who may withdraw from a data sharing network. The researchers recommend that there is need to have a culture that embraces transparency as a means of improving data quality. This study can bridge this gap through data governance. For instance, if problems are identified earlier, then it creates a basis for quality improvement. Ladley (2012) asserts that it is the role of data governance to resolve a data issue before it gets out of hand. Oracle Inc. (2011) indicates that reporting at each level can help track "fit for use" by using service level agreements. In addition, Loshin (2013) recommends the use of a

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data quality score card to assess the level of data quality.

Challenges of data quality and its assessment

Cai and Zhu (2015) identified the challenges of data quality and its assessment in big data era. These researchers found out that data quality not only depends on its dimensions but also on business environment, processes and users. The researchers further pointed out that data producers are not its users and that makes it difficult to measure quality. They proposed a hierarchical data quality standard from the users' perspective which involves data quality dimensions, elements and indicators. It also formulated a big data assessment process with a feedback mechanism which consists of elements from data collection goal setting, determining quality dimensions and elements, indicators, formulating evaluation baseline, actual data collecting, cleaning, assessment generating reports, analysis, mining and finally output results and this process is continuous. The researchers recommended that further studies should focus on data governance because it drives high quality data which is a precondition for Big Data analysis. However, much their study provided a thorough literature review, it lacked empirical testing and an underpinning theory that could inform further research.

Botha et al. (2015) affirmed that creating quality data that is fit for use in the healthcare institution is still a challenge. Qazi and Ali (2011) also, observed that data is collected for the purpose of only generating reports. Cai and Zhu, (2015) noted that data producers are not the users, and data users cannot improve their own data produced within their systems or functional business units. For example, data entrants into the HMIS do not have the incentive to maintain high quality data because they focus on entering data quickly without rejection by the system. As a result, when data is summarized, standardized, integrated and subjected to another system or used in another context, data quality issues emerge.

Paoline et al. (2016) adapted the use of procedures and processes that allowed project and regulatory requirements that can protect patients, their data and health care systems in a Patient Outcome Research to Advanced Learning (PORTAL). The researchers found out that data governance is one of the governance priorities identified and can address issues of overseeing procedures to request and use data, ensuring data quality and integrity, addressing conflict of interest, developing and maintaining transparency of activities and results in defining guidance related to data access and use. The researchers recommended that governance should not work in a vacuum, it must be aligned with organization policies and create a culture of trust and collaboration. This study incorporated culture and trust under the construct of environment in the research model as these factors have been widely acknowledged to inform data governance.

Espinosa and Armour (2016) designed a framework for coordination and governance of Big Data analytics. The researchers used the coordination theory to support their study in which they pointed out that structural (data ownership rights, steering committee), operational (data retention, access rights, data protection, storage and migration policies) and relational (awareness and education on data practices, communication) practices are vital for Big Data analytics governance. Much as the framework of their study was based on related literature, it lacked empirical validation and such limits its use to inform other studies. More still, their study focused on effective coordination and governance for improved Big Data analytics practices and little was done in relation to data governance and its role to improve data quality which is the key aspect of the current study.

Personal Health Data

Holmes (2016) identified that health personal information is increasingly becoming important for a number of users in business operations, quality improvement and research. This requires high standards of security, privacy and proper use of personal health data in order to preserve trust. The researcher holds that despite the existence of health information technology of Big Data and distributed clinical research, there is still limited access and short supply of health data governance. He further recommended that to maximize the utility and availability of data sets, data owners and policy makers should discuss data access policies as a means of improving its governance. Further still, the researcher recommended that data governance design, implementation and functions should be uplifted from being an afterthought or an add-on issue in the health sector. The researcher noted that data governance is a central challenge in the health sector that needs to be handled independently in its own field.

Holmes (2016) and Ladley (2012) observed that many organizations don't have data governance departments or units. They argue that data governance issues are virtually handled by business and IT department thus depriving the ability for data governance to enable carry out the resolution, monitoring and directing data quality issues. Both Holmes (2016) and Ladley (2012) studies lacked underpinning theories that could empirically be used to support organizations in data governance or in the improvement of data quality.

Alhasaan et al. (2016) analyzed 31 peer reviewed papers on data governance activities using Khatri and Brown (2010) data governance framework of five decision domain. Using a content analysis method, they found out 8 major data governance action areas that includes; data roles and responsibilities, policies, processes and procedures, standards, strategy, guidelines,

technologies and requirements. They recommended that these areas need to be empirically tested in future data governance research. Over the past years more and more technologies have been developed, and these technologies have enabled people all around the world to produce and manufacture products at a very high rate. The worrying thing all around the world is that people will begin to manufacture products that are of sub stand, products that do not work, and products that are harmful to human beings. One may wonder if technology has brought more harm than good, in that in the 21st century counterfeit products have increased tremendously and among these counterfeit products are counterfeit drugs, and this has worried the world's health sector because people are making drugs that do not work or drugs that have incorrect measurements of medicinal ingredients in the drugs that are being made.

Women constitute an important segment of population in development. They are not only the majority in many nations but also have great potentials to improve their health and that of society. As an old adage goes 'a healthy nation is a wealthy nation' as healthy people are more productive. Women can effectively ensure a health nation if they are exposed to appropriate, timely, reliable and adequate health information. However, very little is known about women's health information needs in Zambia, Africa and the world at large. The lack of awareness of information needs and the inability to recognize and adequately express information needs are serious barriers to fulfilling information needs of women. Information need is espoused as the foundation from which to develop individual-centred services (Ormandy, 2010). Hence, it is important to study women's health information needs to develop women-oriented information systems in order to serve them better. By highlighting the health information needs of women, awareness for the need to pay

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stronger attention to dormant information needs and information needs that are ignored can be raised to all stakeholders. WHO (2009) argues that some health challenges affect both women and men but, because they have a greater or different impact on women, they require responses that are tailored specifically to women's needs.

Problem of counterfeit drugs

Recent statistics from (Southwick, 2013) have proved that over 1 million people die annually from counterfeit drugs, which is evidence that we are all not secure no country or state is exempted from this problem of counterfeit drugs. Surveys that have been taken in Africa by WHO have proved that between 20% and 90% of all anti-malarial failed quality testing because these anti-malarial drugs contained medicinal ingredients that are incorrect.

According to the Online Editor (2015), sexual and reproductive health is a human right, essential to human development and to achieve the Millennium Development Goals. Poor people, especially women and young people, face huge social and economic barriers to sexual and reproductive health. He further notes that achieving universal access to reproductive health and reproductive rights, including family planning is critical for maintaining and achieving good health outcomes. He also states that access to reproductive health and reproductive rights is also critical for reducing maternal and child mortality. It also positively influences population dynamics including the demographic dividend. To achieve sustainable development, there has to be emphasis on sexual and reproductive health as they are central to achieving sustainable development. Sexual and reproductive health is important to everyone's stage in life. Yet far too many people are denied their right to sexual and reproductive health. The vast majority are poor women, men and young people in developing countries. Millions of women and men lack access to contraception and to the

sexual and reproductive health information and services they need to choose their family size and improve their own and their children's life chances. Millions more people are living with HIV and sexually transmitted infections that could have been prevented or treated. Every minute a woman dies from a complication of pregnancy or childbirth. Some 80 million women each year have unintended or unwanted pregnancies. Women especially need more choice and control over their sexual and reproductive lives. This important aspect of development was also brought out by Vice-President Inonge Wina during her recent visit to New York where she delivered a key note address at a high-level event focusing on pivotal role of reproductive health and rights in sustainable development.

Ngosa (2014) posits that many youths are confused by different safe sex messages the media and various organizations give out in regards to Sexual Reproductive Health (SRH). Ngosa noted that limited and lack of information on SRH as well as limited access to youth friendly health services in many communities has negatively impacted on reproductive health. He further states that statistics of teenage pregnancies were alarming and needed urgent solution and calls for a need to address the barriers that young people face in accessing sexual and reproductive health information and services. He argues that no woman should have to risk her life or health because she lacks safe reproductive health choices.

Maternal Health Information

A recent study was conducted by Mumba (2015). Mumba explored the information needs of women attending antenatal clinic in Zambia's Makululu compound, Kabwe district. This study revealed that women information on nutrition, mother – to – child transmission of HIV/AIDS and immunization against tetanus toxoid (TT) and safe delivery were the major information needs of women. This study

was conducted on only in one district of Zambia out of the 123 districts. Not only that, the study only focused of maternal health information seeking. There is need to understand health information seeking from the general perspective.

The necessity of information in the modern world which is increasingly being strongly influenced by the oncoming of globalization. This is influencing the process of interface and interaction between individuals and organizations across time and space essential. This interaction is fundamental for the exchange of information and knowledge, and is globally supported by the swift expansion of information and communication technologies (ICTs). Information, autonomous of the modes used to relay it is an essential resource for development, and primarily, the basis upon which Individuals and organizations make decisions. Within the organizational framework, information permits individuals to communicate, whether face-to-face or through a relaying medium, about their work, lives and other experiences. ICTs present mankind with great opportunities to permit the processes of social changes, for example the Internet has fundamentally changed our modes of communication. The accessibility and use of ICTs are becoming more and more a requirement for economic and social development in conditions of globalization (Castells, 1999). However, according to (Braa and Nermunkh, 2000; Walsahm, 2000) technology itself does not lead to empower individuals, but it can be configured in alternative ways that are need-based, that enhance social benefits, and can help to empower individuals. It is generally assumed that integration of ICTs in any sector has resulted in improvements, however there is little research or available knowledge on the actual effects of the integration of ICTs in Managing patient information.

Intensify Information, Education and Communication

Simaubi (2013) assessed cervical cancer awareness and uptake of Pap smear among women above 18 years in Maramba Compound of Livingstone in Zambia. The study indicated that half of the women interviewed were not aware of cervical cancer and no one had ever done a Pap smear and that those who were aware of cancer of the cervix had no adequate knowledge on the disease. There is need to for the Health care professionals to intensify Information, Education and Communication (IEC) on cancer of the cervix and its prevention. Meanwhile, Lungu (2011) undertook a study to determine the knowledge levels on breast cancer, risk factors, symptoms and screening methods among first degree female relatives of breast cancer patients at cancer disease hospital in Lusaka, Zambia. The study revealed that relatives of breast cancer patients had average knowledge on breast cancer risk factors, symptoms and screening methods. The study recommended for increase in dissemination on information in these aspects.

Chowa et al (2011) looked at the prevalence of hypertension among women of child-bearing age in Chibombo, Zambia. The study established that many of the participating women were at risk for cardiovascular diseases. Those attending the clinic were unaware of their blood pressure problems resulting in missed opportunities for treatment to maintain their health whether pregnant or not. The study recommended for cost-effective methods for the timely diagnosis and management of hypertension. According to Chowa, increasing opportunities for diagnosis and low-cost life-saving interventions will result in hypertension prevention and control in primary and secondary care settings in Zambia. Low cost hypertension control and treatment strategies include engaging patients in moderate physical activity; encouraging maintenance of normal body weight, limiting alcohol consumption, reducing sodium intake,

maintaining adequate intake of potassium, fruits, vegetables, and low-fat dairy products and foods reduced in saturated and total fat13.

Banda (2010) investigated the knowledge and attitude of antenatal mothers towards danger signs in pregnancy in selected Lusaka Urban clinics. The study revealed varied health education topics that pregnant women are taught at antenatal clinics including prevention of mother to child (PMTC), birth preparedness, nutrition in pregnancy, signs of labor, cancer of the cervix, care of the baby, danger signs in pregnancy, importance of antenatal, family planning and prevention of malaria, syphilis and tetanus. However, the study established that the level of knowledge on danger signs in pregnancy that include bleeding, swelling of the body, high fever, pallor, severe headache, draining, fitting and dizziness was inadequate among pregnant women. This was evident from the low ranking as number four among the topics given during antenatal care. The study concluded by recommending for increased dissemination of information to sensitize women on dangers signs in pregnancy. Another important recommendation was on mode of presentation of this information in a way that it can be best understood by pregnant women.

Recognizing the importance of expanding the number of family planning options available to women as a critical part of increasing contraception coverage, decreasing unintended pregnancies and reducing maternal morbidity and mortality, a study was undertaken by the University Teaching Hospital (2010) on knowledge, practice and attitude towards Emergency Contraception (EC) among women with abortion at the UTH, Lusaka, Zambia. The findings of the study were that knowledge about Emergency Contraception (EC) among women with abortions admitted to UTH was low. Awareness and knowledge of EC should be increased.

Lagro et al (2003) conducted a hospital-based study on postpartum health problems in rural Zambian women. The study population consisted of women who attended the hospital within three months after delivery of a live or stillborn baby with a gestational age of more than 22 weeks or weighing more than 500 grams. The study established that health problems are very common among women as participants reported at least one health problem. The problems reported by participants included abdominal pain, backache, headache, fever, dizziness, vaginal discharge, fatigue, dysuria, constipation, heart palpitations, abnormal vaginal bleeding, breast problems, oedema, incontinence and faecal incontinence. The study recommends that women should be educated on specific conditions that require medical care. More information is also needed on the prevalence of sexually transmitted infections in antenatal and postpartum women including the feasibility of mass screening and treatment in this group of women.

It is clear from this review that although a fair amount of evidence is available on health information needs, it is scattered and uneven in terms of both geographic and thematic coverage. Much of the evidence comes from studies in developed worlds. There is a dearth of literature from developing countries, particularly on the African continent. One key observation from literature is that gender specific studies on health information needs are scanty. This lack of information is a major gap in designing programmes that provide women-centred health information services. In addition, studies exploring the health information needs of women have tended, by and large, to focus on specific periods of women's lives (the reproductive ages, for instance) or specific health challenges (WHO, 2009) such as pregnancy-related health information needs, cancer, and other disease specific conditions. In fact, the major health topics on which information

needs of women have been investigated include cancer (especially breast cancer) and maternal or reproductive health. Thus, major gaps clearly remain. The review highlights the need for more research on health information needs of women pertaining to other specific health conditions like mental health, stroke, malnutrition, heart diseases, tuberculosis, violence, injuries, female cancer (especially cervical and ovarian), STIs and disability. For instance, commenting on the need for studies on mental health and injuries, Cooke (2009) submits that, mental health and vehicular deaths are among many neglected public health challenges yet have major impacts on mortality rates and productivity. It has been predicted that by 2020, road traffic injuries will rank third among causes of disability-adjusted life years in Africa. Few studies on the impact of mental illness on mortality, disability and productivity have been conducted, and mental illness is highly stigmatized and vastly underreported (Cooke, 200).

Unfortunately, Zambia is also affected in that it is not spared from having counterfeit drugs out on the market and people do not get healed because the drugs that they buy are of substandard or contains incorrect ingredients, some people even die because of counterfeit drugs.

Therefore, what shall we do then to solve this problem? Well the solution is in our hands in that a system can be developed that is able to tell a counterfeit drug from a genuine drug from the covers of the drug, a system that is able to tell that this drug is expired and is not safe for consumption. The Vision 2030 plan which seeks to empower the Zambian populace with information among other things will help this system come to a realization (MoH, 2013).

Mobile phone usage has increased tremendously over the past few years and there are 3.5 times more mobile phones than PC's (Nisarg Gandhewar, 2010). Today mobile phones are not just used for texting or calling but are used for other things like entertainment, gathering information and many other important things.

Mobile Usage Increase

Zambia has had an increasing mobile usage increase from 2000 up to 2012 (ZICTA, 2014) until in 2013 and 2014 where the use of mobile phones dropped because people are now using tablets and other devices that are able to communicate like mobile phones. In 2000 there were only 49,957 mobile subscribers and by 2014 there are 8,577,215 which show a steady increase in the use of mobile Technology. The diagram below describes statistics provided by ZICTA.

Using the statistics provided above we can safely say that mobile internet users keep increasing every day. These statistics also help achieve the Zambia e-health strategy, by providing solid evidence why mHealth should be implemented in Zambia. The problem statements stated in the e-health strategy is that there are high disease rates, and shortages of health practitioners (MoH, 2013), but with the help of mHealth these problems can be reduced.

The increasing demand of mobile phones has led to the development of different platforms, some of the big platforms available are Android, RIM's BlackBerry, Apple's iPhone, and Windows Mobile, and therefore in this part of the chapter we are going to elaborate more on each of the popular platforms available.

Android is a software stack for mobile devices which includes an operating system, middleware and applications, which was developed by Google and its code license is under apache which means that its code is free. According to statistics provided by (CSSInsight, 2014) android dominates in volume and market share terms as evidence shows in the diagram below:

	2012		2013		
	Units (M)	Market Share	Units (M)	Market Share	Growth in 2013
Android	517	70%	813	79%	57%
iOS	136	19%	153	15%	13%
Windows Phone	16	2%	33	3%	105%
BlackBerry	33	4%	19	2%	-42%
Symbian	23	3%	1	0%	-96%
Others	9	1%	8	1%	-15%
Total	734	100%	1,027	100%	40%

Figure 1 showing the market share of Mobile platforms as of 2012-2013 source (CSSInsight, 2014)

Android is belt on top of the Linux kernel because the Linux kernel has been improving tremendously over the past years (Marko Gargenta, 2014) and is suitable for the following reasons:

Linux is a very relative system that is very easy to port to another hardware architecture, and because Android is based on the Linux kernel not much is to be considered for the underlying hardware features (Marko Gargenta, 2014).

Linux is a highly secure system, having been tested over the years through some harsh environments and having been passed these tests (Marko Gargenta, 2014) states that it has been concluded that it is a secure kernel, therefore Android relies on the security of Linux. Linux comes with a lot of feature which are important to android, feature like power management, memory management and many other features that android uses. Recognizing that ICTs are important not only as technologies per se, but for the social innovation they can enable, including new ways to manage information and people to strengthen health and medical systems. It is quite notable that there is a disparity in the provision of ICTs in medical information. One such example is the Sustainable Science Institute (SSI) which is embarking on a new initiative in Health Information Technologies (HITs). SSI is building on the Nicaragua experience with the current mandate to improve vaccination efficiency and prenatal care in Managua. SSI is working to identify, test, and implement low-cost, open source ICTs solutions that facilitate infectious disease research, control, and prevention in limited resource settings. It is also evaluating the potential impacts of ICTs solutions (such as electronic medical records [eHealth], mobile phone applications [m Health], and laboratory information management systems [LIMS]) on improving targeted public health outcomes for priority health problems in underserved communities (Coloma & Harris 2009).

The use of ICTs not only empowers Health information specialists with improved access to medical information but more broadly strengthens partnerships and capacity-building networks in the developing world that promote knowledge exchange about sustainable best-practices in HIT implementation at a local level (Coloma & Harris 2009).

One of the most notable ICTs in use is the Internet, which is today the most sophisticated and contemporary way of interactive networking, and has offered global access to all kinds of information generation and sharing across the world, thus plummeting the world to a global village. By 2004, internet users per 1000 in USA had reached 569 as compared to 15 in sub Saharan Africa and 5 in Zambia (World Bank, 2006). The internet has become an important tool for information access because through the

Internet, one can record, access, search and retrieve information anywhere in the world in minutes. One of the recent forms of information sharing with the use of the internet is Data casting. It allows forwarding and storing of data via an Internet protocol (IP) satellite platform. It is being used to complement the broadcasts into sites, making it possible for users to view content stored on a local PC storage device "on demand" daily.

According to McConnell et al (2006: 1) Information and communication technologies

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(ICTs) are increasingly being recognized as essential health technology, giving individuals at all levels of the health workforce and other stakeholders' access to information that helps them protect and improve health and save lives. At the clinical and laboratory level, ICTs are used to track and provide patient information, to facilitate research, diagnosis and testing, and to deliver services through telemedicine despite distance and time barriers.

According to Hoffman (2001:59) the information and communication technologies (ICTs) have accelerated the shift to a knowledge economy where many organizations especially those in the north have capitalized on the communications revolution to accelerate and widen the dissemination of, and access to, knowledge and information.

ICTs have further increased the capacity to generate new knowledge through international networks and partnerships; this is because of the understanding that generating and sharing publicly-funded research provides evidence for social and health policy-making and practice and knowledge for public services and infrastructure.

Hoffman (2001:59), states however, that organizations [and countries] in the south, having faced numerous obstacles in development, have not been able to benefit significantly from dissemination of research on the internet and participation in international research networks. This is because organizations. [and countries] in the south often lack stable, broadband internet access and technical capacity to maintain a network and they also face price barriers to basic research in the form of peer-reviewed literature. Therefore, successful implementation of ICTs needs to address six interlocking frameworks for change: the infrastructure, attitude, staff development, support (technical and administrative), legally mandated coordinating bodies and also sustainability and transferability of the ICTs used.

According to Bedi (1999: 1), the use of ICTs in the development process is on the rise. Many donors are specializing in this field and even earmark aid to mainstream the use of ICTs in their programs. This is because the link between development and the increased use of ICTs in development is based on two assumptions: that a new kind of economy is emerging – an information economy; and second, that the main constraint to development is knowledge or information gaps. As a result, this prevents developing countries from being fully part of the emerging global ICT infrastructure because they lack resources, both financial and human, to acquire and apply the technologies. Even if the government or donor agencies are prepared to invest in the required infrastructure, at present it is assumed there are not enough skilled people within the health sector, especially in the rural areas, who are able or willing to use most ICTs effectively Kirkman (1999: 7) contends that it is in the field of health and medicine that ICTs, specifically the Internet, have been used extensively from their inception. Undoubtedly, telemedicine has a range of immediate and practical benefits. However, it is well-known that lack of up-to-date information is a common problem in developing countries. Kirkman (1999: 7) further states that training textbooks are often outdated and access to information on the latest drugs or preventive treatments, as well as appropriate expertise for accurate diagnosis, are also limited this is particularly so in rural areas.

ICTs in recent times have been developed, spread and used widely (Unwin, 2009). ICTs can have a tremendous effect on accelerating the development process of the country. ICTs make it possible to deliver information by means of voice, text, data, video and graphics faster and more efficiently than before. Furthermore, the constantly evolving range and quality of ICT delivery platforms is improving

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the availability and affordability of accessing of information. These developments provide an enabling environment for government to work with the private sector and civil society to improve and expand access to information for all its citizens (UNESCO, 1996).

The UN hopes that if the very poor in Africa have mobile phones, they will be able to use them effectively in medical emergencies and also to access appropriate and useful health information. A rural hospital would be able to make a call to the nearest specialty hospital or specialist and thus help save lives during emergencies Mobile web browsing, at the very least, could provide instant access to the most relevant and up-to-date health information to health practitioners, especially if the most relevant and appropriate information were available in easily accessible forms, and it would offer a private and personal form of learning experience. The mobile web can be a "knowledge repository" for both providers and consumers of health care (UNESCO, 1996).

Medical record-keeping is an area which begs for leapfrogging. In the tsunami-hit hospitals in Sri Lanka and other countries, for example, paper-based health records and patient records were washed away or destroyed. Having one's medical records available on a mobile phone would also help doctors, nurse and pharmacists make the right decisions based on a patient's health history (McConnell et al, 2006).

2.3 ICTs and Improving Poor People's Health

Health care is one of the most promising areas for poverty alleviation and achievement of sustainable Development Goals (SDGs) with ICTs, based largely as it is on information resources and knowledge. There are many ways in which ICTs can be applied to achieve desirable health outcomes. ICTs are being used in developing countries to facilitate remote consultation,

diagnosis, and treatment. Thus, physicians in remote locations can take advantage of the professional skills and experiences of colleagues and collaborating institutions (DOI, 2001). Health workers in developing countries are accessing relevant medical training through ICT-enabled delivery mechanisms. Several new malaria Internet sites for health professionals include innovative "teach-and-test" self-assessment modules. In addition, centralized data repositories connected to ICT networks enable remote health care professionals to keep abreast of the rapidly evolving stock of medical knowledge.

When applied to disease prevention and epidemic response efforts, ICT can provide considerable benefits and capabilities. Public broadcast media such as radio and television have a long history of effectively facilitating the dissemination of public health messages and disease prevention techniques in developing countries. The Internet can also be utilized to improve disease prevention by enabling more effective monitoring and response mechanisms (Mayanja, 2007).

The World Health Organization and the world's six biggest medical journal publishers are providing access to vital scientific information to close to 100 developing countries that otherwise could not afford such information. The arrangement makes available through the Internet, for free or at reduced rates, almost 1,000 of the world's leading medical and scientific journals to medical schools and research institutions in developing countries. Previously, biomedical journal subscriptions, both electronic and print, were priced uniformly for medical schools, research centres and similar institutions, regardless of geographical location. Annual subscription prices cost on average several hundred dollars per title. Many key titles cost more than US$1500 per year, making it all but impossible for the large majority of health and research institutions in the poorest countries to

access critical scientific information (World Health Organisation, 2004.).

Additionally, Apollo Hospitals has set up a telemedicine centre at Aragonda in Andhra Pradesh, to offer medical advice to the rural population using ICTs. The centre links healthcare specialists with remote clinics, hospitals, and primary care physicians to facilitate medical diagnosis and treatment. The rural telemedicine centre caters to the 50,000 people living in Aragonda and the surrounding six villages. As part of the project, the group has constructed in the village a 50-bed multi-specialty hospital with a CT scan, X-ray, eight-bed intensive care unit, and blood bank. It also has equipment to scan, convert and send data images to the tele-consultant stations at Chennai and Hyderabad. The centre provides free health screening camps for detection of a variety of diseases. There is a VSAT facility at Aragonda for connectivity to Hyderabad and Chennai. The scheme is available to all the families in the villages at a cost of Rs.1 per day for a family of five (Harris, 2002). In Ginnack, a remote island village on the Gambia River, nurses use a digital camera to take pictures of symptoms for examination by a doctor in a nearby town. The physician can send the pictures over the

Internet to a medical institute in the UK for further evaluation. X-ray images can also be compressed and sent through existing telecommunications networks (World Bank, 2002). In Andhra Pradesh again, handheld computers are enabling auxiliary nurse midwives to eliminate redundant paperwork and data entry, freeing time to deliver health care to poor people. Midwives provide most health services in the state's vast rural areas, with each serving about 5,000 people, typically across multiple villages and hamlets. They administer immunizations, offer advice on family planning, educate people on mother-child health programs and collect data on birth and immunization rates. Midwives usually spend 15–20 days a month

collecting and registering data. But with handheld computers they can cut that time by up to 40 percent, increasing the impact and reach of limited resources (World Bank, 2002).

World Health Organization World Report on Knowledge for Better Health: Strengthening Health Systems, LEE Jong-Wook, the Director General of the World Health Organization states that 'There is a gap between today's scientific advances and their application: between what we know and what is actually being done.' (World Health Organization, 2004) Godlee et al (2004) refer to the "know-do gap" being as great in developed countries as it is in developing countries.

This is an interesting shift in rhetoric, suggesting a possible consensus that knowledge is both more freely available and increasingly accessible to all; the difficulty now is how to transform that knowledge into effective practice.

Electronic information in developing countries

There is some existing research into the provision of electronic information in developing countries; there is a lack of research specifically into electronic healthcare resources. Commentators continue to call for an increase into research in this area. (Godlee et al, 2004b; World Health Organization, 2004; World Summit on the Information Society, 2003) The literature presented here is drawn both from general studies in this area, and also from literature that specifically discusses the situation in Nigeria.

Chisenga (2004) carried out a survey of the use of ICTs in ten African Public Library Services. The survey found that, although most libraries had Internet connectivity, almost none were offering Web based information services to their users. Lack of funding remains problematic in developing ICT services, with many libraries relying on donor assistance, or choosing to establish cyber cafes as a means of providing Internet access and generate

revenue. Few libraries had ICT strategies for development. Chisenga identifies four principle barriers to the effective provision of ICTs in the surveyed libraries: a lack of adequate or reliable funding; a lack of strategic planning; a lack of use of Internet to provide information services to users; and a lack of consistent training for library users in new ICT services. There is evidence that access to ICTs themselves remains a problem. Ondari-Okemwa (2004) carried out a survey of 46 sub-Saharan countries to discover the impediments to providing access to "global knowledge" in sub-Saharan Africa. Respondents suggested that unreliable electricity supply and high cost of ICTs were significant barriers to accessing online information.

Similarly, in a study of access to electronic information resources in Nigerian libraries, Ashcroft and Watts (2005) found that unreliable electricity supplies and prohibitively high costs of Internet Service Providers (ISPs), hardware and software were barriers to ICT provision. In a discussion about ICTs in African universities, Karbo (2002) also identifies the problem of the cost of providing ICTs as well as a suitable infrastructure to house them. A study of use of electronic information resources at the University of Agriculture Library in Abeokuta, Nigeria, also found that constraints to accessing resources were principally infrastructural; specifically, a lack of computer terminals and power supply outages (Oduwole and Akpati, 2003).

ICT skills and training causes

Lack of adequate ICT skills and training causes difficulties, both amongst staff providing access to ICTs and their users. (Ashcroft and Watts, 2005; Idiodi, 2005; Karbo, 2002) This may be compounded in some countries by low basic literacy levels amongst the population. (Ondari-Okemwa, 2004) Funding itself may be poor. Okiy (2005) describes the situation in Nigerian libraries,

which receive poor allocations from Government, and therefore look elsewhere for income. Costs may be passed on to users themselves. For example, the University of Jos introduced library fees for its students. Akporhonor (2005) reports a similar situation at Ambrose Alli University and Delta State University.

There is some evidence that many ICT users in developing countries gain access to Internet facilities through cybercafés, again passing costs on to users. Jagboro (2003) conducted a study of Internet usage in Nigerian universities and found that 45.2% of respondents accessed the Internet in cybercafés. Jagboro suggests that this high score may be due to the proximity of cybercafés to user facilities, such as hostels and lecture halls.

However, access to cybercafés may also be problematic. Adomi (2005) reports on a price increase in cybercafé services in Abraka, Nigeria. This was brought about after cybercafé owners invested in generators in order to provide a reliable electricity supply, as well as meeting high costs of ISPs. The price increase was reversed as it led to a decrease in customer patronage.

Some research exists about the use of electronic healthcare resources in Nigeria. Ajuwon et al (2003) carried out a study of uptake of ICTs by health science students at the University College Hospital, Ibadan. This study found that 57.4% of students sampled could not use a computer, that there was a need for ICT literacy to be added to the curriculum and that there was a need for adequate computer laboratories to be established. Ogunyade (2003) examined the use of Medline the database of life sciences and biomedical bibliographic information – by medical students at the University of Lagos. The study found that use of the database was poor, due to lack of awareness, lack of access to computers, insufficient training and the high cost of provision.

Across Sub-Saharan Africa, the Internet is used to report daily cases of meningitis to monitor emerging epidemics. When threshold levels are reached, mass vaccination is required and the Internet is used to rapidly mobilize medical personnel and effectively coordinate laboratories and specialist services.

However, Sub-Saharan Africa has fewer than 10 doctors per 100,000 people, and 14 countries in the region do not have a single radiologist. The few specialists and services available are concentrated in cities. Rural health workers, who serve most of the population, are isolated from specialist support and up-to-date information by poor roads, scarce and expensive telephones, and a lack of library facilities (Fraser and McGrath, 2000).

In a bid to find a solution to the growing medical problems of sub-Saharan Africa, many governmental, non-governmental, and international developmental organizations are tinkering with the notion of telemedicine. The International Telecommunication Union has organized several missions of telemedicine experts to selected African countries. These missions have tried to identify Africa's needs and priorities for the introduction of telemedicine services (ITU, 2000). Health Net, the most developed Africa-wide initiative, has conducted numerous projects since the mid-1980s, involving physician collaborations, medical data collection, health care delivery, medical alerts, access to medical libraries, and medical research (SATELLIFE, 2001).

Success stories of telemedicine penetration and digital revolution driven by ICTs

Despite the various obstacles, there have been some success stories of telemedicine penetration in the African continent such as Health Net. Health Net is a computer network project, which was initiated in 1989. It employs satellite, telephone and Internet technology to provide health information and communication among professionals and thereby attempts to overcome a shortage of current health information and the isolation of health professionals. It provides concrete benefits to health-care workers such as physician collaborations, data collection, health-care delivery, medical alerts, access to medical libraries and user databases, to name a few. (HealthNet, 2001).

Thus, the arguments we have made for the need to establish comprehensive ICT infrastructure is very pertinent for the potentials of telemedicine to be realized. Even in urban areas that have some Telecommunications infrastructure, the limited bandwidth and shortage of telemedicine expertise limits its adoption. Most African countries cannot afford the very sophisticated telemedicine solutions involving ATM, virtual networks, and other advanced technologies.

There's a growing evidence that the digital revolution driven by ICTs has the power to transform production process, government efficiency and effectiveness, education, health, citizen participation and others aspects of our individual and collective lives (Amoussougbo, 2008). Therefore, it can create new form of economic growth and social development in third world countries, Zambia inclusive. It is also important to note that the existing Digital Divide works as a barrier to the existence of a true Information Society's existence in the developing world, Zambia inclusive. Digital Divide is the technological gap between countries that have fully exploited ICTs and those that have not. The digital divide is often associated with the resulting gap in terms of economic development.

[2] 2.4 ICTs, Health and in Zambia

Zambia being a country with a low level of technological development in Africa and one of the most economically poor in Sub-Saharan Africa has low information and communications technology (ICT) development. Research has shown that ICT

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is a key for economic growth and development in virtually all countries in the present information age (Mbarika et al., 2005; Meso et al., 2006). With the development of complex and modern ICT, both developed and underdeveloped countries are exploring ways to enjoy the many benefits of these technologies (Musa et al., 2005; Straub et al., 2001).

With the variance in ICTs between Zambia and other countries, it is essential to take into consideration that application of ICTs varies. A digital divide between underdeveloped and developed countries looms large and brings differential capabilities of entire social [or regional] groups to access and utilize electronic forms of knowledge (Straub, 2003). This segregates the "haves" from the "have-nots" in the information society. While much discussion on the digital divide has focused on that which occurs among different social [and professional] groups within a single country (Hoffman and Novak, 1998), its cardinal to note the importance of the international digital divide between different countries.

An example of the "haves" is the International Network for the Availability of Scientific Publications. It has a (INASP 2005) Health Links, an Internet subject gateway to selected websites for health professionals, medical library communities, and publishers in developing and transitional countries.

In terms of health, the region's growing medical epidemics in the face of an acute shortage of medical facilities and personnel, the delivery of healthcare is inarguably one of the most fundamental needs for Sub Saharan Africa (Musa et al., 2005). The World Health Organization (WHO) reported that by the end of 2004, an estimated 38 million people worldwide, 2.7 million of them younger than 15 years were living with HIV/AIDS. More than 70% (28 million) of the total

infected live in sub-Saharan Africa (Fowler, 2004; Musa et al., 2005). Furthermore, malaria kills more than 2,800 each day in Africa; in some areas, 40% of toddlers may die of acute malaria due to inadequate medical intervention. Other diseases that kill millions of Africans each year include very treatable ones such as dysentery, cholera, typhoid, and yellow fever, among others. It is estimated that malaria is responsible for nearly 4 million clinical cases and 50,000 deaths per year, including up to 20 percent of maternal mortality… HIV prevalence in the general population was estimated at 16 percent of the population aged 15 to 49…other diseases contribute significantly to the disease burden in Zambia. These diseases include acute respiratory infections, diarrhea, worm infestations and bilharzias (schistosomiasis) and non-communicable diseases (NCDs) (FNDP, 2005.).

Norris (2001) provides an interesting analysis of this division, describing a multi-dimensional digital divide that exists globally, socially and democratically. The global digital divide is the difference in access to ICTs between countries; the social digital divide is the difference in access to ICTs between the citizens of a country; the democratic digital divide is the difference between those who are or are not able to use ICTs to participate in public life.

The multi-dimensional digital divide that Norris describes has a clear impact on the provision of electronic healthcare information in the developing world, both between countries and within them. Electronic healthcare information resources emerging from the developed world may not necessarily be relevant or appropriate to the needs of those living in developing countries. It may be that knowledge no longer functions accurately when disconnected from its environment (Jamba, 2000), that information is perceived as having little local relevance (Carter, 2005), or there is a lack of evidence-based research that is applicable for healthcare practitioners in developing countries.

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(Chinnock et al, 2005) Although there is continuing access to suitable ICTs and reliable connections to the Internet, it remains challenging and costly for many.

CHAPTER THREE: METHODOLOGY
3.0 OVERVIEW

This chapter presents the research methodology that was used to conduct the study. It presents details relating to the research design, area of study target population and the sampling procedure that was engaged. It will be going forward highlight data collection methods, data analysis, validity and reliability of research instruments and looked at issues related to ethical considerations and limitations of this study.

3.1 RESEARCH DESIGN

The research design refers to the overall strategy that you choose to integrate the different components of the study in a coherent and logical way, thereby, ensuring you will effectively address the research problem; it constitutes the blueprint for the collection, measurement, and analysis of data (SAGE, 2001).

A case study is an in-depth study of a particular research problem rather than a sweeping statistical survey or comprehensive comparative inquiry. It is often used to narrow down a very broad field of research into one or a few easily researchable examples (Sage, 2013). The case study research design is proposed to be used for testing whether a specific theory and model will actually apply.

The research proposed to adopt a qualitative case study design and at the same time it will borrow from qualitative paradigm in data collection and analysis. Further the research sat on the research philosophy of ontology which are theories of what the world is and what is goes on. Sage, (2008) defines ontology where this work is sitting on as the study that describes the nature of reality for

example, what is real and what is not, what is fundamental and what is derivative?

Since the researcher wants to boldly understand the effectiveness of ICT in managing health information some selected hospitals in Lusaka district. This research adopts case study design. According to kay martin (2015) these are studies that involve in-depth analysis of one unit of analysis. This unit of analysis could be an individual, group, community or society. That unit of analysis could be taken either as an independent or dependent variable depending on the nature of the problem.

3.2 TARGET POPULATION

Basha and Harter (1980 cited in Djan, 2013) "a population is any set of persons or objects that possesses at least one common characteristic." The term population" should not be taken in its normal sense when sampling rather it represents the full set of cases from which the sample is chosen (Saunders et al., 2012). Thus, the population from which sample for the study will be chosen from the clinics and hospitals in Lusaka (University Teaching Hospital, Levy Mwanawasa Teaching Hospital, Chipata 1st level Hospital and Metero 1st level Hospital.

It will be easier for the researcher to approach the residents of Lusaka as the researcher lives in the same district. Choosing any other city apart from Lusaka will mean travelling a long distance just to collect data which will be very difficult considering the time frame of this paper.

The focus of the research was on IT service delivery. Kombo and Troup (2006:76) show that, "a population is a group of individuals, objects or items from which the samples are taken for measurement" the population in the selected from clinics and hospitals in Lusaka (University Teaching Hospital, Levy Mwanawasa Teaching

Hospital, Chipata 1st level Hospital and Metero 1st level Hospital of Lusaka District.

3.3. SOURCE OF DATA

There are a variety of approaches that can be used in collecting information from respondents. Miller (1991) also acknowledges that data collection methods range from mere observation, interviews, questionnaires and group discussions. However, this study used both Secondary and primary data and was able to collect information from publications, reports, journals and published books. Primary data which was the basis of this study was collected through field work using self-administered questionnaires to the people involved. The advantage of using this kind of data is that it helped to sharpen and broaden the issues under investigation. In order to come up with the appropriate data, the researcher collected data from both primary and secondary sources.

3.4. RESEARCH SITE

The study was done at clinics and hospitals in Lusaka (University Teaching Hospital, Levy Mwanawasa Teaching Hospital, Chipata 1st level Hospital and Metero 1st level Hospital.

3.5. SAMPLE SIZE

The study adopted Fisher et al. (1983) formula in Mugenda & Mugenda (1999) to determine the sample size in the IT department and patients in the hospitals.

Since the sample size was small, data was be collected using semi- structured interview guides. An interview guide was a written list if questions that needed to be covered by the interview. Focused interviews, intensively investigated a topic and aims at gaining a complete and detailed situation.

In purposive sampling, sampling is done with a purpose in mind. We usually would have one or more specific predefined groups we are seeking (Babbie, 1986:165).

All of the methods that follow can be considered subcategories of purposive sampling methods. The researcher sampled specific groups of people as in modal instance, here it would be the stakeholders of the hospitals under discussion. In this method the researcher sampled with a purpose.

The study assesses about 100 – 150 people in the IT department and patients in the hospital. To determine how effective ICT management of health information was, and how it was helping both the data management team and the patients.

3.6. STUDY SAMPLE

The sample was surveyed is clinics and hospitals in Lusaka (University Teaching Hospital, Levy Mwanawasa Teaching Hospital, Chipata 1st level Hospital and Metero 1st level Hospital. According to Cook and Campbell (1979), in Wimmer and Dominick (1997), "one way to ensure external validity is to select a sample that is representative of the group to which the results will be generalized". Thus, this research sample adequately passes this test.

3.7. SAMPLING TECHNIQUE

Sampling can be defined as the "selection of research participants from an entire population, and involves decisions about which people, setting, events, behaviours and or social processes to observe." (Babbie, 1986:163).

Purposive sampling was used to determine who would form part of the focus groups and who would be interviewed. In purposive sampling, samples will be selected with a purpose in mind, and one or more specific predefined groups are targeted (Du Plooy, 1995:62). This type of sampling permits the selection of interviewees whose qualities or experiences indicate an understanding of the phenomena in question, and are therefore valuable.

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The stakeholders' experience and knowledge about the service delivery and how the situation could be improved.

This is the strength of purposive sampling. According to Du Plooy (1995:63) the advantage of a purposive sample is that the units selected are qualified to assist in the research. One can ensure that groups found in the population are represented in the sample.

Primary data was collected from the stakeholders themselves using purposive sampling technique and secondary information, which reviewed information regarding current situation was collected from published official government documents and other researched and published papers in journals.

This study employed a combination of two purposive sampling strategies; critical case and stratified sampling. Critical case sampling involves selecting a small number of important cases to "yield the most information and have the greatest impact on the development of knowledge". Patton 2015:276). The sample generally attain higher quality standards, and they are a principal source of scholarly evidence Creswell (2015). For the process to be systematic, both simple random and purposive sampling techniques were used to the selected targeted samples. Kombo (2002) argues that sampling procedure is a process of selecting individuals or objects from a population such that the selected group contains elements representative of the characteristics found in the entire group." The sample procedure therefore draws from men and women.

The researcher shall employ non probability sampling techniques in selecting the sample. Convenient sampling was used in the selection of the hospital while purposive sampling was used when selecting the research participants.

3.8. INSTRUMENTS FOR DATA COLLECTION

There are possible ways of gathering data directly from the respondents. In this research, the researcher used questionnaire and semi-structured interviews schedules to collect data. Sidhu (1984:145) states that, an interview is a two-way method that permits an exchange of ideas and information". This enables the researcher to collect more information because respondents are able to answer and express their views freely.

Since the sample size was small, data was collected using semi- structured interview guides. An interview guide was a written list if questions that needed to be covered by the interview. Focused interviews, intensively investigated a topic and aimed at gaining a complete and detailed situation.

A focus group discussion is a special type of group in terms of its purpose, size, composition and procedures. A focus group who are dealing directly with the IT departments, patients and patrons of these hospitals and clinics of the district and which were relevant for the study was proposed to be used. The discussion was carefully planned and designed to obtain information on the participants' beliefs and perceptions on a defined area of interest (Kombo and Tromp, 2006).

Focus group discussions were used to collect data from the stakeholders of the selected hospitals and clinics of Lusaka District.

In order to understand service delivery and performance at large, the researcher prepared the framework for the interviews and observations that enabled her to write the questionnaires and the interview guides and to refine her own interviews techniques. Besides that, senior and junior officers responded to closed and open-ended questionnaires. According to Turkmen, as cited by White (2005:253), open ended questions allow the

respondents to give their responses in whatever format they choose.

The study used structured questionnaires for the medical personnel and key informants in collecting data. The questionnaires were used in collecting both quantitative and qualitative data. Open ended questions in the questionnaires facilitated the collection of qualitative data while closed ended questions in the questionnaire solicited quantitative data.

3.9 DATA ANALYSIS TECHNIQUES

Data Analysis is the culmination of a lengthy process of the construction of instruments and data collection (Bailey, 1994:378). As several factors can influence the quality of focus groups interviews, considerable effort was made to minimise the risk of poor-quality responses within the groups. However, even though much care was taken to maximize quality in these groups, it was realized that the community cannot be assumed to have "a unitary set of values and interests" (Edwards, 1989), nor that those participating in the focus groups represent the diversity of interests likely to be found within the area. The results of these sessions were therefore only indicative of possible issues and priorities.

In this research study, data was analysed manually using thematic and content analysis. The scripts were first be coded according to the key thematic areas using a matrix such as knowledge, attitude, behaviour and practice. The recorded data was transcribed and keyed. Key emerging themes were proposed to be introduced based on the findings and was coded accorded for easy analysis.

Based on the nature of data collected, the data was tabulated and analyzed by mean, percentage and ranking order. Additionally, descriptions were based on the results of the graphic presentations such as tables, pie charts etcetera. The data

collected will be analyzed qualitatively by descriptive statements.

3.10 ETHICAL CONSIDERATION

The researcher strived to pursue respondents consent before administering the questionnaire and assured them that of confidentiality of results or the discussion. The study used codes for all transcripts and concealing of names of all respondents. Therefore, the study was conducted with respect and concern in the interest of all informants and respondents.

Research ethics is seen as the branch of philosophy that reflects on morally 'good' and morally 'bad' behaviour in scientific research (Dooley, 1984:330). The researcher's identity as a researcher was made known to all participants and was an open researcher. All information that was gathered in the focus groups remained confidential and the participants' anonymity was guaranteed and respected in the research process. The participants were allowed to terminate their participation at any point in the research process.

Sensitive issues such as bribery, corruption, abuse and discrimination were not be discussed or exposed in the final research dissertation. The researcher requested permission from the respondents before administering the questionnaire.

Field notes from the respondents and respondents' observation was typed on my computer and a password was required to access the field notes. One of the ground rules of the focus groups was that all discussions that took place within the focus group and remained within the focus group. The researcher promised to observe to the prescribed Information and Communications University code of ethics at all times.

3.11. LIMITATION OF THE STUDY

Some of the encountered limitations during the study included unstructured attitudes and moods of IT personnel and patients thus made work difficult; the congestion in the clinics and hospitals made it hard to navigate through the facilities, some of the respondents were unwilling to offer information for fear of selling out their colleagues; the potential respondents wanted bribes for them to offer data and information concerning the situation obtaining with regard to the discussion under study and, some respondents claimed to be busy. This research study was limited to clinics and hospitals in Lusaka district, the other issue limiting the study was that questions may not have been understood by respondents and some respondents were unwilling to give truthful respondents.

3.12. CONCLUSION OF CHAPTER

This chapter has brought out the methodological approaches that were employed in this study based on the research objectives. It had among other things highlighted the research design, the target population and the methodology used in collecting and analyzing the research. The chapter further highlighted ethical considerations and limitations to the study.

CHAPTER FOUR
4.0 PRESENTATION OF FINDINGS

Data analysis can be described as the process of examining the collected information by deductions and inferences from it. Kombo and Tromp (2006) state that analysis of data can be done qualitatively or quantitatively, for this study, data was compiled, checked and analysed using thematic analysis with simple tables, figures, and charts generated from excel.

This chapter presents the findings of this study. This is based on what the study set out to do: To assess how ICT utilization in managing patient information, was measured as whether the ICT facilities are being utilized in the management of patient information. This chapter begins with presenting the characteristics of respondents.

4.1 Characteristics of Respondents

For key informants four respondents were sampled from each of the 4 health facilities. Whereas for medical staff a total of 80 respondents were sampled from the four (4) Health facilities. An average of 15 – 20 respondents was sampled from each institution. In some institutions more than 20 were sampled where as in other institutions less than 10 were sampled. This was based on the availability of medical staff.
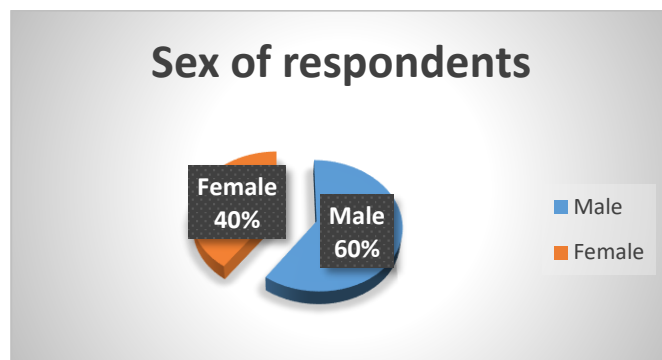
The sample of key respondents was characterized by certain key features. In terms of sex for the key respondents, (60%) of respondents were male while (40%) were female.
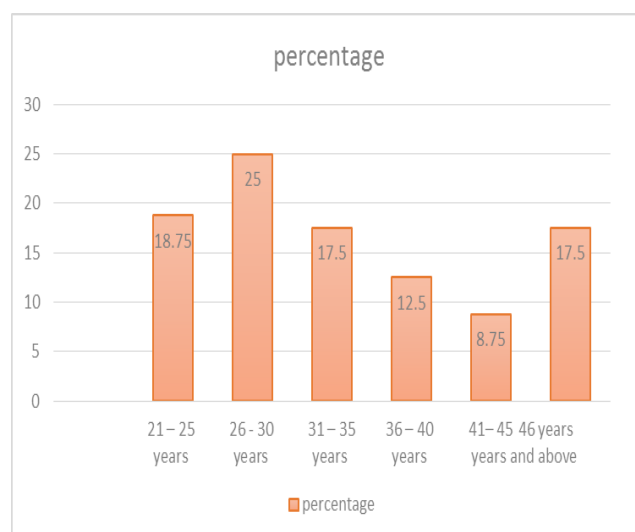
In terms of age distribution, the sample of key informants was characterized by (18.75%) of respondents being between 21-25 years of age. (25%) of respondents were between 26-30 and. (17.5%) were 31-35%. 12.5% of the respondents were 36-40 years. 8.75 of the respondents were 41-45% and 17% of the respondents were above the of 46years.
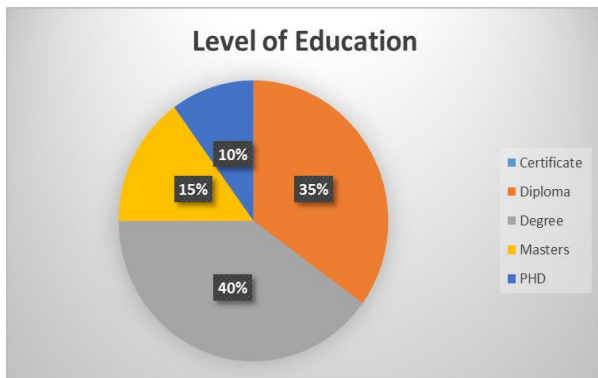

The study also revealed that (40%) of key informant respondents had a Bachelor's Degree as their qualification, followed by percent 35% with a Diploma, (10%) with a PhD and three (8.3%) with a Diploma. While for medical staff it was observed that 34 (42.5%) of respondents had a Bachelor's Degree as their qualification, followed by 24 (30%) with a Diploma, 14 (17.5%) with a Master's Degree, five (6.3%) with a Certificate and three (3.8%) with a PhD.

4.2 TYPE OF ICT USED
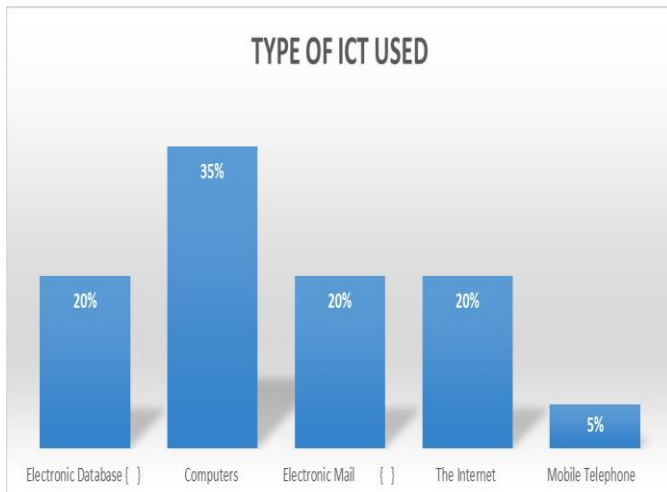
Following the findings, 35% of the respondents use computers to manage their data, and 20% of the respondents said they use electronic data bases, 20% of the respondents, 20% of the respondents used the internet, 5% use mobile telephones.

4.3.1 ICT POLICY
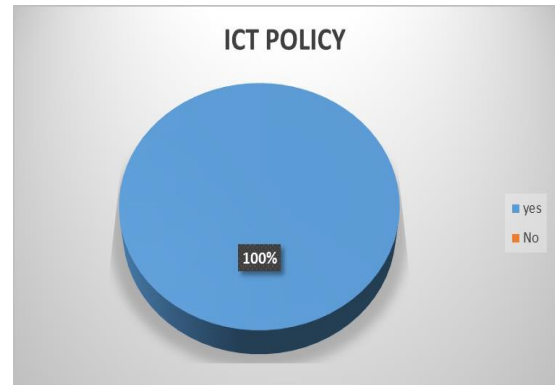
Hospitals where also asked if they have a policy with regards to ICT in place. 100% of the respondents acknowledged of having an ICT policy.

4.3.1 ICT Policy Framework and Training

All the 80 (100%) respondents indicated that their institutions had a policy that governs the acquisition and use of ICTs. However, only (38.9%) of the respondents stated that their institutions had an ICT training policy for their data management personnel with (61.1%) stating that their organizations did not have an ICT training policy for their data management personnel (Shown below in figure 28).
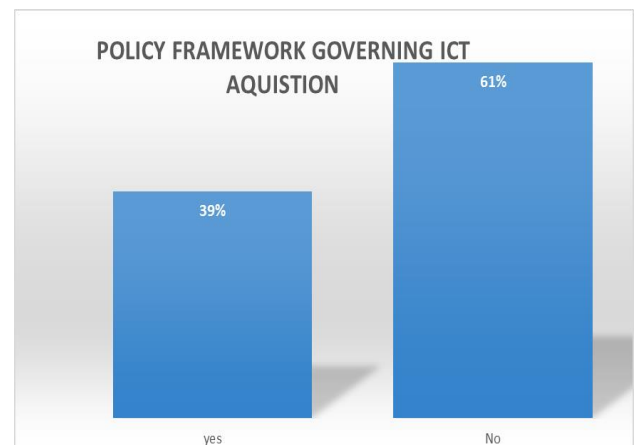
Given that (61.1%) do not have an ICT training policy, (11.1%) of the respondents indicated that they sent their staff for training every one to two years. Three (8.3%) of the respondents stated that they sent their data management personnel for ICT training every four to six months while three (5.6%) of the respondents only sent their staff every two to three months, and three (11.1%) of the respondents indicated that their data management personnel are not consistently sent for training, whereas one (2.8%) of the respondents stated that they would commence ICT training for their staff in the year to come.

4.3.2 Frequency of ICT Training

When asked on the adequacy of the ICT training for their staff, (33.3%) of the respondents stated that it was good, while (38.9%) of the respondents indicated that it was fair, and (27.8%) of the respondents indicated that it was poor.
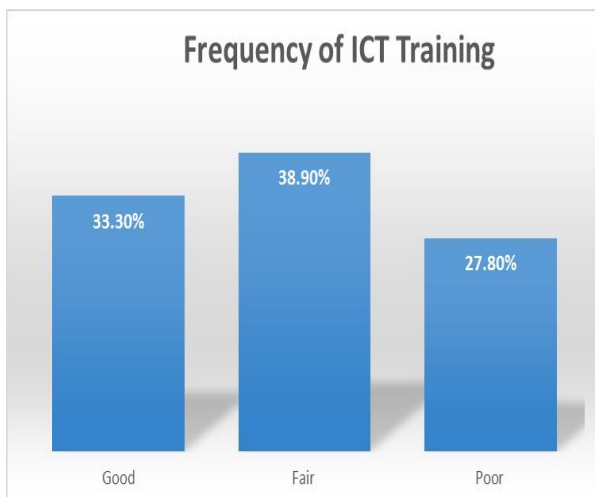
4.3.3 Adequacy of ICT Training
In probing further, respondents were asked to explain their ranking of adequacy in ICT training.

Respondents that ranked the adequacy of ICT training as Poor cited the following reasons;

➢ Poor ICT infrastructure and development/trai

ning policies

➢ Lack of resources or institutional capacity

➢ Lack of interest among IT staff

➢ Lack of appreciation by the organization as a whole to integrate ICTs in all operations of th e institution

➢ Poor or no collaboration between ICT trainin g institutions and medical institutions Lack of awareness, importance and use of ICTs

➢ Lack of development, promotion and coordin ation of ICT related activities among medical institutions.

➢ Lack of medical transcript centers

➢ Lack of IT specialists within

Respondents that ranked the adequacy if ICT training as Fair cited the following reasons;

➢ ICT training institutions met the basic trainin g requirement that the health facilities require d.

➢ Staff had appreciated the ICT training and kee p requesting for more training.

➢ The training met the minimum requirements f or staff to use ICT

➢ The training had improved the ease of commu nication

➢ Training had improved the ease of access to li terature and information

Respondents that ranked the adequacy if ICT training as Good cited the following reasons;

➢ The curriculum is modern and is updated freq uently

➢ The training had enhanced efficiency amongst data management personnel and in conductin g

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➤ The training had further exposed them to new ways and means of accessing the much-needed information for their activities.

➤ The training had made it possible for medical staff to hold meetings via internet, review manuscripts and publish online.

➤ The training had made it enabled medical staff to transmit data easily

When asked to explain what should be done to improve the training, respondents cited the following;

The ICT training curriculum should be tailored in such a way that it should enhance the quality of information.

The training should provide skills to utilize web-based portals for dissemination of existing clinical and medical information and epidemiological information on the prevention of diseases such as sexually transmitted infections (STIs)/HIV/AIDS, TB and malaria.

The training should improve and promote closer health sector collaboration with private entrepreneurs and regional initiatives in ICTs.

Run online training modules that are regularly and frequently updated.

Staff training on computer utilization would be helpful if it is done frequently, especially for staff who are not specialized in ICTs.

Establish a strong relationship with ICT centers and provide standardized training and references to inspire proficiency.

Training should be provided to medical scientists both on a one to one basis when available and in groups.

Need to reinforce that training policy that already exists so that the training can be accessed by all medical staff.

In probing further, respondents were asked to explain how the introduction of ICTs had made medical information more or less accessible and below are their explanations. Respondents who stated that the introduction of ICTs had made medical information become more accessible cited the following reasons:

The introduction of ICTs have facilitated more access to the world's medical knowledge and locally-relevant content resources which has helped strengthen public health and prevention programmes and promoting women's and men's health, such as content on sexual and reproductive health and sexually transmitted infections, and for diseases that attract full attention of the world including HIV/AIDS, malaria and tuberculosis.

ICTs help us to become alert, monitor and control the spread of communicable diseases, through the improvement of common information systems. Furthermore, ICTs promote the development of international standards for the exchange of health data, taking due account of privacy concerns.

Introduction of ICTs has made medical information more accessible and also exchange of information with other each has been made in a quick and timely manner. Additionally, ICTs have made networking with other scientists around the world easier and this helps us to remain updated on current scientific work and as such avoid duplication of effort.

The introduction of ICTs has further enhanced access to more accurate and timely information as opposed to the manual systems of storing and transferring information.

Additionally, the use of the internet has enabled advocacy coalition members to interact online, develop a shared identity and common agenda, exchange information, and mobilize collective action. Furthermore, offline activities can also be

coordinated via SMS (mobile phone text messages).

ICTs have helped in improving and extending health care and health information systems to remote and underserved areas and vulnerable populations, recognizing women's roles as health providers in their families and communities.

Respondents who stated that the introduction of ICTs had made medical information less accessible cited the following reasons

With the introduction of ICTs information has become less accessible because confidentiality has been enhanced by as required by ethics and they have put in place passwords that restrict access to information, unless the organization or the individual subscribes to the particular journal or database to have access to information.

The introduction of ICTs has reduced access to medical information in the sense that if the computer network goes down, information is unavailable. This becomes inconvenient or may even be life threatening. Additionally, all staff will need training in the use of the software and part time staff may not be trained and therefore cannot access vital information. Some staff may be resistant or fearful of using ICTs moreover it is very expensive to set up

Limited infrastructure facilities have made ICTs reduce access to medical information and this poses a great challenge especially so in disseminating and providing access to information for those working on disease like HIV/AIDS.

4.3.4 Rank of ICTs Used in the Organization

It was established that (50%) of the respondents indicated that the ICTs used to access medical information in the health facilities were good, while (41.2 %) of the respondents indicated that they were very good and (6.2%) stated that the ICTs used to access medical information were fair.

On the contrary one (1.2%) of the respondents indicated that the ICTs used to access medical information were very poor and poor respectively,
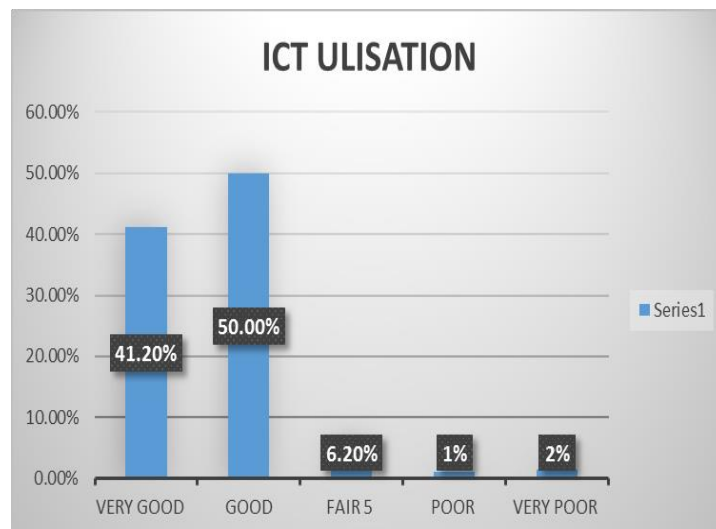
ICT Training Undertaken

It was established from the data obtained that (42.5%) of the respondents had undergone short ICT course training, while (27.5%) indicated that they had received lessons from a friend or colleague and (25.0%) stated that they only learn through self-learning and trial and error whilst only (5.0%) of the respondents had undergone formal ICT training as shown in table.

CHAPTER FIVE: DISCUSSION OF THE FINDINGS,

CONCLUSION AND DISCSSION

The study revealed a number of significant findings in relation to the objectives and the reviewed literature.

5.1 ICTs Utilization in Accessing Medical Information

ICTs being tools that facilitate the production, processing, transmission and storage of information, it was expected that a high proportion of health institutions would employ their use. It was therefore within the hypothesized result that all of

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the organizations sampled use ICTs in accessing medical information. Not only did all the top officials (Key respondents) emphasize on their organizations use of ICTs but also all respondents (medical staff stated that they use ICTs in accessing medical information for various purposes. From a broader perspective it is essential to note that Zambia which was the second country to embrace ICTs in Africa is sadly enough not even among the best 30 in Africa with countries like Mauritius, Kenya and Rwanda using ICTs for delivery of health services and national income generation at large. This is due to restrictive regulatory framework (Chinyama in Mutale Kapekele; Post Newspaper, 23rd, March 2010).

The study showed that in line with the objective one, that all the sampled health facilities and personnel use ICTs to have access to medical information. From this finding and with the support from the gathered and reviewed literature, it is safe induce that ICTs are used by health facilities and personnel to access medical information. It is also within the scope of the study to deduce from the theoretical background and supported by the findings that the health facilities are embracing and using ICTs as a means of accessing medical information.

5.2 ICTs Used

It is therefore in conformity to the theoretical framework and literature review that all the respondents sampled stated that they use computers in accessing medical information for various activities. According to McConnell et al (2006: 1) Information and communication technologies (ICTs) are increasingly being recognized as essential health technology, giving individuals at all levels of the health workforce and other stakeholders' access to information that helps them protect and improve health and save lives.

5.5 Acquisition and Use of ICTs

All the respondents indicated that their institutions have a policy that governs the acquisition and use of ICTs. However, "Lack of a clear implementation framework and strategy is seriously affecting the use of the Information and Communication Technology (ICT) sector as a tool for national development and income generation, Computer Society of Zambia has observed" (Mutale Kapekele; in Post Newspaper, 23rd, March 2010). Inspire of all the organizations having indicated that they have an ICT policy that governs acquisition and use of ICTs, there still remains two main bottlenecks. The first exists in the form of none comprehensive and dynamic ICT policies. The second exists at the point of implementation.

The policies fail to clearly define the requirements of the communication infrastructure. In addition, the policies are not comprehensive in outlining the practices, procedures and routines which make the infrastructure work. This causes a multiplicity of the types and standards of ICT equipment acquired and practices, procedures and routines used. Furthermore, poor infrastructure leads to poor coordination and information sharing between sectors. The policies also barely manage to take into consideration the issues of rapidly evolving technologies. The policies do try to foster a system with harmonized technology in terms of compatibility and performance, but fall short resulting in the case were there are two parallel technology systems operating. One with old technology and the other with recent and latest technology.

In addition, management commitment and recognition of ICT policy formulation and implementation as a key area is not highly pronounced. The implementation of ICT policy is crucial as Braa et al, (2000) states that implementation of infrastructure of communication is a key to support development and to make planning effective. However, health institution

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managers and directors may perceive other policies such as finding solutions to epidemics as higher priority than that of implementing a policy that is not the core function of the health/medical institution. Therefore, successful implementation of ICTs needs to address six interlocking frameworks for change: the infrastructure, attitude, staff development, support (technical and administrative), legally mandated coordinating bodies and also sustainability and transferability of the ICTs used.

As observed by Shenton and Dixon (2004), this current study established that there is no universally accepted definition of information need. Different scholars conceptualize information needs differently. "The lack of a common understanding of the term information need is a recurrent theme in library and information science writing. The definitions that have been offered typically address one or more of the following dimensions: the manner in which needs emerge, how needs may lead to information-seeking action, types of need that may exist, the nature of the information that may be required, or how a need differs from a want" (Shenton and Dixon, 2004). This makes it difficult for researchers to conduct researches on information needs. In spite of the variations in definitions, scholars agree that information needs result from more basic human needs that may be cognitive, physiological, or psychological/affective in nature and that needs arise from an individual recognizing some dissatisfaction with their existing situation which may take the form of detecting a discrepancy between the current position and a more informed state to which the person aspires to accomplish a task (Nicholas, 2000; Choo, 2000; Shenton and Dixon, 2004; Ormandy, 2010; and Case, 2007).

It is clear from literature that women's health information needs are varied and peculiar (Mabawonku, 2006; Marton, 2010; WHO, 2009; Johnstone, Brown and Beaumont (2001). They range from disease specific to reproductive health. Their varied health information needs are a reflection of the unique roles and responsibilities women play as well as their biological make-up. Specifically, studies have revealed that women require varied information on maternal or reproductive (including post-reproductive age) health, HIV/AIDS, stroke and speech and language difficulty, cancer, heart diseases, violence and mental health. In as far as maternal or reproductive (including post-reproductive age) health is concerned, the major health information needs of women include diet and nutrition in pregnancy as well as during postpartum period, pregnancy complications, danger signs in pregnancy, sexual and family relations, fetal development, childbirth, birth preparedness, importance of antenatal, exercises during pregnancy, infant care and infant feeding, and maternal recovery. They also need information on STIs and HIV/AIDS, malaria, tuberculosis in pregnancy, hygiene, family planning and clean environment. Women of post-reproductive age have unique health information needs as revealed by the study. These information needs include menopause, osteoporosis, prolapse of the womb, incontinence, depression and mood change, sexual relations, gynecological cancer as well as breast cancer and arthritis.

The review also shows that women require information on HIV/AIDS that include, transmission, prevention, and stigmatization of persons with HIV/AIDS. Women infected with HIV/AIDS need information on general support issues, medical providers (or gender specific) medical care, network of peer, family, community and medical support to avoid isolation. information that can assist them to access other vital health information, referrals, counselling, support groups, buddies, hospice care, complimentary therapies, child care, transportation and food. They also need information on relationships, sexuality and family, violence, alcohol use, reproductive decision-

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making, legal information about treatment consent issues, disclosure of their status, HIV/AIDS health and support services such as counseling, support groups and complementary therapies, available support services when faced with violent acts, information on religious and spiritual topics, social activities, death and dying. On stroke and speech and language difficulty, the required information needs include clinical information, medications and treatment including details on the rehabilitation process, diagnosis, (practical information (i.e. available healthcare services, medical professionals, coping mechanisms, leisure activities and exercise following a stroke, including sexual activity, information on local community and support groups/ clubs and experience of others.

Women's health information needs on cancer include information on the nature of cancer, chances of cure, all possible treatments, and all possible side effects of treatment and how treatment works, breast health and breast cancer screening, supportive care needs, financial and employment needs, multidisciplinary care needs, information about clinical trials, and information on superannuation especially as it relates to terminal illness provisions. On cardiovascular (heart) disease, women need information on the risk factors, signs and symptoms, diagnosis, treatment and prevention. In as far as violence is concerned, women need information that can empower them economically such as information on opportunities, benefits, resources and information on financial institutions that provide financial assistance to women.

Women also need information on laws on violence against women and where they can report violent acts. Other areas of women's information on violence include information which project a positive image of girl child and women in society and also information on livelihood skills that would ensure their effective tackling of hunger, poverty, disease and unemployment challenges as well as

information that can assist them access social services like education and health. On mental health, women need information on how they can look after their mental health. Such information includes information on social factors and that which can help avoid depression, self-harm, anxiety, eating disorders, post-traumatic stress disorder (PTSD), etc. as these increases their risk of developing mental health problems.

Major gaps in literature have been revealed including limited studies on health information needs of women especially in developing countries. Much of the evidence comes from studies in developed worlds. This could be due to the difficulty in researching this area as noted from the definitions of information need. Researchers seem not to clearly understand what to research on. Also, gender specific studies on health information needs are scanty making it difficult for information providers to design women-centred health information services. More attention in literature is on studying information needs of women in pregnancy and cancer diseases (especially breast cancer). Fewer studies exist on other health conditions women experience like mental health, stroke, malnutrition, heart diseases, tuberculosis, violence, injuries, female cancer (especially cervical and ovarian), STIs and disability.

5.6 Training in ICTs

It was found that 38.9% of the sampled institutions have an ICT training policy for their medical staff, with as many as 61.1% stating that their organizations do not have an ICT training policy for their medical staff. This comes from a background were the penetration levels of ICTs in Zambia's education institutions remain low, with those schools that are equipped mostly utilizing second-hand and refurbished computers. The integration of ICTs in learning and teaching practice has been limited, although the introduction of computer studies as a school subject has begun

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to change this. The adoption of a national ICT policy in 2007, as well as the development of a draft ICT policy for education and an associated implementation framework, provides an enabling policy environment to promote far greater access and use of ICTs across all sectors of Zambia's health education system, including a system for enhancing health education management, administration, and teaching and learning.

Given this background, Zulu (2009) asserts that educators and medical practitioners in public health have increasingly developed a view that information and communication technologies (ICTs) in general has the potential to revolutionize the way health-care professionals are trained and practice, and to boost their performance on the job. However, the demographics that relate to ICTs, such as tele-density, indicate that Zambia has a high degree of ICT illiteracy and lack of ICT usage and access. The Least Developed Countries Report 2008 (UNCTAD, 2008) indicates that only 145 out of 1000 have access to radio services, 64 out of 1000 have access to Television, 8 out of 1000 have access to Telephone landlines, 140 out of 1000 have access to Mobile phones, 11 out of 1000 have access to personal computers and 42 out of 1000 have access to Internet. Therefore, delivery of services to the people is highly inefficient and in need of an urgent overhaul.

In addition, the few medical institutions that have an ICT training policy would still experience low utilization of ICTs due to the fast pace at which technology and more specifically ICTs are evolving and the fact that they do not train their health information personnel frequently enough. For example, out of the institutions that have an ICT training policy, 44% indicated that they send their medical staff for training every one to two years

This group of respondents indicated that the ICT training institutions met the basic training requirements that the medical institutions required. In addition, the medical staff had appreciated the ICT training and kept requesting for more training. They thought the training met the minimum requirements for medical staff to use ICTs for accessing health information. The respondents said the training seemingly improved the ease of communication amongst staff when conducting a search and improved the ease of access to literature and information. The training had also made it possible for medical staff to hold meetings via internet, review manuscripts and publish online and had enabled health staff to transmit data easily to other places for analysis and interpretation in there. According to WHO, the use of ICTs in health is not merely about technology (Dzenowagis, 2005), but a means to reach a series of desired outcomes, such as improved medical care, health workers making better treatment decisions, hospitals providing higher quality and safer care, people making informed choices about their own health, governments becoming more responsive to health needs, national and local information systems supporting the development of effective, efficient, and equitable health systems, policymakers and the public becoming more aware of health risks and people having better access to the information and knowledge they need for better health.

Respondents that ranked the adequacy of ICT training as poor (27.8%) bemoaned poor ICT infrastructure and development/training policies and lack of resources or institutional capacity. They also stated that lack of interest among health staff and lack of appreciation by the organization as a whole to integrate ICTs in all operations of the institution. Additionally, poor or no collaboration between ICT training institutions and health institutions had contributed to the inadequate training that medical staff underwent. It was also found that there was a lack of awareness of the importance and use of ICTs in health information including the lack of development, promotion and

coordination of ICT related activities among medical institutions. To aggravate the situation, there was also a lack in some information support services such as medical transcript centers and ICT specialists within medical institutions to advocate and supplement training. It re-enforces the assertion that successful implementation of ICTs in medical institutions needs to address not just infrastructure but also staff attitudes, staff development, technical and administrative staff services and policy framework with legally mandated coordinating bodies and also sustainability and transferability of the ICTs used.

In addition, ICT training should provide skills to utilize web-based portals for dissemination of existing clinical and medical information and epidemiological information on the prevention of diseases such as sexually transmitted infections (STIs)/HIV/AIDS, TB and malaria. Respondents also thought ICT training should aim to improve and promote closer health sector collaboration with private entrepreneurs and regional initiatives in ICTs. ICT training institutions and medical institutions could also collaborate to run online training modules that are regularly and frequently updated.

It was discovered that Staff training on computer utilization could be helpful if it was done frequently, especially for staff who are not specialized in ICTs. It was also noted that establishing a strong relationship between ICT centers and health facilities would help provide standardized training and references to inspire proficiency. A need for strong training policy for health policy stakeholders and training institutions such as schools of medicine, physiotherapy, pharmacy and nursing was identified coupled with training provided to medical scientists and data management personnel both on a one to one basis when available and in groups. Furthermore, it was observed that there was a need to reinforce that training policy that already exists in the institutions

with an ICT training policy and establish one in the institutions that do not have, so that the training can be accessed by all data management personnel, medical staff and not just the privileged few.

5.7 Accessibility of Health Information by health information officers' l with the Introduction of ICTs.

The resultant effect of introducing ICTs in accessing health information may have a somewhat variegated view but remains generally positive. The study revealed that 92.5% of respondents indicated that the introduction of ICTs had made health information more accessible. This can be attributed to the introduction of ICTs that has facilitated more access to the world's medical knowledge and development of locally-relevant content resources which has helped strengthen public health policies and prevention programmes. This is in conformity with the assertion of Unwin (2009) that ICTs have in recent times been developed, spread and used widely. This has resulted in a global swing in the creation, storage, exchange and ultimately the accessibility of information. The field health information is not an exception.

It is also important to note that ICTs happen to encourage alertness, monitoring and controlling the spread of communicable diseases, through the improvement of common information systems. Furthermore, ICTs promote the development of international standards for the exchange of health data from d health information systems, taking due account of privacy concerns. Ultimately ICTs tend to improve on the different aspects of quality of information.

Introduction of ICTs has made medical information more accessible and also exchange of information with other users has been made in a quick and timely manner. ICTs can be viewed as also representing a way for health workers to share

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information on changes in disease prevalence and to develop effective responses. They provide opportunities to encourage dialogue, debate, and social mobilization around a key public health concern. From the findings, it can be deduced that the introduction of ICTs has further enhanced access to more accurate and timely information. This is because the use of computer based and networked technologies such as the internet have enabled quick access to information

In Zambia, this has been evident in response to HIV/AIDS, Malaria and Cholera amongst other diseases. More recent ICTs like mobile phones, email and the internet could also be used to provide information on health alerts to the general public as well as medical consultations.

ICTs have also helped in improving and extending health care and health information systems to remote and underserved areas and vulnerable populations, recognizing women's roles as health providers in their families and communities.

Some respondents explained that the introduction of ICTs had made medical information less accessible because confidentiality had been enhanced as required by ethics and they have put in place passwords that restrict access to information, unless the organization or the individual subscribes to the particular journal or database to have access to information.

The introduction of ICTs has reduced access to medical information in the sense that if the computer network goes down, information is unavailable. This becomes inconvenient or may even be life-threatening. Additionally, all staff will need training in the use of the software and part time staff may not be trained and therefore cannot access vital information. Some staff may be resistant or fearful of using ICTs moreover it is very expensive to set up. Limited infrastructure facilities have made ICTs reduce access to medical information and this poses a great challenge

especially so in disseminating and providing access to information for those working on disease like HIV/AIDS. Poor infrastructure leads to poor coordination and information sharing between sectors like health, education and contributes to an absence of coherent socio-economic development initiatives with benefits to the people. Braa et al, (2000) states that implementation of infrastructure of communication is a key to support development and to make planning effective.

There exist a number of ICT tools that can be used in the provision of formative assessment and feedback. Depending on particular contexts and the type of the formative assessment, lecturers can employ one or more combinations of traditional and electronic feedback methods. Type written comments, feedback forms and annotated student work are in this case more common electronic technique for producing feedback. The extent to which these feedback techniques and communication methods facilitate the provision of quality feedback is applauded since they integrate differently the timeliness, motivation, personalization, manageability and relation to assessment criteria quality attributes of feedback.

CONCLUSIONS

Health facilities in Zambia have developed an appreciation for the use of ICTs. Health institutions in Zambia do use ICTs in accessing medical information. The study showed that there has been an effect of ICTs on the accessibility of medical information by medical personnel, and data management personnel in Zambia. It was revealed that ICTs are utilized in accessing medical information by medical personnel and that medical information is more accessible by medical personnel with the introduction of ICTs. On further analysis of the research findings, the study revealed an above average satisfaction level of medical personnel in the health facilities with their use of ICTs in accessing medical information.

Additionally, the study has revealed that the introduction of ICTs has made medical information more accessible because they have accorded medical personnel and data management personnel with more sources from which information can be accessed from in an effective, efficient and timely manner. Even though there may be some bottlenecks to having access the study found that the introduction of ICTs had made medical much more accessible with the larger proportion indicating that they had been provided with numerous information sources and resources as a result of the introduction of ICTs. The previous manual or none ICT based medical Information sources and resources are still accessible and in use. Therefore

Arising from the above, it is clear that women's health information needs are varied and unique because of their biological make-up and the roles and responsibilities they play in society. This is supported by Mabawonku (2006) who observed that most studies that have been carried out in different parts of the world on women have shown that women have their peculiar information needs. Agreeing with Mabawonku (2006), Johnstone, Brown and Beaumont (2001) argue that though ignored by Policy on the national health priority areas, there is evidence about differences between men and women and the need for services that cater for their differing needs. They maintain that women are different from men, they experience different things while growing up as adults; biological factors can influence health and well-being outcomes; factors related to gender can affect treatment choices; health (and ill-health) can affect women's role in society (and women's role can affect their health); and women are the majority of carers for people who are both healthy and not so healthy.

In addition to the effective increase in access to medical information by medical personnel, the study has also shown an above average satisfaction level of medical personnel and data management personnel in health facilities with their use of ICTs in accessing medical information. Therefore, the introduction of ICTs in accessing medical information has not only brought about an improvement in the work processes of medical staffs and data management personnel but also augmented information sharing and networking among medical staff and health facilities.

The study therefore reveals that ICTs being tools that facilitate the production, processing, transmission and storage of information have the potential and have in effect brought about complimentary and wider access to information. By this ICTs have made it more possible for the manifestation of an information society.

This study has revealed some of the dynamics of how ICTs have affected the generation of knowledge for the development of new therapeutic strategies to prevent, cure or treat disease, infection and damage that deviates from the optimum function of the body. More specifically, the study has assessed the effects, both negative and positive. The study has revealed that access to medical information using ICTs has increased although the country still has a lot to do when it comes to the acquisition of state of the art of ICTs being used to facilitate access to the so much required medical information which is needed by medical personnel. This was observed in most the public institutions that had old computers mostly and accessing the internet and other databases almost takes forever. The study also revealed that medical information is more accessible by medical personnel and data management personnel with the introduction of ICTs and that access could be enhanced further if health facilities could network with one another.

RECOMMENDATIONS

An information society where there is the free flow of accurate and reliable information, equally available to all members of the society. ICTs have ushered in an information society and benefits that have affected all aspects of life and sectors of human endeavor that improve the overall quality of life and one such sector being the health and medical sector. This is a sector that deals with the treatment and management of illness and the preservation of health through services offered by the medical and health professionals

the introduction of ICTs in accessing medical information has effectively increased sources and resource access, thereby complimenting access and supporting the field to better enforce more uniform international standards.

The study further explored the satisfaction levels of medical personnel and data management personnel in the health facilities with their use of ICTs in accessing medical information.

Therefore, the introduction of ICTs in accessing medical information has made medical personnel more efficient and effective with a higher capacity of participating at national, regional, continental and international level.

Therefore, women's health information needs must be properly understood in order to resolve many issues such as, male dominated health services and gender-blind service delivery, medicalization of health, women being viewed as wombs (i.e. viewing women's health as reproductive health), lack of access to information and gender-blind research and policy (Johnstone, Brown and Beaumont, 2001). In other words, the differences between men and women are such that the health of women deserves particular attention (World Health Organization, 2009).

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