THE EFFICACY OF INFORMANTION AND COMMUNICATION TECHNOLOGY IN HIV/AIDS HEALTH EDUCATION IN HATCLIFFE DISTRICT HARARE.

Bindura University of Science and Technology

A dissertation report submitted to the department of Social Work, Bindura University of Science Education in partial fulfillment of the requirements for Bachelor of Social Work Honors degree.

Supervised by

Dr MANGWIRO

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DEDICATION

I dedicate this work to my Mother Elizabeth Makoni, and my sister Chenayimoyo Makoni and my brother Gumisai Makoni for their unwavering financial and emotional support and believing in me.

ABSTRACT

Many scholars and practitioners in public health, social work and other related fields are advocating for the adoption of ICTs in HIV/AIDS programming due to their presumed efficiency, effectiveness and ability to increase outreach of healthcare services. This study sought to explore the efficacy of information and communication technology in HIV/AIDS programming among young people. Its objectives were to explore the ICT infrastructures impact population health outcomes in health delivery systems, understand the role of technology in HIV/AIDS programming, find out about the available ICT infrastructure in HIV/AIDS programming, identify existing bottlenecks of ICT regarding HIV/AIDS education and to determine possible intervention strategies to improve ICT infrastructure in HIV/AIDS programming. A descriptive research design based on a mixed research approach was used to fulfil the research objectives. The population of the study was made up young people in Hatcliffe aged of 16-24 and key informants from HIV/AIDS organisations, Social Services department, civil society, and health service providers operating in Hatcliffe. Data was collected from 16 young people using self-administered questionnaires and from 7 key informants using individual interviews. Quantitative data was analysed using percentages, mean and standard deviation while qualitative data was analysed using thematic analysis. Findings from the study indicated that ICTs are very instrumental in HIV/AIDS as they are efficient in disseminating knowledge and information about HIV/AIDS, enhance quality, efficiency and accessibility of HIV/AIDS healthcare services and improve the availability of reliable and accurate data on HIV/AIDS, enabling informed decision-making. However there are several barriers, including unreliable electricity supply and poor network connectivity and insufficient financial ICT and skilled personnel to effectively use ICTs in HIV/AIDS programming. The study thus came up with a number of recommendations to the government, health sector, developmental organisations and young people to ameliorate these challenges.

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ACRONYMS/ABBREVIATIONS

TBIs:	Technology-Based Interventions
PLWHA:	People Living with HIV and AIDS
CHCs:	Community Health Centers
MoHCC:	Ministry of Health and Child Care
ICT:	Information and Communication Technology
HIV:	Human immune Virus
AIDS:	Acquired Immunodeficiency Syndrom

CHAPTER 1

INTRODUCTION AND BACKGROUND OF THE STUDY

1.0 Introduction

In the past decade, information and communication technology usage, has seen exponential growth in healthcare programmes and service delivery. Examples of include the dissemination of health information on social media including Twitter, Whatsapp and Facebook, monitoring duration and quality of sleep using wearable devices, reminding patients to take their medications on their mobile devices, and using digital solutions for remote counselling (Ferguson, 2011). These technologies have a number of functionalities which affords them several advantages as compared traditional methods. These include their ability to expand outreach of healthcare services, provide reliable service remotely, and cost-effectiveness as well as scalability in their usage. Previous studies have illustrated and verified the efficacy of such ICTs in enhancing health behaviour and management of diseases across numerous scenarios, including diabetes, cardiovascular disease, mental health, medication adherence, physical health, as well as sexual and reproductive health including HIV (Sands, 2015).

So far available evidence points to the fact that, the future of quality healthcare services is anchored on ICT utilisation. Therefore, this research focused on the utilisation of ICTs in healthcare in Zimbabwe focusing on HIV/AIDS programming. This is so since ICTs enable information dissemination to many people along with effectively delivering of healthcare services and feedback to populations that are faced with a higher risk of HIV infection and AIDS-related deaths. This chapter presents the background to the study, the problem statement, justification of the study, research aim and main objective, specific objectives and research questions. The chapter also focuses on the delimitations and limitations of the research, as well as the definition of key terms.

1.1 Background to the Study

Across the globe, health systems are driven by firm belief in the opportunities offered by ICTs in improving healthcare and the quality of life in communities. International organisations including developmental and international agencies are encouraging the utilisation of ICTs in healthcare (World Bank, 2011). In 2014 the World Health Organization (WHO) proposed the eHealth strategy in an effort to improve processes of healthcare, encompassing infectious disease, for instance HIV/IADS and other STIs (WHO, 2017). Above that, the WHO African

Region signed a partnership agreement with the International Telecommunication Union (ITU) in October of 2017, with the goal to build platforms for ensuring effective ehealth, build an agile healthcare sector labourforce for the effective utilisation of ICTs, and to strengthen partnerships of stakeholders to sustainably adopt and execute eHealth in African healthcare (WHO, 2017). This shows a lot of commitment in ensuring the effective utilisation of ICTs in healthcare.

Globally, healthcare systems are a sophisticated adaptive system, effectively incorporating ICTs and with prospects to improve. African countries should also be part and parcel of this trend. Even with the recent worldwide advances in the medical and information technology arena, health indices among African countries continue being low (WHO, 2014). Majority of the countries in Africa have been subjected to protracted military dictatorship, political instability and institutionalised corruption, factors that have resulted in the region continuing to lag behind in terms of digital transformation. The transition from authoritarian to democratic rule has moved at a snail pace in the bulk of the nations. This scenario has resulted in wholesale failure of systems at all levels hence impeding the transformation of health infrastructure. Thus, the majority of the nations in Sub-Saharan Africa have remained poor and underdeveloped (Shehata, 2016). Despite the current transformation and diffusion of conventional medicine across Sub-Saharan Africa, the severe lack of modern healthcare ICTs remains a major barrier to orthodox medicine, especially in remote areas. Consequently, ICT healthcare systems are failing to make some inroads among African countries (Pierce, 2006).

It is estimated that 45% the population in Africa is severely poor (WHO, 2014). This scenario is perpetuated as a result of the dilapidation of healthcare systems, a deficit of skilled healthcare personnel and recurring instability in the political and economic spheres, among other factors. According to the WHO (2014), these factors have a detrimental effect on health outcomes within the region. Hence for instance, in the region life expectancy is approximately 52 years, which is a far cry compared to sixty-six which is the average worldwide (WHO, 2014). As stated by the United Nations Childrens Education Fund (UNICEF) (2009), research has indicated that insufficient knowledge, poor information systems along with poor quality healthcare service delivery are the main factors leading to this scenario. Hence the utilisation of ICTs in healthcare can potentially address most of the challenges through buttressing information availability, accessibility and exchange, utilising cell phone devices as well as online platforms. As a result, the usage of digital technologies such as cellular technology, the

internet as well as landline telephone connections is crucial in empowering individuals, in order to reduce the prevalence of epidemics like HIV and AIDS.

1.2 Statement of the Problem

Despite the potential benefits of health information technology, research suggests that the adoption of health ICTs is occurring at a very slow pace within settings where people living with HIV/AIDS (PLWHA) receive care, including at physician offices, public hospitals, and community healthcare centres (CHCs). Data obtain from representative surveys in Zimbabwe and across the world concerning office-based physicians indicate that 25% of physician offices were using a basic ICT system since 2010, which was up from 22% in 2009. Only 10% of physicians were utilising a fully-functional system in 2010, as compared with 7% in 2009 (Ferguson, 2011). Large organisations are better situated to foot the costs of implementing ICTs in healthcare, since the costs are spread over a larger number of patients and service providers (Smith et al., 2008). However, Lardiere (2010) notes that, besides the installation and maintenance costs of health IT systems, a number of other barriers exist including the inability to integrate new and existing systems, concerns regarding security and data privacy, productivity losses during transitions to new electronic systems. Bloom (2008) argues that when effectively used, health ICTs can facilitate the efficient collection and analysis of healthcare data, improved outreach of healthcare services. However, literature is showing that few studies has been carried out either in the Western or African scenario on the use and configuration of health IT for HIV/IADS programming.

1.3 Justification/Rationale of the Study

The research is of significant importance to a number of stakeholders including Ministry of Health and Child Care (MoHCC), ICT infrastructure service providers, people living with HIV/AIDS, communities, as well as healthcare researchers. The study particularly benefits women youths and young adults who with the opportunity to learn more about the usage of technology in HIV/AIDS related programme to improve service uptake. In the same vein these people would obtain information about effective coping mechanisms that they can adopt to managing their health under the strain of HIV/AIDS. The study also provides reliable information about the services that PLWHA can access in order to get assistance. In the same vein, the Hatciffe community would benefit significantly from the carrying of this research. The community through this study would be made aware of the importance of ICTs in accessing SRH health services.

1.4 Research Aim

The main aim of the study are to explore the efficacy of information and communication technology in HIV/AIDS programming.

1.5 Research Objectives

- To explore the ICT infrastructures impact population health outcomes in health delivery systems
- To understand the role of technology in HIV/AIDS programming
- To find out about the available ICT infrastructure in HIV/AIDS programming
- To identify existing bottlenecks of ICT regarding HIV/AIDS education
- To determine possible intervention strategies to improve ICT infrastructure in HIV/AIDS programming

1.6 Research questions

- What is the ICT infrastructures impact population health outcomes in health delivery systems?
- What is the role of technology in HIV/AIDS programming?
- What are the available ICT infrastructure in HIV/AIDS programming?
- What are the existing bottlenecks of ICT infrastructure in HIV/AIDS programming?
- What can be do to improve ICT infrastructure in HIV/AIDS programming

1.7 Assumptions

ICT infrastructure in HIV/AIDS programming is the future of health delivery system. Poor countries are still struggling to have a working ICT infrastructure in HIV/AIDS programming. In addition to that, fraud and embezzlement of health funds are the leading impediments to the success of ICT infrastructure in HIV/AIDS programming. Again, ICT infrastructural development in HIV/AIDS programming is very slow in Africa

1.8 Delimitations

The search was conducted in Hatcliffe district, residential area that is 14 km North of Harare CBD. The district is among the main hot spots of HIV transmission in Zimbabwe and as such, generalizations would be made hinging on the findings of the research. In addition to that, only residents of the district in question from the ages of 16-24 participated whilst key informants were coming from organizations such as National AIDS Council, SAYWHAT, Action AIDS Trust, Social services department, Musasa, and health service providers operating in Hatcliffe.

1.9 Definition of Key Terms

- **Information and communication technology diffusion**: Percentage of people with access to ICTs such as mobile devices, landline telephone and the internet.
- **HIV:** Human Immunodeficiency Virus
- **AIDS:** Acquired immunodeficiency syndrome
- **Efficacy of Technology:** refers to the usefulness and effectiveness of electronic HIV/AIDS related service delivery.

1.10 Chapter summary

This chapter focused mainly on introducing the research subject, explaining the rationale behind its undertaking and the main objectives and context which guided the carrying out of the study. The chapter began by the background to the study, the problem statement, justification of the study and the main aim and objective of the study. It moved on to the specific objectives and research questions of the study, the delimitations and limitations of the study. The last section dealt with the definition of key terms used in the study. The next chapter focuses on review of related literature.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This chapter focuses on the literature review on the efficacy of Information Communication Technology in HIV/AIDS health education infrastructure on HIV/AIDs programming. The chapter starts by describing and explaining the theoretical framework of the study. After that the chapter focuses on literature concerning explore how ICT infrastructures impact population health outcomes in health delivery systems. The chapter then reviews literature on the role of technology in HIV/AIDS programming. It also looks at literature on the available ICT infrastructure in HIV/AIDS programming. The chapter further focuses on empirical studies on the efficacy of ICTs on HIV/AIDS programming.

2.1 Theoretical framework

A theory is a set of interrelated concepts, definitions, and propositions that present a systematic view of phenomena by specifying relations among variables, with the purpose of explaining and predicting the phenomena (Kivunja, 2018). A theoretical framework is adopted/ adapted from a pre-existing theory or theoretical perspective. According to Kim and Kim (2021), it can be defined as a theory that a researcher chooses to shed light on his or her research problem. There are many theories that are used to measure acceptance of technology. This research used Value based adoption model (VAM) as its theoretical framework. VAM proposed by Kim et al. (2007) proffers that the previous TAM proposed by Davis et al. (1989) was limited in explaining the acceptance of new technology and that new ICT users should not be recognized as simply technology users, but also as consumers. The theory thus seeks to explain technology adoption from the point of view of consumers of the technology.

VAM sees benefits which include usefulness and enjoyment, and sacrifices which involve technicality and perceived fee as the main factors of perceived value and analysed intention to use. A technology that is considered by consumers to be useful in solving existing problems is thus more likely to be adopted. This is concurred by Lau et al. (2019) adding that usefulness is also judged based on the benefits of using the technology, which in the case of ICTs include convenience, increased accessibility, efficiency and speed. Similarly enjoyment is a function of the fun derived from using the technology. Those who experience pleasure or joy from using a technology are more likely to adopt a technology since they can readily adapt to the technology and use it more (Yu et al., 2019). Sohn and Kwon (2020) also mention that

enjoyment also include perceived ease of use from the perspective of consumers. This therefore means that factors that enhance usefulness and enjoyment are postulated to be major drivers of perceived value, which in turn results in intention to use a given technology.

On the other hand sacrifices are the things that consumers have to make do with in order to be able to use a certain technology. According to the value-based model, sacrifices involve technicalities and the perceived fee that should be paid to be able to use a technology. Technicalities are defined by perceived ease of use (that is whether the use of the technology is free from physical, mental and learning obstacles), reliability (error-free, always available and secure), uninterrupted and efficient. VAM perceives these elements of sacrifices to negatively associated with perceived value, hence intention to use a technology (Hsu and Lin, 2016). In addition, VAM is based on a cost-benefit paradigm that reflects decision making. The process by which the decision to use is made by comparing the cost of uncertainty in choosing a new technology or product (Lin, Wu, Hsu, and Chou, 2018). In other words, VAM aims to explain the introduction of TAM-based technology (Davis, 2014) and the recognised value of Zeithaml (1988)'s service quality model for overcoming the limitations of TAM in new ICT environments. Therefore, this study used the VAM concept model in shaping the framework for the efficacy of ICTs in HIV/AIDS programming. This theory was relevant for the study because it highlights the notion that the perceived value of a technology is dependent on perceived usefulness and sacrifice. It thus points out to the major benefits and costs of utilising ICTs in combating HIV/AIDS.

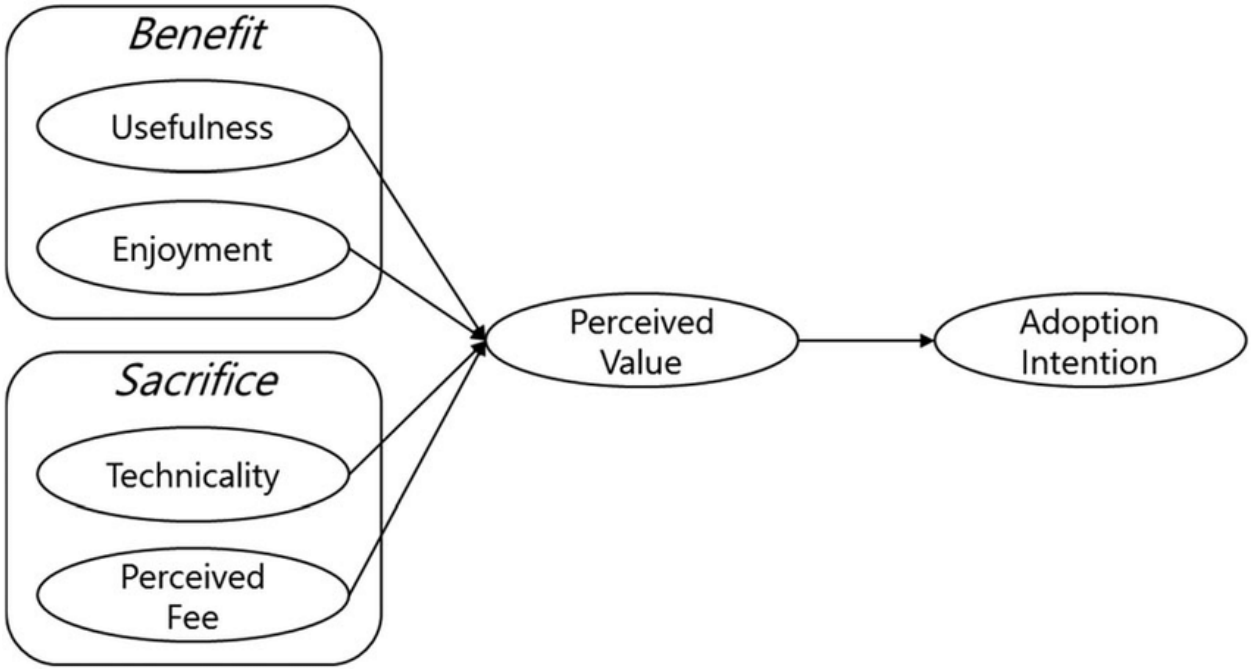

Fig 2.2: Value-based Adoption Model

2.1.1 Relevancy of the theory to the study

A number of researchers have adopted VAM as their theoretical framework in their researches, trying to characterise the factors impacting on the adoption of ICT in various scenarios (Jun et al., 2018). This theory is thus instrumental in that it provides the research with a framework of evaluating the role of ICT in HIV/AIDS programming in Zimbabwe. It alerts the researcher to the need to focus on the benefits that are derived from utilising ICTs combating HIV/AIDS in Zimbabwe. Similarly the VAM is instrumental as it points out to the importance of analysing the costs involved in the adoption of information technology in achieving health outcomes. Hence the theory provides a framework for assessing the impact of ICTs in combating HIV/AIDS in Zimbabwe.

In the same vein, VAM is instrumental in explaining initial adoption intention as well as usage behaviours after adoption (Kim et al., 2007; Wang et al., 2020). This is because users need to keep considering the value while making decisions on the continued use of a technology in solving their problems (Wang et al., 2022). Thus in this case VAM was instrumental in modelling the perceptions of users of ICTs in HIV/AIDS programming concerning the role that ICTs play in perpetuating the fight against HIV/AIDS. It gave credence to the choice of target population as a relevant group in a privileged position to comment on the efficacy of ICTs in HIV/AIDS programming in Zimbabwe. Thus VAM was used to explain the relationship between the benefits of ICT usage and the barriers of ICTs usage in HIV/AIDS programming.

2.2 Impact of ICT on population health outcomes in health delivery systems

2.2.1 Global

Of recent, there is vast amount of scholarly comments focusing on the experiences of specific health organisations in the implementation of a several health ICTs including e-prescriptions, electronic medical records (EMRs) and Computerized Physician Order Entry (CPOE) systems (Shekelle and Glodzweig, 2009). In overall terms, literature from advanced economies such the US and Western Europe illustrates that, under conducive conditions, health ICTs are instrumental in enhancing in efficiency and quality in healthcare. Agarwal et al. (2015) state that regarding healthcare quality, the majority of the researches concur that increased patient safety has been one of the greatest contribution of ICTs to health care. Three types of medical error normally occur, namely errors due to forgetfulness or inattention, rule-based errors, and knowledge-based errors. DeSouza et al. (2014) reports that using digital technologies in

healthcare results in enhanced ability to share information among health care professionals, thus preventing the occurrence of errors and improving patient safety in the process.

In the same vein, digital tools which encompass those that alert healthcare workers of a patient's deteriorating health condition, and enable healthcare professionals to communicate seamlessly also have substantial benefits on health outcomes in England (Bates, 2002). This is seconded by WHO (2020) adding that enabling patients and healthcare workers to communicate seamlessly is very crucial to ensure safe and quality healthcare delivery, particularly in primary healthcare. Bhowmik et al. (2013) go on to reveal that in Sweden there are tools that have been deployed, including clinical decision support tools and clinical guidelines and databases of drugs that can be accessed online. Similarly health ICTs also have a positive impact quality and efficiency as they ensure that healthcare workers comply with guidelines or protocols, especially in the managing chronic diseases like diabetes, heart failure and asthma. According to Lee et al. (2016) these diseases need patients to be regularly monitored for tracking changes in clinical parameters and ensure speed in identifying deviations, in which case ICTs come in handy.

ICTs have been found to be very useful in reducing of operating costs of health services in a number of ways (Rosewell et al., 2013). These include through improving the manner in which clinical tasks are performed, through saving time in the processing of data and reducing multiple handling of documents among other avenues. This is supported by Shah et al. (2018) underscoring that empirical evidence in other sectors has shown that to be positively associated with productivity among healthcare workers. In the health sector ICTs can play an instrumental role in reducing the work related to the collection of information about the patient and ensuring that it gets to the right people. By the same token in India the use of electronic messaging saves time for health professionals, as a result of being able to easily get hold of data about the patient, speed in communicating among professionals, and through ensuring that data is readily available, is complete and is of of high quality (Shankar et al., 2017). This is concurred by the OECD (2010) which reported that Swedish pharmacists are now able to process prescriptions ubiquitously through utilising e-prescriptions and because there is no more need to call doctors asking for prescriptions.

At the same time despite difficulties in measuring cost and benefits associated with the implementation of health ICTs, there are a number of non-financial, intangible gains that emanate from the use of these technologies. Among these is confidentiality and speed of

communication through the use of digital tools for sharing patient information (Ebenso et al., 2018). In addition, health professionals are able to access patient information at multiple locations providing them with a lot of time that they can deploy to add value to health care services (Labrique et al., 2018). Willcox et al. (2019) support this, revealing that GPs in Western Australia were very happy that they could access patient data or clinical notes without the need to return to their practices. Thus the gains in time results in improvements in the quality of life, effectiveness in making decisions, and in improved care quality leading to higher satisfaction among clients.

2.2.2 Regional

In most countries including those in Africa, primary healthcare is the major point of entry into the healthcare delivery system for all issues to do with healthcare (Onwujekwe et al., 2015). It is important in providing ongoing person-focused care, and is vital in coordinating or integrating care provided by others or elsewhere. Countries such as Kenya and Ghana that have health systems more oriented towards primary care benefit a lot in terms of better healthcare coordination and outcomes, higher life expectancy, better satisfaction among patients, as well as lower costs of healthcare (Garg, 2005) The primary health care system is also important in providing an effective infrastructure through which unusual health events can be detected, and the rapid disseminating information can be undertaken and care in national health emergencies can be provided. Thus according to Kress et al. (2016), ICTs' implementation in health care in Africa can serve to renew primary health care enabling it to effectively achieve the afore mentioned objectives.

In addition, uncoordinated approaches to health services provision, and inequalities in accessing healthcare emanating from geographical, economic, and socio-cultural deficiencies has a negatively affect the ability of all citizens to access quality healthcare (Srivastava et al., 2015). This is particularly true with respect to Sub-Saharan Africa where socio-economic inequalities result in many marginalised and remote communities finding it difficult to access healthcare services. However according to Zurovac et al. (2011), there are a variety of ICT tools that could be used to expand outreach of healthcare services through the provision of cost-effective ways of delivering exceptional healthcare to such marginalised and remote. For instance telemedicine has been successfully employed in Tanzania to overcome shortage in workforce as well as the usually unequally distributed medical doctors (Nyamtema et al., 2017). Telemedicine can provide emergency care to patients who previously could not access. In addition online courses are offered to healthcare workers in remote areas in Ghana that they

can access through links send to their mobile phones (Mars, 2013). This can be instrumental in improving the availability of trained healthcare workers that can offer health services in their local communities.

The fundamental goal of every healthcare sector is the delivery of quality healthcare to society. At an increasing rate, hospitals and other health care services providers in Africa are being evaluated through systematically measuring and reporting their performance (Shankar et al., 2017). However, this is often a labour-intensive and time-consuming process which can interfere with the normal dispatch of health care services. Thus in line with the OECD (2010), automated data collection and processing can facilitate the provision of richer data which can be easily accessed, facilitating benchmarking and identification of opportunities for quality improvement. In addition, ICTs have been witnessed to improve compliance with set guidelines relating to the management of quality, surveillance and the collection and analysis of base level health data in Rwanda and Burundi (Kukafka, 2007). Hence through the use of health ICTs, healthcare policymakers, administrators and the general populace are able to effectively evaluate the performance of the health system, enabling them to come up with a clear picture of how resources should be allocated to improve health outcomes.

2.2.3 Zimbabwe

In Zimbabwe the E-Health Strategy 2012-2017 had acknowledged that, across the globe the majority of the countries have adopted ICTs in order to improve the provision of quality healthcare in a competitive manner. It is thus natural that Zimbabwe should follow suit. The policy document thus propels the versatility of digital technologies in significantly improving healthcare delivery system and can lead to the massive transformation in the manner in which health systems in the country are run.

According to the Ministry of Health and Child Care (MHCC) (2012), ICTs can potentially fortify many crucial roles of healthcare through enhancing capacity for gathering, analysing, managing and exchanging information across the vast healthcare system. ICTs can help the healthcare system in Zimbabwe by improving the quality of skills in healthcare workforce and by coming up with innovative ways of fulfilling healthcare outcomes. Similarly it is the E-Health Strategy's conviction that ICTs could be effective in tracking diseases across the population, thus improving decision-making and efficient allocation of resource. Zimbabwe's E-Health Strategy, (2012-2017:6) further mentions that by using ICTs in health, "the right health information is provided to the right person at the right place and time in a secure

electronic form to optimise the quality and efficiency of health care delivery, research, education and knowledge".

According to Verbeke et al. (2019) ICT platforms that Zimbabwe could use in healthcare an EMR system that could be used to track health records of a person across the entire healthcare services sector. In addition, telemedicine could also be used, enabling the digital sharing of health data and records from remotely so as to improve the quality of care. In the same vein mobile phones can also be employed in providing healthcare services. Mobile technologies including cell phones, sensors, PADs and other internet-enabled mobile devices could be utilised in monitoring and reporting of diseases. At the same time public health education and medical research can be supported as a result of access to evidence-based clinical practice and training as well as global repositories of knowledge (Chikonzo, 2018). The quality of healthcare professionals and that of healthcare itself would thus be significantly improved.

2.3 Role of technology in HIV/AIDS programming

2.3.1 Global

Over the past two decades the advent of modern ICTs has offered new opportunities in combating the HIV/AIDS health crisis (Fernandez et al., 2016). Technologies such as modern generation mobile technologies, the internet, social media and other digital technologies can be very crucial in producing positive results towards eradicating HIV and AIDS as a threat to global and societal health. This seconded by Brady et al. (2015) asserting that technology can play a very instrumental role in the prevention and treatment of HIV and AIDS. Numerous ways exist whereby technology has been seen to be instrumental in HIV and AIDS programming across the globe and these are explored below.

Most scholars, including Brady et al. (2015) now agree that the integration of ICTs in Comprehensive Care Centers (CCCs) for HIV and AIDS can be instrumental in reducing discrimination, new HIV infections and AIDS-related deaths. This is concurred by Motley et al. (2017) explaining that in the United Kingdom ICT has been seen to enhance HIV/AIDS programming by making sure that everyone is able to effectively access services in terms of HIV prevention, treatment, as well as support and care. The capabilities of ICT, particularly through broadcast and social network information access and diffusion, is offering a very simple and cost-effective strategy of creating basic knowledge about HIV/AIDS that is so necessary in combating the pandemic (Cordova et al., 2015). Scott and Mars (2013) mention

that voluntary counselling and testing of HIV/AIDS is a very crucial component of the fight against the proliferation of HIV and AIDS in the society.

At the same time ICTs have been found to be very effective in providing crucial HIV/AIDS health services to people in remote and marginalised communities. Thus with the employment of ICTs it is possible to eliminate HIV/AIDS problems such as mother to child transmission in rural areas where there is a shortage of healthcare workers and medical facilities. This is supported by the UNICEF (2010), revealing that the integration of ICT in PMTCT services in Asia-Pacific resulted in the coverage of services increasing from 9% in 2004 to 32% in 2009 while the population of new born children infected with HIV and AIDS reduced by 18% over the same period.

2.3.2 Regional

Regionally ICTs have been instrumental in education programmes concerning HIV/AIDS and prevention methods. Lithgow et al. (2017) observed that ICTs such as mobile phones and digital media are crucial in disseminating information on the benefits of HIV counselling and testing, HIV testing places as well as counselling services. The scholars supported their assertion through their study which found out that the success rate of email based online counselling in Ugandan schools was about 90%. In addition, developing countries often struggle with disparities between patients and healthcare workers and facilities, along with the realities of small populations in remote areas who have little access to medical facilities (Rosewell et al., 2018). Under such circumstance, ICT tools can provide the only effective and affordable means for the delivery of critical health services, from diagnosing HIV and AIDS to prescription and monitoring (Okpaku, 2003). UNAIDS is aimed at ensuring that there universal access to anti-retroviral therapy for PLWAs. Similarly ICTs could help deliver HIV and AIDS treatment and monitoring of health among those being treated (Gardner et al., 2011). Kabaara (2015) agrees with this, pointing out that Rwanda made use of various forms of ICTs for creating and monitoring a health sector which ensures that populations even those in remote region enjoy quality healthcare services. The scholars go on to reveal that Rwanda had already came up with a system in which everyone can enjoy HIV therapy by the time of their writing.

At the same time Tuberculosis (TB) is among the major causes of illness and death among people living with HIV and AIDS (WHO, 2009). Thus ICT infrastructure such as Geographic Information Systems (GIS) are crucial as they can be used to monitor treatment and trace defaulters to ensure that treatment for TB among those living with HIV and AIDS is successful

(Gardner et al, 2011). In the same vein, ICT applications can be employed to gather data and to undertake research on innovative tools for TB diagnosis and treatment. This is in line with Admire et al. (2009) who found out that Geographic Information Systems were instrumental in increasing the tracing of TB defaulters to over 90% in Vulundilela, South Africa.

The economic, social and psychological burden HIV/AIDS exerts on patients and families is also a major part of the challenge of HIV/AIDS pandemic (Rosewell et al., 2018). According to Fernandez et al. (2016) health care professionals can use ICT tools including broadcast, print, telephony and networked education to disseminate information on ways of coping with HIV/AIDS in the family and community. They can also employ personal information sharing applications and social networking platform in countering the negative psychosocial effects of the HIV and AIDS pandemic (Billings et al., 2015). This is emphasised by Okpaku (2003), indicating that studies carried out in Botswana showed that susceptibility and vulnerability to the psychosocial effects of HIV and AIDS reduced by approximately 50% within households that had access to ICTs.

A major obstacle in combating HIV/AIDS in developing regions such as Africa is the inadequacy and inaccuracy of data and information (both episodic and statistical) on all aspects concerning infections, diffusion, impact as well as control (Brady et al., 2015). According to Fernandez et al. (2016), ICTs provide the best option for dealing with such shortcomings. The creative utilisation of radio and TV technology, as well as the adoption of internet or intranet infrastructure greatly enhances the scope as well as quality of data and information gathering processes and mechanisms (Bada et al., 2011). This thus results in comprehensive information that can be used for research and improved decision making in combating the pandemic.

2.3.3 Zimbabwe

Information technology also has crucial role to play in fighting against HIV/AIDS in Zimbabwe. In line with Gandiwa (2021), the adoption of ICTs in HIV/AIDS programming would provide the country's health care sector with versatile tools to improve information dissemination to young people concerning the dangers and preventive measures against HIV/AIDS. Social media tools including Facebook, Twitter and Youtube can significantly enhance the diffusion of information to the youth about positive sexual and reproductive health behaviour. This is supported by Chikonzo (2018) pointing out that Zimbabwe has witnessed an increase in internet penetration from 11% to 47% between the periods 2010-2016 thus exhibiting a huge potential to reach the youth with information about HIV/AIDS.

At the same time advances in ICT could significantly improve prospects for those populations which are at risk of contracting HIV or those who are HIV positive in Zimbabwe. According to Gandiwa (2021), the use of mobile and online platforms for educating people about HIV/AIDS could be used to prevent the spread of HIV and AIDS. There has been an increased use social media in the country, and studies indicate that social media data could go a long in monitoring health across population, for instance the identification of HIV-related risk behaviours (Young et al., 2014). ICTs, including interventions that use mobile phone technology, are instrumental in effectively communicating with targeted populations. Guo et al. (2018) also believes that online messengers can be an important mode of information dissemination to HIV-infected people, so as to promote medication adherence, good mental wellbeing, as well as life satisfaction.

Similarly utilising healthcare information systems helps improve quality of care to ensure maximum recovery and satisfaction for the patient. They help engage the patient throughout the entire process of patient care, ensuring that healthcare professionals and patients are able to easily access and share patient information (Ellingsen and Obstfelder, 2007). ICT help engage patients enabling them to actively participate in their treatment and care, by promoting health living and by improving health knowledge and information (Sands, 2015). Engaging patients encompass norms, values and beliefs that help in corroborating decisions by patients concerning their healthcare. Such approaches can be implemented in the management of HIV and can include respect that is mutual, decision-making that is shared, as well as maximum being highly transparent when communicating and exchanging information (Marin et al., 2016).

2.4 Available ICT infrastructure in HIV/AIDS programming

This subsection provides an overview of ICT infrastructure that is used in HIV/AIDS programming. ICT infrastructure used in HIV/AIDS programming is location independent. Utilisation could be on the spot, for instance in a hospital or the surgery of a physician and can also be used across geography.

2.4.1 Global

Electronic Health Record (EHR) is one of the major ICTs used in HIV/AIDS programming across the world. Electronic Health Record (EHR) is regarded as a comprehensive, cross-institutional and longitudinal collection of a patient's health and healthcare data (Moen et al.,

2012). Most developed and emerging economies including Spain and India maintain a comprehensive and amalgamated record of health status is now considered central to modern health care systems. However it is very demanding and is often implemented only in part and far from ubiquitous. Apart from being used to have comprehensive knowledge about a patient that can be accessed from various locations, EHR is also used as data for public health planning, medical and research systems, as well as quality management. EHR is further used in health care services includes clinical, educational, preventive, administrative and research purposes.

Telemedicine is also one of the ICT tools that is normally used in HIV/AIDS programming. Rosewell et al. (2018) defines telemedicine as practicing medicine remotely. This is concurred by Zurovac et al. (2011) explaining that in Europe telemedicine involves the utilisation of modern ICTs, particularly two-way interactive audio and video communication, telemetry and computers to deliver health care services to patients remotely. It is thus a an integrated, in most cases regional health care network capable of offering comprehensive health care to a predefined population using telecommunications and computer technologies. In relation to telemedicine is the use of telemonitoring is defined as the transmission of physiologic data like electrocardiogram, weight, blood pressure, respiratory rate and some other information such as life style, self-care, education and administration of medicine using modern telecommunications technology (e.g. broadband, wireless, satellite and Bluetooth (Fernandez et al., 2016). Thus in Spain telemonitoring involves monitoring patients remotely using modern information and communication technologies.

In addition there is teleconsultation which according to Billings et al. (2015) encompasses the inspection of medical data of patients by physician located at a distance. The most common type of teleconsultation involves two healthcare professionals, usually one a physician would be located close to the patient while the other one the specialist would be located at a distance but in need of comprehensive information about the patient. This type of ICT health infrastructure makes use of real time, store and forward, hybrid technologies to facilitate the teleconsultation. There is also virtual healthcare teams which are employed in most advanced and emerging economies in delivering health outcomes. These consists of teams of health care professional who collaborate and share information on patients at a distance using modern digital equipment (Fernandez et al., 2016).

2.4.2 Regional

In countries in Africa electronic health record has been implemented as well. However due to shortage of resources the records are not yet comprehensive and are usually not updated in time. Nevertheless most African countries such as Tanzania, Ethiopia and Kenya have experimented telemedicine and teleconsultations in rolling out their HIV/AIDS intervention programmes. Also in Sudan, the first National Telemedicine Network was established in 2007 while in Tunisia, the Tunisian Society for e-health and Telemedicine was established in 2000 with the purpose of advancing the development of digital healthcare in the country. Some countries such as also employ ePrescriptions as part of their HIV/AIDS programming. This is described as "access to prescribing options, printing prescriptions to patients and sometimes electronic transmission of prescriptions from doctors to pharmacists" (Fertman, 2015, p. 312). Thus with ePrescription prescriptions of HIV/AIDS drugs are send directly to patients or to pharmacists enabling HIV/AIDS patients to quickly and easily access the drugs without the need to travel to where the physician is located.

In overall terms, M-health is the most widely used ICT in Africa in achieving health outcomes including combating HIV/AIDS. The WHO defines M-Health as a technology where one can make use mobile devices including mobile cellphones, wireless gadgets, personal digital assistants (PDAs), as well as patient monitoring devices for use in medical and public healthcare practice (Bhowmik et al., 2013). M-health has many apps or computer programs that can be downloaded to keep track of medications. Thus healthcare workers and virtual healthcare staff use these apps to record the patients' data, deliver healthcare information to patients and at risk individuals, as well as collaborate and share knowledge with other healthcare staff remotely.

In the same vein interactive online social platforms have become among the most convenient tools for people to share and discuss ideas, content and issues about HIV/AIDs with peers, healthcare organisations and healthcare workers (Brady et al., 2015). In line with Cordova et al. (2015), the most commonly used social media platforms in Africa include Facebook, Whatsapp Twitter, and Youtube. However some health care organisations custom make their own platforms to exclusively serve their purposes. The reach of social media is crucial in targeting people living with HIV/AIDS, as the disease can be isolating for them and pushing them to avoid discussing the subject (Fernandez et al., 2016). Thus social media platforms are used to engage in discussions of sexual and reproductive health remotely and anonymously enabling an open discussion and knowledge sharing about sensitive subjects.

2.4.3 Zimbabwe

In Zimbabwe the wide adoption of e-health systems has been very low according to Furusa and Coleman (2018) who carried out a study on the factors that impact on the adoption and implementation of e-health in hospitals in Zimbabwe. Semi-structured interviews were carried out with 20 medical doctors in 3 central hospitals and 7 provincial hospitals. The doctors had some experience with the use of EHR, telemedicine and District hospital information systems (DHIS). The study revealed that lack of adequate ICT infrastructures, insufficient ICT skills among physicians, resistance to change as well as poor policies by government are some of the factors hindering the diffusion of ICTs in healthcare services delivery in Zimbabwe. Nevertheless Zimbabwe is one of the countries mentioned by Omotosho et al. (2019) as having implemented, albeit partial electronic health record technology in some of the major health care facilities. Telemedicine is also reported to be used in Zimbabwe. In line with UNDP Innovation Fund Report (2014) the telemedicine services facilitate the electronic exchange of medical and health information across sites so as to improve the health status of patients.

In addition healthcare workers in Zimbabwe has been found to extensively use ICTs in accessing healthcare information. A study carried out by Gandiwa (2021) revealed that health professionals in the country use information from different sources including electronic medical databases and Internet electronic journals which are among the most widely used sources of health information for the professionals. At the same time social media and online textbooks are also widely consulted to obtain healthcare information. The research went on to show smartphones, tablets, laptops and desktops are the most preferred ICT tools were respectively in handling information concerning HIV/AIDs. However the ICTs being used by the HIV/AIDS organisations were found to be inadequate in meeting the requirements and needs of healthcare professionals.

At the same time social media is widely used in the disseminating of information to the youth concerning HIV/AIDS in Zimbabwe. This involves the use of social media platforms such as Facebook, Youtube, Twitter and Whatsapp to spread information about sexual and reproductive health, HIV/AIDS prevention, as well as counselling and testing services available to young people (Furusa and Coleman, 2018). According to Chikonzo (2018) many organisations have been involved in the dissemination of information about HIV/AIDs through the social media. These include National AIDS Council (NAC), Hope Zimbabwe, Southern Africa HIV and AIDS Information Dissemination Service (SAfAIDS), Zimbabwe AIDS Network and Zimbabwe National Network for People Living with HIV/AIDS (ZNNP+).

2.5 Empirical studies on the use of ICT in HIV/AIDS Programming

A number of studies have been undertaken looking into the use of ICT for combating HIV/AIDS. For instance Maloney et al. (2020) studied digital solutions for HIV prevention and care. The research was based on a pragmatist research philosophy incorporating both quantitative and qualitative data. The research strategy was a systematic literature review. It collected data from articles searched on medicine and public health journal databases from 1 September 2014 to 1 September 2018. Data was analysed using statistical as well as thematic analysis. The findings of revealed that most developed countries make use of smartphone application for education, behaviour change and testing for HIV. However little emphasis is being put on medical and PrEP care.

Purnomo et al. (2018) examined the use of eHealth for engaging and retaining priority populations in HIV treatment and care in the Asia-Pacific region. Positivism was employed in carrying out the study. The research made use of a systematic review of literature in interrogating its study questions. Data was collected from various research journals in databases of major international and national organisations in Europe, North America and Australia. Data analysis as carried out using standard deviations, percentages, means and p values. The research findings indicated that most of the Asia-Pacific countries made use of ehealth platforms including texts, social media and websites, in promoting HIV testing among gay men. The study also showed that ehealth via phone call reminders had a positive effect on adherence to antiretroviral treatment (ART).

Kibaara (2015) investigated the use of ICTs in CCCc in Kenya. The research used mixed research methods in choosing its research methods. It employed a descriptive research design based on a survey strategy to answer research questions. Data was collected from healthcare workers using self-administered questionnaires and from patients using focus group discussions. The study used descriptive and inferential statistics in analysing quantitative data and content analysis in analysing qualitative data. From the result it was shown that the respondents believed ICT usage to be very effective in the fight against HIV and AIDS.

Sørensen et al. (2008) reviewed the ICT systems used for the management anti-retroviral treatment therapy in South Africa. The research employed a pragmatist research paradigm in choosing its research methods. Historical literature review along with a phenomenological study were chosen as the research strategy of the study. Research articles were drawn from various databases including medicine and public health journals. The research also collected

data using semi-structured interviews healthcare workers. Systematic review was used to analyse the literature while the interview data was analysed with the help of thematic analysis. The findings of the research indicated that the country made use of electronic health records in managing it health information systems. However although some plans for telemedicine and e-health implementation were in place, there was no comprehensive ICT-based system in place for AIDS treatment in the country.

Chikonzo (2018) studied the efficacy of social media in disseminating information about HIV/AIDS in Zimbabwe focusing on young people. The research used pragmatism to determine the methods used in undertaking research on the subject. A survey research strategy was used to fulfil the research objectives. The data was collected from young people using self-administered questionnaires and from health organisations using semi-structured interviews. The research used percentages, mean scores and standard deviations in analysing quantitative data and thematic analysis to analyse qualitative data. Findings from the research indicated that social media has an important role in efficiently and easily disseminating HIV/AIDS information to people between the ages 18-24 years old. It showed that social media significantly improves the outreach of HIV/AIDS information across different communities in Harare.

This study is very instrumental in characterizing the use of ICT in HIV programming. Most of the studies agreed that ICT has a positive impact on health outcomes for HIV/AIDS prevention and care. The findings of the study showed a number of ICT interventions including smartphone applications, social media, websites, text messages and TV and radio broadcasts. The studies also indicated that the bulk of the interventions are dedicated more towards prevention than care. However there were also instances where ICTs were employed for records keeping and remote health care delivery. Nevertheless despite this scenario most of the study have been carried out in other countries except Zimbabwe where only one study was carried out. In addition the only study carried out was delimited to social media use in dissemination of information about HIV/AIDS to young people, disregarding all other ICT interventions and all other functions that ICTs can be used for in HIV/AIDS programming. It was therefore this gap that this study sought to fill in.

2.6 Chapter summary

This chapter focused on the literature review on the efficacy of ICT infrastructure on HIV/AIDs programming. The chapter started by describing and explaining the theoretical framework of

the study. After that the chapter focused on literature concerning explore how ICT infrastructures impact population health outcomes in health delivery systems. The chapter then reviewed literature on the role of technology in HIV/AIDS programming. It also looked at literature on the available ICT infrastructure in HIV/AIDS programming. The chapter further focused on empirical studies on the efficacy of ICTs on HIV/AIDS programming. The next chapter focuses on the research methodology of the study.

CHAPTER THREE

RESEARCH METHODOLOGY

3.0 Introduction

The chapter is mainly concerned with the tools and methods chosen in undertaking the research. The chapter starts by focusing on the research philosophy and the research design. The chapter goes on to the research population, sampling, methods of collecting data and data collection procedure. The methods used to buttress validity and reliability are also included in the chapter. The chapter further include the procedures that were used in analysing the research data, as well as the procedures used to satisfy the ethical considerations of the research. It finishes with the methodological limitations of the study.

3.1 Research philosophy

The research philosophy is the general belief concerning the nature of knowledge and how knowledge should be obtained (Saunders et al., 2013). The same authors also reveal that there are three major research paradigms common in social sciences research, namely positivism, interpretivism and pragmatism. Positivism hold the belief that knowledge is abstract from the human mind and should be obtained using scientific method as those used in physical sciences (Creswell, 2014). On the other hand interpretivism holds the view that knowledge is inherent in humans thus qualitative methods should be used to question human beings in the social settings under study (Saunders et al., 2013). At the same time Salkind (2010) states that pragmatism asserts the notion that there is no peculiar way of searching for knowledge but that research methods should be combined together depending on the nature and circumstances surrounding the research so as to fully answer the study questions.

This study chose the pragmatism in choosing its research methods, which thus resulted in the use of a mixed research approach in fulfilling the study objectives. Pragmatism was chosen because it allowed for flexibility in choosing the methods of research that suited the type of

research questions as well as the research context. In addition, pragmatism facilitated triangulation of quantitative with qualitative data thus yielding reliable research findings. In the same vein the use of the pragmatist research philosophy enabled the researcher to combine data from young people in Hatcliffe district with that from key informants from civil society organisations focusing on HIV/AIDS in order to fully answer the study questions.

3.2 Research design

The research design is the general conceptual framework employed by the research in order to answer the research questions (Creswell, 2014). The same author goes on to mention that there are three main research designs used in social sciences, namely exploratory, descriptive and explanatory research designs. This study adopted the descriptive research design in answering its research questions. The descriptive research design was used in the study because enabled the research to come up with an in-depth description characterising the efficacy of technology in HIV/AIDS programing. It made it possible to come up with a clear picture of how ICTs are employed in the fight against HIV/AIDS as well as the challenges being encountered in the usage of ICTs in HIV/AIDS programing.

3.3 Population

The population is the total number of things or organisms that are under study (Creswell, 2014). The target population of the study was made up of 19870 young people in Hatcliffe between the ages of 16 and 24, as estimated from the Zimbabwe Population Census (2022) and the 2017 Inter-Censual Demographic Survey (ICDS) (ZIMSTAT, 2022; ZIMSTAT, 2017). It also included key informants drawn from community health and social workers from the National AIDS Council, SAYWHAT, Action AIDS Trust, Social Services department, Musasa, and health service providers operating in Hatcliffe. The young people were chosen because they are a target group for the usage of ICTs to discuss and combat HIV/AIDS issues. Similarly the key informants had valuable knowledge concerning the efficacy of technology in the prevention and treatment of HIV/AIDS in the Hatcliffe.

3.3.1 Sample size

The research determined the sample size for the key informants based on the need to reach saturation in the research findings. Thus the sample size for the community health and social workers drawn from the National AIDS Council, SAYWHAT, Action AIDS Trust, Social services department, Musasa Project, and health service providers operating in Hatcliffe was chosen to be 10 to reach the saturation levels required. Hence ten (10) key informants were targeted to participate in the study. On the other hand the sample size for the young people who

participated in the study was determined to be twenty (20), which was also considered sufficient to cater for all demographic groups among young people in the Hatcliffe community. Thus the research used a total sample size of thirty (30) respondents in the study.

3.4 Sample and sampling techniques

Saunders et al. (2013) defines a sample as a subset of the population put aside in order to learn more about the population. The author goes on to distinguish two main types of sampling techniques which include probability sampling and nonprobability sampling. Probability sampling involves sampling in such a manner that the sampling error can easily be calculated while with nonprobability sampling it is very difficult to characterise the sampling error.

The research used purpose sampling to pick the young people and the key informants who took part in the study. Saunders et al. (2013) define purposive sampling as when the researcher uses intuition to select respondents. Purposive sampling was used because in ensured that the sample for key informants had people who had knowledge concerning the research subject. It also made sure that those who were selected were readily available thus enhancing the response rate of the field research. Additionally purposive sampling allowed the researcher to select a mix of young people with different demographic characteristics thus avoiding selection bias, and ensuring that the sample was representative of the young people in Hatcliffe. This helped improve the credibility and trustworthiness of the study.

3.5 Data collection methods

These are the tools that are used to collect primary data for a given study (Creswell, 2014). The research used questionnaires to collect data from young people using and interviews to collect data from key informants from civil society organisations and health institutions dealing with HIV/AIDS in Hatcliffe.

3.5.1 Questionnaires

A questionnaire is a document with a list of questions and boxes or spaces provided to fill in the answers that is used by a research to collect primary data from respondents (Bryman, 2015). The research used a questionnaire to collect data from young people between the ages 16-24 in Hatcliffe. The questionnaire that was used consisted of mainly closed questions that were meant to keep the respondents within the confines of the research. However a few open-ended questions were also included to give respondents room to express themselves. The first part of the questionnaire contained questions about the demographic characteristics of respondents. After that there were questions about the impact of ICT infrastructures on population health

outcomes in Zimbabwe. It also included questions about the role of technology in HIV/AIDS programming, as well as about the available ICT infrastructure in HIV/AIDS programming. In addition the questionnaire involved questions concerning existing bottlenecks of ICT infrastructure in HIV/AIDS programming.

The use of the questionnaire was very advantageous for the study. It enabled the collection of data from many respondents at the same time. In addition to that, the questionnaire facilitated the collection of quantitative data that could be easily coded into numerical data thus enabling the use of descriptive and inferential statistics in objectively analysing the data. At the same time the questionnaire did not require respondents to write the names thus guaranteeing the anonymity of their responses. In addition to that, respondents were allowed to fill in the questionnaire in their own spare time and in the absence of the researcher. This meant that respondents could not be intimidated by the presence of the researcher, thus enhancing the reliability of their responses.

3.5.2 Semi-structured interviews

Semi-structured interviews were used in order to collect data from key informants from the National AIDS Council, SAYWHAT, Action AIDS Trust, Social services department, Musasa, and local health services providers. The type of interviews were face to face semi-structured interviews. That is the researcher met the interviewees physically and conducted the interviews face to face. In addition the type of interviews used was that of semi-structured interviews. This means that an interview guide with predetermined questions was used while at the same time the interviewer could use follow up questions to probe more into the opinions and perceptions of the interviewees. The interviewer asked questions about the impact of ICT infrastructures on population health outcomes and about the role of technology in HIV/AIDS programming. The interviews also included questions about the available ICT infrastructure in HIV/AIDS programming and the existing bottlenecks of ICT infrastructure in HIV/AIDS programming.

The use of interviews had many benefits which helped ensure reliable and valid of the study findings. They enabled the respondents to fully express themselves thus providing comprehensive data about the efficacy of technology in HIV/AIDS programming. In the same vein, the use of follow up questions enabled the researcher to better understand the perceptions and perspectives of the respondents. In addition, the use of interviews facilitated the observation of nonverbal ques such as tone, pitch, tempo and gestures enabling the researcher to better understand the perspectives of the interview respondents. Furthermore interviews

made it possible for interviewees to ask for clarification of interview questions, enabling them to provide valid answers.

3.6 Data collection procedure

Mixed research methods were used to carry out the study. The researcher started by obtaining a letter of approval from Bindura University of Science Education (BUSE) which authorised her to carry out the study. She then went on to use the letter to obtain authorisation from the Hatcliffe District offices to allow her to carry out the study in the area. After that the questionnaire for young people and an interview guide used in interviews with key informants were drafted. A consent form was also drafted which was offered to potential respondents to sin if they had agreed to participate in the research**.**

The AIDS organisations, civil society and government departments involved were then approached to seek their cooperation in providing key informants for the study. A purposive sample of the key informants was then drawn. This was followed by the drawing of a purposive sample of the young people who participated in the questionnaire survey. All the participants were given a consent form to sign before the data collection exercise. The questionnaires for young people were administered concurrently with the sampling process in order to avoid the hustles of later searching for the selected research subjects to fill in the questionnaires. The interviews last half and hour to an hour so that all relevant issues could be discussed. Voice recordings of the interviews were taken with the consent of the interviewees.

3.7 Validity and reliability of data

Validity of data means that the data is relevant for use in the study (Creswell, 2013). The research ensured the validity of the data of quantitative data by recruiting people who have relevant knowledge concerning the efficacy of ICTs in HIV/AIDS education in Hatcliffe. Also, the questionnaire for collecting data was designed with the help of literature review thus ensuring that the questions asked were within the confines of the research subject. In addition the questionnaire was pretested so as to make sure that the questions asked were relevant and directly related to the research questions. In terms of qualitative data, the research ensured conformity by purposively selecting key informants from community health and social workers from the Social Services Department and organisations focusing on HIV/AIDS programming, who have comprehensive knowledge about the accounting practices used by SMEs in Zimbabwe. Additionally the interview questions were based on the research questions ensuring that relevant data was obtained for the study. The trustworthiness and credibility of the

qualitative data was ensured by conducting the interview participants to read through the sub-themes generated and their description and confirm whether or not they represented what they said during the interview sessions. The research further ensured credibility of the study by clearly explaining the research strategy used and procedures used to undertake the study so that others could be able to verify the study results. The research further

On the other hand reliability or dependability of data means that the findings from the data are consistent even when a different sample from the same population is used (Bryman, 2015). Hence in ensuring reliability the researcher compared the research findings with scholarly comments and past studies on the use of ICTs in educating young people about HIV/AIDS to find out the extent to which the findings agreed or disagreed with literature. At the same time the pretesting of the questionnaire and interview guide ensured that the questions that were contained were simple to understand and had no errors which will aid the reliability of the study. Additionally the use of both questionnaires and interviews in collecting data from different samples enabled triangulation which also buttressed the dependability of the study findings.

3.8 Data presentation and analysis procedures

The research employed both quantitative and qualitative techniques in order to present and analysis the research data. Quantitative data was entered into excel and presented in the form of tables and charts which enabled easier illustration of the patterns of responses. The quantitative data was analysed using percentages, means scores and standard deviations. Percentages were very useful as they enabled easier interpretation of the study findings. Mean scores were instrumental in summarising the respondents showing clearly the response choices chosen by the majority of the study respondents. At the same time standard deviations were very useful in measuring the extent to which the mean score results represented the sentiments of the bulk of respondents, hence ensuring the validity of the research findings.

On the other hand qualitative data was presented in the form of text and through direct quotations. This was done in order to provide readers with a clear picture of the perceptions and opinions of the respondents. The qualitative data was analysed using thematic analysis. Thus it was transcribed into text and coded along the research questions. After that sub-codes were created from the coded data enabling the researcher to fully characterise the main themes discussed by the respondents. The themes were then analysed in line with the main objectives of the study.

3.9 Ethical considerations

It is the duty of the researcher to make sure that the research is carried out in an ethical manner. Neuman (2014) defines research ethics as ensuring that the research is undertaken based on the norms of values of society and ensuring that no one is injured as a result of being involved in the study. The four ethics that should be observed in researches include informed consent, confidentiality of responses, withdrawal rights and debriefing of respondents.

Informed consent means ensuring that respondents voluntarily participate in the study knowing what they are getting into (Neuman, 2014). Thus in ensuring informed consent, the researcher obtained a letter of approval from the Bindura University of Science Education (BUSE) which was shown to every individual or organisation that took part in the study. The researcher introduced herself to potential respondents, telling them her name, the name of the institution approving the study and the nature and purpose of the study. Those who took part in the study did so voluntarily without any form of cohesion from anyone. This ensured that respondents were aware of who they were dealing with and the main purpose of the study, thus ensuring informed consent from respondents.

Confidentiality means that protecting the identity of respondents and ensuring that their responses are not shown to anyone who is not part of the research team (Saunders et al., 2013). In ensuring confidentiality, the researcher assured respondents of the confidentiality of their responses. In addition, the reporting of study findings did not involve identifying the names of the people who respondent but the respondents were either identified in groups or using phrases such as participant 1 etc. The helped ensure the anonymity of responses hence confidentiality.

Right of withdrawal means that the respondents should be free to withdraw from the study anytime they want to do so (Neuman, 2014). The researcher also told respondents that they could withdraw from the study at any given time without having to explain themselves and without damaging their relationships with the researcher or BUSE. Hence right of withdrawal was assured in the study.

Debriefing means that reporting back to research participants about the results, conclusions and recommendations of the study after the study has been finalised (Saunders et al., 2013). The researcher promised respondents that they would be sent copies of the research report once it had been approved by BUSE meaning that respondents had the right of being debriefed about the results of the study.

3.10 Limitations of the study

The study faced a number of limitations that threatened the validity and reliability of the research findings. Firstly there was a risk that respondents could get bored during the data collection process due to the amount of issues that were to be discussed. Thus both the questionnaire and interview sessions were shortened in order to ensure that the respondents were not bored or failed to attend to all questions. Apart from that there was a risk of young people not providing sincere responses in trying to protect their privacy regarding their activities involving the use of digital technology. In reducing this risk the researcher guaranteed the anonymity and confidentiality of their responses. Also, there was a chance that some of the young people who took part in the study would be uncomfortable discussing issues of HIV/AIDS. Hence questions in their questionnaire were be made less obtrusive to reduce the discomfort of the respondents when answering questions. The possibility of selection bias was also another limitation of the study. This was solved by purposively selecting the research participants focusing on coming up with a sample of people with different demographic characteristics, thereby enhancing the reliability and credibility of the study.

3.11 Delimitations

The search was conducted in Hatcliffe district, residential area that is 14 km North of Harare CBD. The district is among the main hot spots of HIV transmission in Zimbabwe and as such, generalizations would be made hinging on the findings of the research. In addition to that, only residents of the district in question from the ages of 16-24 participated whilst key informants were coming from organizations such as National AIDS Council, SAYWHAT, Action AIDS Trust, Social services department, Musasa, and health service providers operating in Hatcliffe. It focused on the usage of ICT in HIV/AIDS programming during the period January 2022 to January 2023.

3.12 Chapter summary

This chapter was mainly concerned with the methods that were chosen by the researcher in undertaking the study. The chapter started by focusing on the research philosophy, research design and research strategy. It went on to the research population, the sample and sampling techniques, as well as data collection methods and data collection procedure. The methods used to ensure the validity and reliability of the research data were also included in the chapter. The chapter further included the procedures that were used in analysing the research data, as well as the procedures used to satisfy the ethical considerations of the research. It finished with the

methodological limitations of the study. Chapter four focuses on data presentation, analysis and interpretation of results

CHAPTER FOUR

DATA PRESENTATION, ANALYSIS AND INTERPRETATION

4.0 Introduction

This chapter focuses on presenting, analysing and interpreting the results of the study. The chapter starts by the response rate and the demographic characteristics of the questionnaire respondents, including gender, age, marital status, religion and education. The chapter then focuses on the main results of the study, which are grouped into quantitative and qualitative findings. Within each of the two study methodologies the results are based on the main objectives of the study. Thus they starts from findings concerning how ICT infrastructures impact population health outcomes in health delivery systems, the role of technology in the prevention and treatment of HVI/AIDS, the ICT tools used to combat HIV/AIDS, the challenges of using ICTs in programmes for the prevention and treatment of HIV/AIDS. The final part of the chapter discusses the results of the study in the context of theoretical and empirical literature.

4.1 Response rate

The researcher distributed 20 questionnaires to young people aged 16-24 in Hatcliffe. She also planned to carry out 10 interviews with key informants from National AIDS Council, SAYWHAT, Action AIDS Trust, Social services department, Musasa, and health service providers operating in Hatcliffe. The findings in Table 4.1 below indicate the response rates.

Table 4.1: Response rate

Respondents	**Questionnaires administered/Interviews planned**	**Questionnaires returned/Interviews carried out**	**Response rate**
Young people	20	16	80%
Key informants	10	7	70%

Total	**30**	**23**	**76.7%**

Source: Primary data

The findings in Table 4.1 above show that young people had a 80% response rate while key informants had a 70% response rate. The total response rate was found to be 67%. These findings indicated that young people had the highest response rate. Also the overall response rate was very high, hence most of the people approached were keen to take part in the study.

4.2 Demographic characteristics of young people

The questionnaire for supermarket employees asked respondents about their demographic characteristics. The questions included those about the gender, age, marital status, religion and level of education. The demographic characteristics are presented here under.

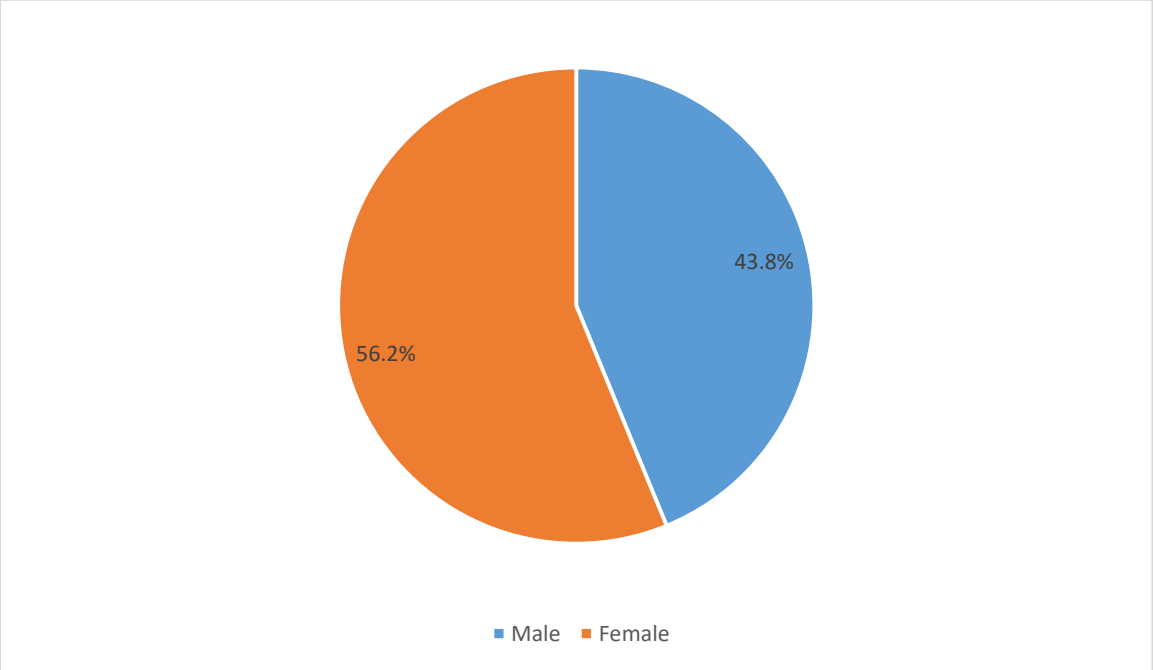

Fig 4.1: Gender
Source: Questionnaire data

The results in Fig 4.1 indicate that of the 16 questionnaire respondents, 43.8% were male while 56.2% were female. These results indicated that majority of the questionnaire respondents were female.

Table 4.2: Age

	Frequency	Percent	Cumulative Percent

Valid	17 and below	2	12.5	12.5
	18-20	5	31.3	43.8
	20-22	6	37.5	81.3
	22-24	3	18.6	100
	Total	16	100	

Source: Questionnaire data

The results in Table 4.2 show that 12.5% of the respondents were aged 17 years and below, 31.3% were 18-20 years old, 37.5% were 20-22 years old and 18.6% were 22-24 years old. This means the age group 20-22 years dominated the response group followed by the 18-20 years old age group.

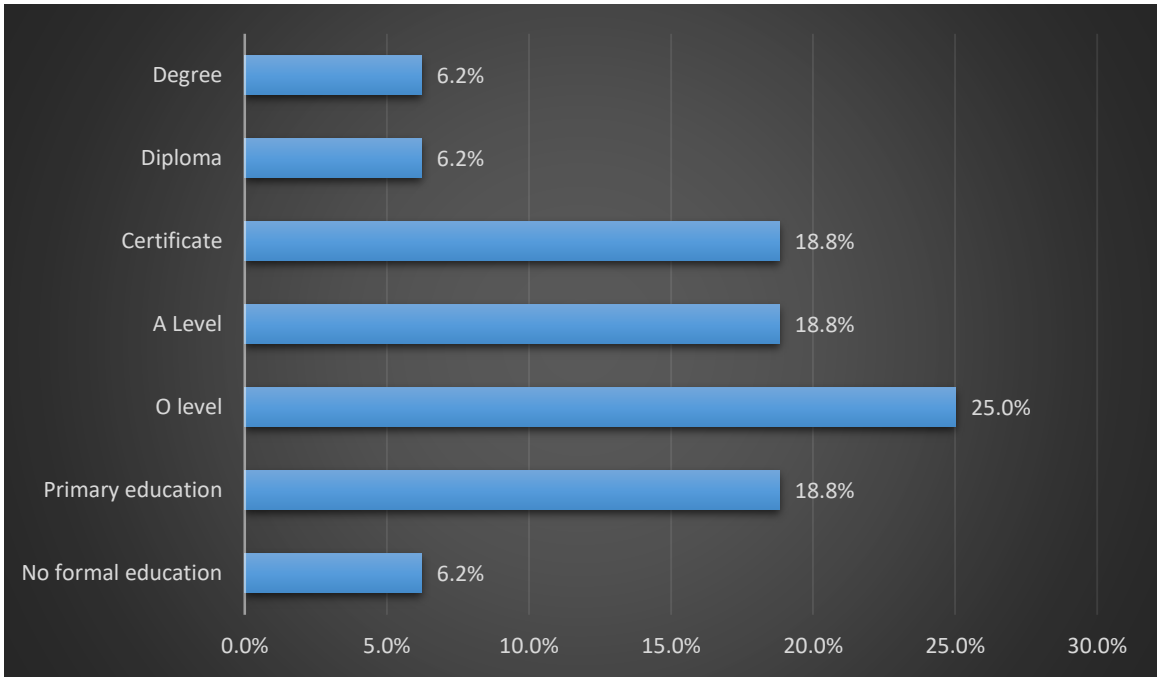

Fig 4.2: Highest level education
Source: Questionnaire data

The findings in Fig 4.2 above show that 6.2% of the respondents had no formal education, 18.8% had primary education, 25% had O level, 18.8% had A level, 18.8% had a certificate, 6.2% had a diploma and 6.2% had a degree as their highest academic qualification. Hence the largest proportion of the respondents had O level with the lowest having a degree, while those with no formal education, a diploma and a degree occupied the lowest proportions among the respondents

Table 4.3: Religion of the respondents

		Frequency	Percent	Cumulative Percent
Valid	Christianity	9	56.3	56.3
	Islam	4	25	81.3
	Hindu	0	0	81.3
	African Traditional	3	17.7	100.0
	Total	16	100	

Source: Questionnaire data

The results in Table 4.3 above indicate that 56.3% of the respondents were Christian, 25% were Muslim, 0% were Hindu while 17.7% had African Traditional Religion as their religion. This indicated Christians dominated the religion of the questionnaire respondents.

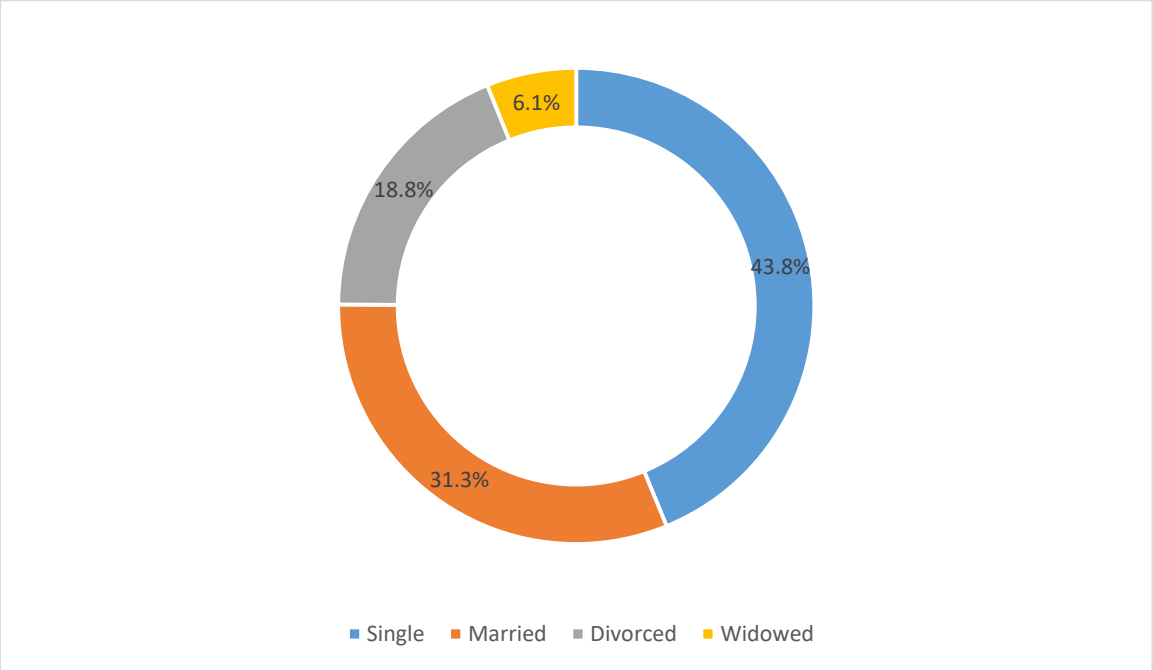

Fig 4.3: Marital status of the respondents

Fig 4.3 indicates that 43.8% of the respondents were single (never married), 31.3% were married, 18.8% were divorced and 6.1% were widowed. These results indicated that the bulk of the respondents were single, followed by those who were married, those who were divorced and lastly those who were widowed.

4.3 Quantitative Data Presentation

The research collected quantitative data from young people aged 16-24 years using a questionnaire. The questionnaire data was analysed using percentages, mean scores and standard deviations. Below are the quantitative results obtained from the questionnaire data.

4.3.1 How ICT infrastructures impact population health outcomes in health delivery systems

The young people who took part in the study were asked about whether or not they thought ICTs have a role to play in improving health in their community. The results of their responses are shown in Fig 4.4 below.

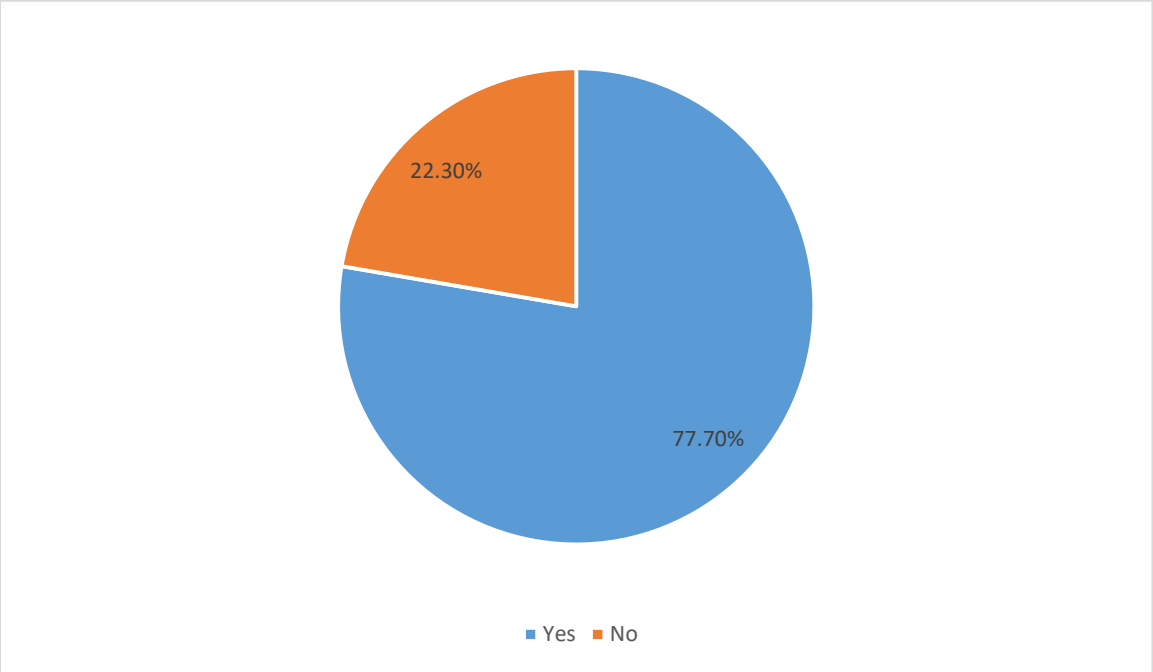

Fig 4.4: Whether or not they thought ICTs have a role to play in improving health in the Hatcliffe community

The results in Fig 4.4 above show 77.7% answered yes and 22.3% said no. This indicated that most of the survey respondents were in agreement with the notion that ICTs have a role to play in improving the health of their community.

Questionnaire respondents also were asked to indicate from strongly disagree= 1 to strongly agree= 5 their level of agreement concerning the main benefits of using ICT tools in maintaining the health of the community. The results were analysed in terms of mean scores and standard deviations. The research interpreted mean score less than 2.5 as showing that the majority of the respondents were in disagreement and those above 2.5 to show that most

respondents were in agreement. Table 4.4 below shows the results of the study concerning the main benefits of using ICT tools in maintaining the health of the community

Table 4.4: Benefits of using ICT tools in maintaining health the Hatcliffe community

	N	Mean	Std. Dev
Improving quality and efficiency in health care	224	3.89	1.41
Reducing operating costs of clinical services	224	3.82	1.57
Improved access to health care	224	3.27	1.39
Availability of more information concerning the performance of the health system	224	4.21	1.46
Improvement in care for chronic diseases (e.g. diabetes, asthma, hypertension etc.)	224	3.36	1.37
Enhanced speed in health care communication	224	4.03	1.96
Reduced workload for health care staff	224	2.81	1.32

Source: Questionnaire data

The findings in Table 4.4 show that the mean score on the statement that ICTs help in improving quality and efficiency in health care was 3.89 with a standard deviation of 1.41. The mean score was more than 2.5 which indicated that the majority of the questionnaire respondents agreed that improvements in quality and efficiency in health care is one of the main benefits of ICTs. The standard deviation was below 3 indicating that the mean score result was reliability in illustrating the general sentiments expressed by the bulk of the questionnaire respondents.

The mean score on the statement that ICTs help in reducing operating costs of clinical services was 3.82 with a standard deviation of 1.57. These findings showed that most of the respondents were in agreement with the statement that reducing operating costs of clinical services is among the main advantages of employing ICTs in health care. The standard deviation was less than hence showing that the result mean score result was reliable for use in the study.

The mean score on the statement that ICTs results in improved access to health care was 3.27 with a standard deviation of 1.39. The results of the study thus indicated that the majority of the respondents were in agreement that improved access to health care is one of the major

benefits of ICTs in health care. The standard deviation was below 3 indicating that the mean score result was reliability in illustrating the general sentiments expressed by the bulk of the questionnaire respondents.

The mean score on the statement that ICTs results in the availability of more information concerning the performance of the health system was 4.21 with a standard deviation of 1.46. This indicated that most of the respondents agreed the use of ICTs in health care results in the availability of more information concerning the performance of the health system. The standard deviation was less than hence showing that the result mean score result was reliable for use in the study.

The mean score on the statement that ICTs lead to improvements in care for chronic diseases was 3.36 with a standard deviation of 1.37. These findings showed that the majority of the questionnaire respondents were in agreement with statement that improvements in care for chronic diseases is one of the significance benefits of utilising ICTs in health care. The standard deviation results indicated that the mean score was a reliable measure expressing the sentiments of the majority of the survey respondents

The mean score on the statement that ICTs results in enhanced speed in health care communication was 4.03 with a standard deviation of 1.96. The results of the study thus indicated that the majority of the respondents were in agreement that enhanced speed in health care communication is one of the major benefits of ICTs in health care. The standard deviation was below 3 indicating that the mean score result was reliability in illustrating the general sentiments expressed by the bulk of the questionnaire respondents.

The findings in Table 4.4 further show that the mean score on the statement that ICTs help in reducing the workload for health care staff was found to be 2.81 with a standard deviation of 1.32. The mean score was more than 2.5 which indicated that the majority of the questionnaire respondents agreed that reduced workload for health care staff is among the main benefits of ICTs. The standard deviation was below 3 indicating that the mean score result was reliability in illustrating the general sentiments expressed by the bulk of the questionnaire respondents.

The questionnaire went on to ask respondents whether they knew anyone in Hatcliffe who has received advice or medical instructions through their mobile phone, computer or similar device. Fig 4.5 indicates their responses.

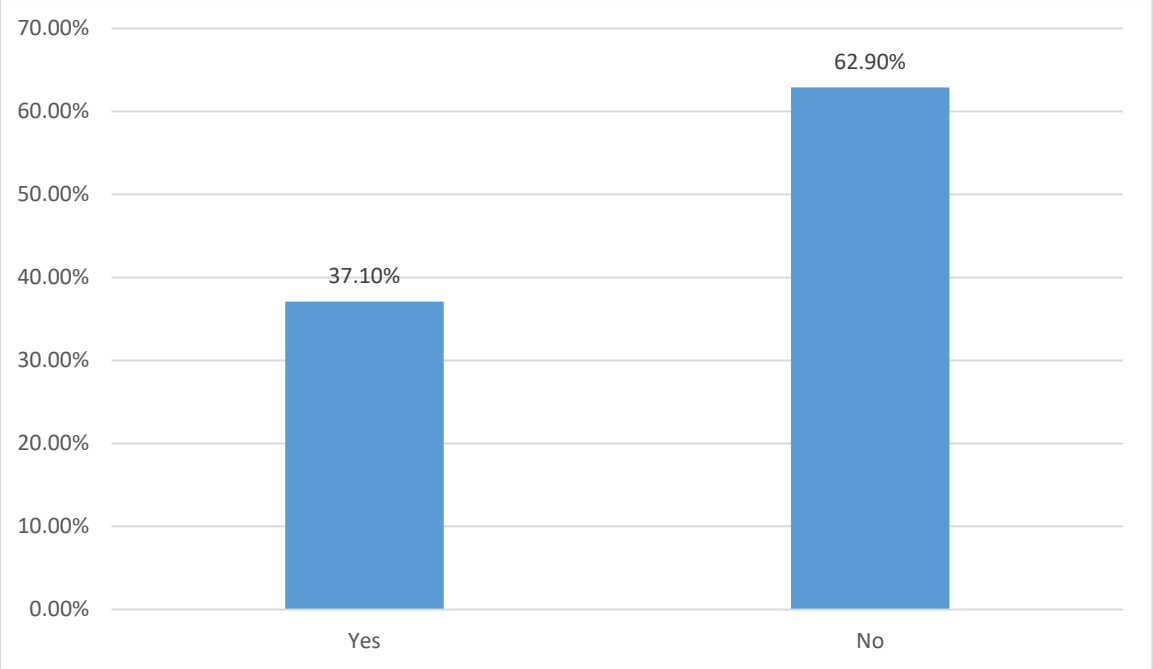

Fig 4.5: Whether respondents knew anyone in Hatcliffe who has received advice or medical instructions through their mobile phone, computer or similar device

Fig 4. Shows that 37.1% said yes and 62.9% said no to the question of whether respondents knew anyone in Hatcliffe who has received advice or medical instructions through their mobile phone, computer or similar device. These result indicated that the majority of the respondent disagreed that they knew anyone in Hatcliffe who has received advice or medical instructions through their mobile phone, computer or similar device.

4.3.2 The role of ICTs in HIV/AIDS programming

The young people who took part in the questionnaire survey were asked a number of questions concerning the role of ICTs in HIV/AIDS programming. Firsts they were asked whether or not they thought information technology could play an important role in programmes to fight against HIV/AIDS. Fig 4.6 indicates the percentage distribution of their responses.

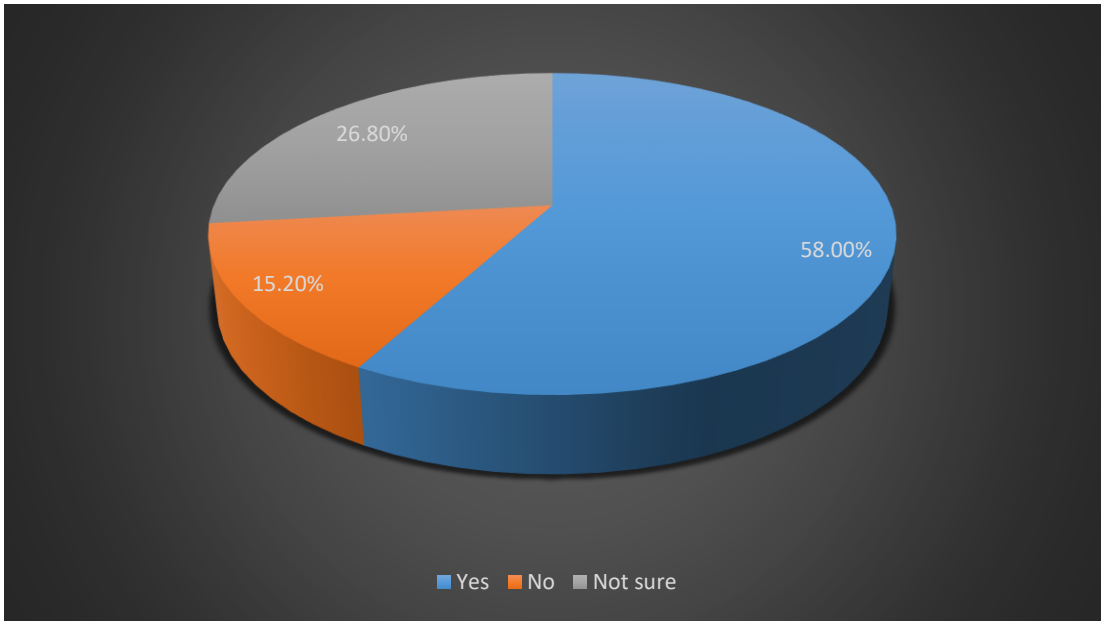

Fig 4.6: Whether or not ICTs could play an important role in HIV/AIDS programming in Hatcliffe

Fig 4.6 shows that 58% said yes, 15.2% said no and 26.8% said not sure to the question of whether or not they thought ICTs could play an important role in HIV/AIDS programming in their community. These results indicated that majority of the survey respondents were of the perception that ICTs could play an important role in HIV/AIDS programming in Hatcliffe.

Respondents were then asked to indicate the extent to which they agreed a number of attributes taken from literature were among the main benefits of using information and communication technologies in programmes for the prevention and treatment of HIV/AIDS. The questions were based on a 5-point agreement level scale from strong disagree to strongly agree. The results in Table 4.5 show the mean scores and standard deviation obtained from the results.

Table 4.5: Benefits of using ICTs in HIV/AIDS programming

How far do you agree to the following;	N	Mean	St. deviation
Providing basic knowledge about HIV/AIDS	224	3.32	0.99
Providing information about the benefits of HIV counselling and testing	224	3.25	1.35
Providing information about HIV testing and care	224	3.49	1.27

centres			
Improving access to HIV/AIDS health care services	224	3.17	1.72
Providing psychological support to families handling HIV/AIDS patients	224	3.46	0.84
Gathering research data on HIV/AIDS	224	3.77	1.78
Valid N (listwise)	224		

Source: Questionnaire data

Table 4.4 above shows that the mean value providing basic knowledge about HIV/AIDS was found to be 3.32 with standard deviation of 0.99. These results indicated that the majority of the respondents agreed with the notion that providing basic knowledge about HIV/AIDS is one of the major benefits of using ICTs in HIV/AIDS programming. The standard deviation was more less than 3 indicating that the mean value result was a good representation of the sentiments expressed by the bulk of the respondents.

The mean value providing information about the benefits of HIV counselling and testing was found to be 3.25 with a standard deviation of 1.35. These findings indicated that the bulk of the respondents agreed that providing information about the benefits of HIV counselling and testing is among the benefits of employing ICTs in HIV/AIDS programmes. The standard deviation was more less than 3 thus indicating that the result was a reliable indication of the opinions of the majority of the respondents.

The results also show that the mean value for providing information about HIV testing and care centres was found to be 3.49 with a standard deviation of 1.27. The findings of the study thus indicated that the majority of the respondents agreed that providing information about HIV testing and care centres is one of the important roles ICTs can play in HIV/AIDS programming. The standard deviation was less than 3 showing that the mean value result represented the opinion of the bulk of the respondents.

In addition, the findings of the study indicated that the mean value improving access to HIV/AIDS health care services was found to be 3.17 with a standard deviation of 1.72. These results indicated that most of the respondents agreed with the statement that improving access to HIV/AIDS health care services is among the major benefits of ICTs in programmes for the prevention and treatment of HIV/AIDS. The standard deviation was lower than 3 which indicated that the result was reliable for further use in the study.

The research also found the mean value for providing psychological support to families handling HIV/AIDS patients to be 3.46 with a standard deviation of 0.84. The results of the study indicated that the majority of the respondents were in agreement with the notion ICTs are instrumental in providing psychological support to families handling HIV/AIDS patients. The research also indicated a standard deviation that was less than 3 showing that the mean value result was a good measure of the sentiments of most respondents.

The findings of the study also show that the mean value gathering research data on HIV/AIDS was found to be 3.77 with a standard deviation of 1.78. The results of the study indicated that the majority of the respondents agreed that the ability to effectively and efficiently gather research data on HIV/AIDS is among the major advantages of employing ICTs in HIV/AIDS programming. The standard deviation was below 3 indicating that the mean score result was reliability in illustrating the general sentiments expressed by the bulk of the questionnaire respondents.

4.3.3 ICT tools used to combat HIV/AIDS

The research also sought to establish the ICT tools used to combat HIV/AIDS in Hatcliffe. Thus questionnaire respondents were asked to indicate their level of agreement to a number of statements about the ICT tools used to combat HIV/AIDS in Hatcliffe. The findings in Table 4.6 show the mean scores and p values calculated from their responses.

Table 4.6: ICT tools used to combat HIV/AIDS in Hatcliffe

	N	Mean	Std. Dev
Use of mobile phones to deliver HIV/AIDS information and healthcare	224	3.43	1.10
Use of websites to deliver HIV/AIDS information	224	2.59	1.34
Use of social media for discussing sexual and reproductive health	224	3.75	1.26
Use of ICT to monitor whether one is taking their medications	224	1.76	2.19

Source: Questionnaire data

The findings in Table 4.6 show that the mean score for the use of mobile phones to deliver HIV/AIDS information and healthcare was found to be 3.43 with a standard deviation of 1.10.

This indicated that the majority of the respondents agreed that mobile phones are used to deliver HIV/AIDS information and healthcare in Hatcliffe. The a standard deviation was lower than 3 indicating that the mean score represented what was said by the bulk of the respondents

The findings also show that the mean score for the use of websites to deliver HIV/AIDS information was found to be 2.59 with a standard deviation of 1.34. These findings show that the bulk of the respondents were in agreement with the statement websites are used to deliver HIV/AIDS information in Hatcliffe. The standard deviation was found to be less than 3 indicating that the mean score results were reliable in exhibit the perceptions of the majority of the survey participants.

On the use of social media for discussing sexual and reproductive health a mean score of 3.75 with a standard deviation of 1.26 were obtained. Since the mean score is more than 2.5 the results indicated that the majority of the respondents agreed with the notion that social media is used for discussing sexual and reproductive in Hatcliffe. The standard deviation was less than hence showing that the result mean score result was reliable for use in the study.

On the use of ICT to monitor whether one is taking their medications a mean score of 1.76 and a standard deviation of 2.19. This shows that the majority of the respondents disagreed that ICT is used to monitor whether one is taking their medications in Hatcliffe. The standard deviation was below 3 indicating that the mean score result was reliability in illustrating the general sentiments expressed by the bulk of the questionnaire respondents.

4.3.4 Challenges of using ICTs in programmes for the prevention and treatment of HIV/AIDS

The research also sought to find out about the major barriers to using ICTs in programmes for the prevention and treatment of HIV/AIDS in Hatcliffe. The young people who participated in the study were first asked whether or not they had cellphones. The results in Fig 4.7 indicate the distribution of their responses.

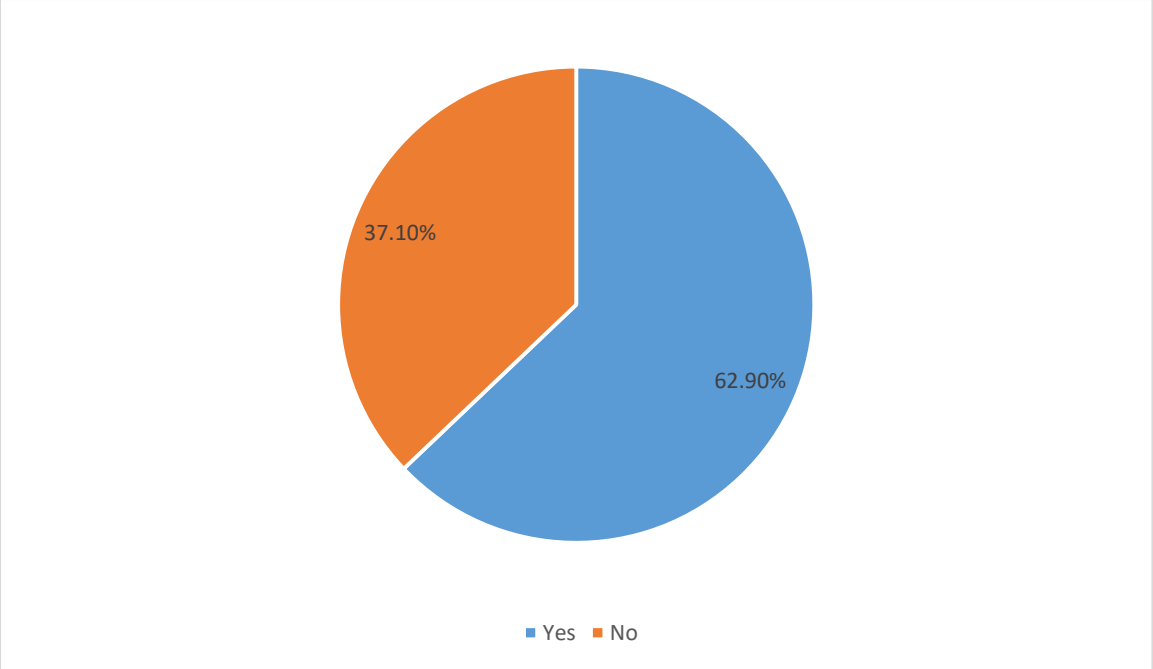

Fig 4.7: Ownership of cell phones in young people in Hatcliffe

Fig 4.7 show that 62.9 % of the respondents said yes and 37.1 % said no. This indicated that most of the young people who took part in the study owned cellphones.

The questionnaire respondents were also asked whether or not they owned a smart phone. The findings are shown in Fig 4.8 below.

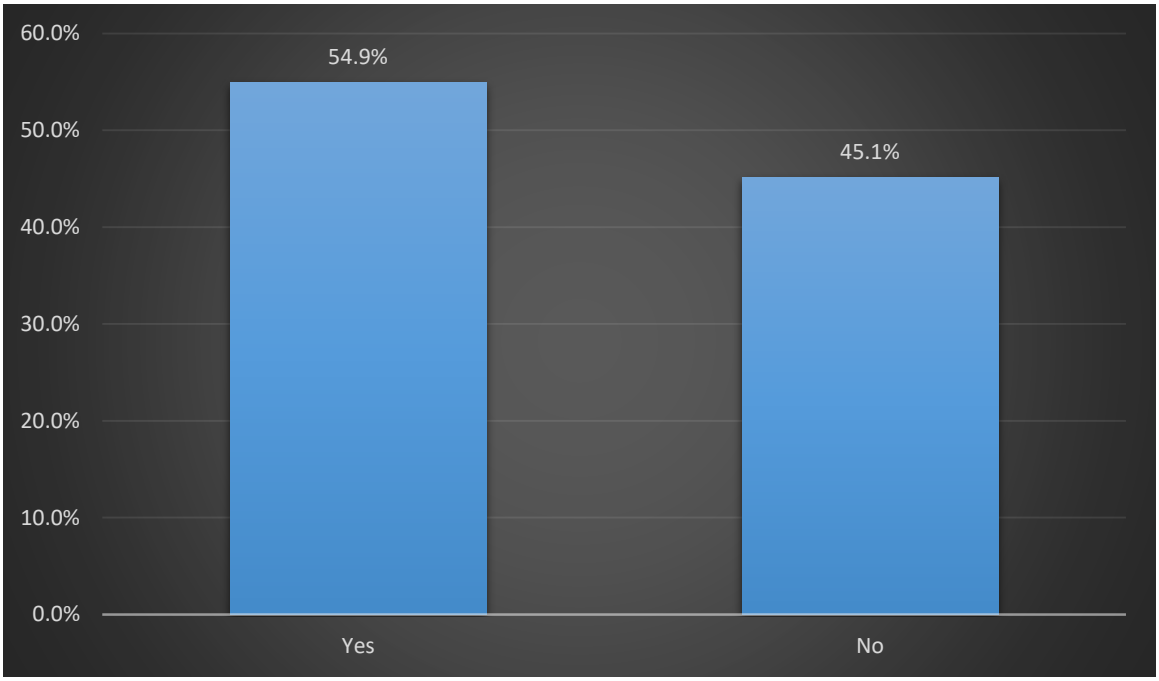

Fig 4.8: Ownership of smart phones in young people in Hatcliffe

The findings in Fig 4.8 indicate that 54.9% answered yes and 45.1% answered no to the question of whether or not they owned a smart phone. These findings showed that the majority of the young people had smart phones.

In addition, the young people were asked if there are any network challenges in their area. Their responses are shown in Fig 4.9 below.

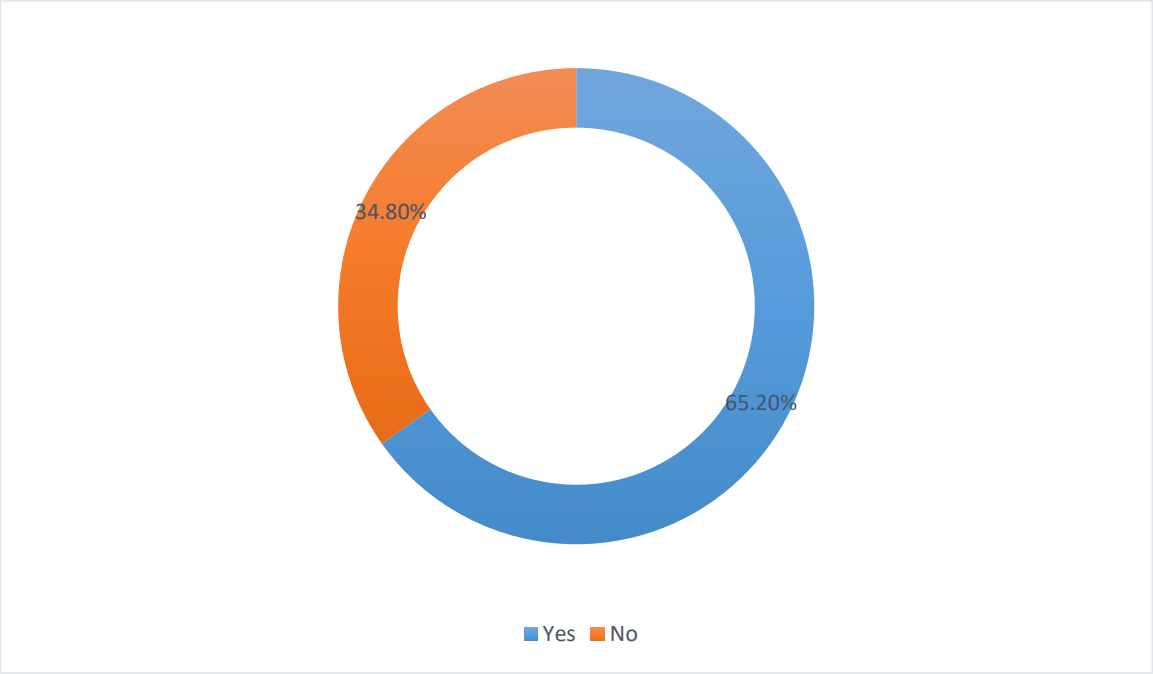

Fig 4.9: Whether or not there are any network challenges in Hatcliffe

Fig 4.9 shows that 65.2% said yes and 34.8% said no to the question of whether or not there are network challenges in the area. This shows that the majority of the respondents indicated that there are network challenges in Hatcliffe. Those who answered yes were then asked to specify the type of network challenges. Table 4.7 shows the network challenges identified by the questionnaire respondents.

Table 4.7: Network challenges in Hatcliffe

		Frequency	Percent	Cumulative Percent
Valid	Poor internet connectivity	57	39.0	39.0
	Poor signal strength	47	32.2	71.2
	Poor internet coverage	42	27.8	27.8
	Total	146	100	

Source: Questionnaire data

Table 4.7 indicates that 39% identified poor internet connectivity, 32.2% said poor signals strength and 27.8% said poor internet coverage were the major network challenges in their area. Thus those who complained about poor internet connectivity dominated the responses, followed by those who identified poor internet coverage among the major network challenges in Hatcliffe.

A 5 point agreement level scale was then used to ask the questionnaire respondents about the extent to which they agreed that several factors identified in literature were among the main challenges of using ICTs in programmes for the prevention and treatment of HIV/AIDS in their area. The findings in Table 4.8 show the mean scores and standard deviations obtained from the results.

Table 4.8: Challenges of using ICTs for HIV/AIDS programming

How far do you agree to the following;	N	Mean	Std. Dev
Poor mobile network and internet connectivity	224	3.34	1.69
Unreliable electricity supply	224	3.75	2.04
Shortage of sufficiently trained health personnel	224	2.38	2.27
Shortage of financial resources for investing in health ICT equipment	224	4.17	1.72
Lack of interest in ICT-based health care tools	224	2.46	1.84

Source: Questionnaire data

The mean score for poor mobile network and internet connectivity was 3.34 with a standard deviation of 1.69. These findings showed that most of the respondents were in agreement with the statement that poor mobile network and internet connectivity is among the main challenges of employing ICTs in health care. The standard deviation was less than hence showing that the result mean score result was reliable for use in the study.

The mean score for unreliable electricity supply was 3.75 with a standard deviation of 2.04. The results of the study thus indicated that the majority of the respondents were in agreement with the notion that unreliable electricity supply is one of the major barriers of using ICTs in health care. The standard deviation was below 3 indicating that the mean score result was

reliability in illustrating the general sentiments expressed by the bulk of the questionnaire respondents.

The mean score for shortage of sufficiently trained health personnel was 2.83 with a standard deviation of 2.27. This indicated that most of the respondents disagreed the use of ICTs in health care is negatively affected by the shortage of sufficiently trained health personnel. The standard deviation was less than hence showing that the result mean score result was reliable for use in the study.

The mean score for shortage of financial resources for investing in health ICT equipment was 4.17 with a standard deviation of 1.72. These findings showed that the majority of the questionnaire respondents were in agreement with statement that the shortage of financial resources for investing in health ICT equipment is among the major barriers to the use of ICTs in health care in Hatcliffe. The standard deviation results indicated that the mean score was a reliable measure expressing the sentiments of the majority of the survey respondents

The mean score for lack of interest in ICT-based health care tools was 2.46 with a standard deviation of 1.84. The results of the study thus indicated that the majority of the respondents were in disagreement with the notion that lack of interest in ICT-based health care tools is one of the major challenges of using ICTs in health care. The standard deviation was below 3 indicating that the mean score result was reliability in illustrating the general sentiments expressed by the bulk of the questionnaire respondents.

4.4 Qualitative Data Presentation

Qualitative data was obtained from key informants from National AIDS Council, SAYWHAT, Action AIDS Trust, Social services department, Musasa, and local health services providers using semi-structured interviews. The qualitative data was then analysed using thematic analysis. Below are the findings obtained from the interviews with the key informants.

4.4.1 How ICT infrastructures impact population health outcomes in health delivery systems

The researcher also asked the 7 key informants who participated in the semi-structured interviews about the importance of using ICTs in health care in achieving health care outcomes. The majority of the respondents indicated that ICTs are very instrumental in the dissemination of health information to young people. One of the key informants said that,

> "*Most young people use Facebook, Twitter and Whatsapp as channels for communication, networking and entertainment. This means that disseminating health*

information through such social media platforms is very quick, informative and user friendly to the youth".

In addition, the bulk of the respondents highlighted the crucial role played by ICTs in improving the quality and effectiveness of health care services. One interviewee mentioned,

"*ICT-driven health information systems play a very important role in improving the quality and effectiveness of health care. Information about patients is readily available to all professionals, including allergy lists and automatic high-risk drug alerts, online medicine databases, as well as the ability to coordinate with colleagues to deliver the best treatment to patients*".

Similarly, most interviewees highlighted the importance of ICTs, particularly electronic health records for enhancing access and efficiency in obtaining patient information. In the words of one of the interviewees,

"*The eHR electronic health records) are more easily accessible. In previous times, you had to write to or call the healthcare provider and ask them to send you the records of a particular patient. Now it's easy because I can simply log in to the system and read whenever I want to*".

The interviewees also championed ICTs for their importance in enhancing access to health services and broadening and widening the outreach of health care services. According to one interviewee,

"*ICTs are very versatile in improving access to health care services. For example telemedicine could immensely contribute to the growth of health coverage in Zimbabwe, particularly in remote areas where there are shortages of health facilities and professionals*".

At the same time the majority of the interviewees applauded ICTs for improving workflow and reducing staff workload. One of them mentioned that,

"*With access to patient information modernized through eHR and virtual and online platforms for sharing and analysing information I can see that my workload has been significantly reduced. I can now focus on more pressing issues to enhance the quality and efficiency of services to clients*".

4.4.2 The role of ICTs in HIV/AIDS programming

The key informants were also asked questions pertaining to the role of ICTs in HIV/AIDS programming. The semi-structured interviews revealed that most of the respondents propelled the use of ICTs in programmes for the prevention, treatment and care for HIV/AIDS. They

concurred that could are instrumental in educating young people about the HIV/AIDS prevention, testing, counselling and treatment. One of the respondents mentioned that,

> "*Even though not every young person has a cell phone capable of using the social media networks, they could still access social media through people's phones, given how they like social media so much. So for us it is a very good opportunity to capture their attention and educate them about HIV/AIDS*".

The majority of the interviewees also championed ICTs for their role in enhancing the availability of reliable and accurate data on HIV/AIDS issues. In line with one of the key informants,

> "*If we collect data on HIV/AIDS using ICT application, we can for example notice that the prevalence of HIV infections is getting worse, then we consider what we can do. Can we roll out social media campaigns, school education programmes etc. to teach the youth about HIV/AIDS prevention? Again that would depend on our data on the success of previous programmes*".

In addition, most of the interviewees highlighted the usefulness of ICTs in improving access to HIV/AIDS treatment and care. One of the respondents indicated that,

> "*ICTs offer many facilities that can help us to enhance our HIV/AIDS programmes. We can use Telemedicine to offer HIV/AIDS counselling and treatment or we can collaborate with health professionals close to the patient to offer treatment and care services*".

The respondents further revealed the importance of ICTs in improving the quality and efficiency of HIV/AIDS treatment and care. One of the interviewees elaborated that ICTs can help health care professional organise their work, get instant access to patient data and consult with others remotely to ensure quality service delivery to HIV/AIDS patients. Another interviewee noted that ICTs are instrumental in,

> "*monitoring resources, ensure proper prescriptions of drugs and provide productive service delivery to target recipients*".

Similarly, the bulk of the key informants stressed the usefulness of ICTs in enhancing the effectiveness of healthcare. According to one of them,

> "*I would say ICT-driven health information systems play a very important role in improving the quality and effectiveness of health care. Information about patients is readily available to all professionals, including allergy lists and automatic high-risk*

drug alerts, online medicine databases, as well as the ability to coordinate with colleagues to deliver the best treatment to patients. In addition it enhances the efficiency of communication among health professionals and key stakeholders".

4.4.3 ICT tools used to combat HIV/AIDS

The interviewees also provided information about the ICTs used in HIV/AIDS programming. The majority of them championed the use of social media, mobile and computer applications in the dissemination of information, data collection and communication. One respondent indicated that,

> "*ICTs particularly social media and other online applications have been very useful in programmes for preventing HIV/AIDS and eradicating risk sexual behaviour among young people. We have also been able to reach a wider audience in outreach campaigns to encourage the youth to testing and counselling services*".

The qualitative findings also indicated the tools used in HIV/AIDS programming include mobile devices, computers and online applications. They indicated that online applications are used on both mobile devices and PC computers. In line with one of the interviewees,

> "*They mainly include mobile devices, social media, mobile and online computer applications*". Another on revealed that, "*Social media and online applications, mobile apps, electronic databases are some of the ICTs used*".

At the same time the respondents revealed the use of telemedicine and teleconsultation in the treatment and care for HIV/AIDS patients. In the words of one of the interviewees,

> "*Our professionals have been able to provide advice on patient's mobile phones. We also employ SMS texts to remind patients of upcoming consultations and encouraging them to continue taking their medications*". Another respondent mentioned that, "*we can collaborate remotely with other health professionals, sharing notes and important data such as earlier diagnoses, prescriptions and treatment plans*".

The findings of the semi-structured interviews also indicated electronic health records are being used by health professionals in HIV/AIDS treatment and care. According to one of the interviewees,

> "*When I log into the system, then I can find the referrals, I can find the test results, the diagnoses, previous medications and any allergies or resistance to previous drugs. This*

helps a lot in making sure that can offer quality and effective services in the treatment and care of HIV/AIDS patients".

4.4.4 Challenges of using ICTs in programmes for the prevention and treatment of HIV/AIDS

The key informants identified a number of challenges that they said were hindering the effective and efficient use of ICTs in HIV/AIDS programming in Hatcliffe. Among the major challenges was poor internet connectivity. One interviewee lamented that,

> "*Data entry and transmission on our applications is a bit slow due problems with internet connectivity. Especially what we have been experiencing for the past 2 months. Sometimes I have to turn on my private Wi-Fi, but if I don't have data, then it means we have to rely on manual files and systems*".

In the same vein, the bulk of the interview respondents identified unreliable electricity as a major impediment to the use of ICTs in HIV/AIDS.

> "*ICTs rely heavily on reliable electricity infrastructure, not just for us but for our targeted groups in the community. If there is no electricity and their cell phone turn off, then we have no way to reach them with our online behavioural health change programmes*",

explained one of the key informants.

The key informants also talked about lack of sufficient ICT infrastructure as very detrimental to the usage of ICTs in HIV/AIDS prevention and treatment programmes. One interviewee explained that,

> "*Internet facilities, electronic databases, communication systems and other ICT infrastructure are needed in successfully utilising e-health technologies. Keeping that in mind, the hardware acquisition and maintenance in resource-constrained countries like Zimbabwe is very difficult, thus imposing some limitations on our usage of ICT for HIV/AIDS programmes*".

In the same vein, lack of internet-enabled devices and access to the internet was noted among the major barriers to the effective use of ICTs in HIV/AIDS programming.

> "*The major barriers are that some don't have cell phones and they don't have internet connection*", explained one of the key informants. Another challenge noted by one of the informants was lack of skills among the populace to utilise ICTs. The informant mentioned that, "*Some of these people do not know how to use modern ICTs, and this is a challenge if you want to reach them via digital technologies*".

The respondents further cited insufficient skills among health professionals in using ICTs for delivering health services. According to one key informant, "*Since e-health solutions are still at stage in Zimbabwe, healthcare professionals and their patients do not have much knowledge and skills to effectively utilise them. Some health professionals are unable to adequately master the e-health systems, resulting in complexities including lower speed, connectivity issues and unplanned downtime, with implications on the overall reliability of the system*".

4.5 Discussion of results

The research collected data from 16 young people between the ages 16-24 years, as well as 7 key informants from the National AIDS Council, SAYWHAT, Action AIDS Trust, Social services department, Musasa Project, and health service providers operating in Hatcliffe. Data on the demographic characteristics of young people indicated that the majority of them were female, aged 20-24 years, with at least O level as their highest educational level and of Christian religious affiliation. Below is a discussion of the research findings per objective.

The research first sought to explore how ICT related HIV education impact population health outcomes in health delivery systems. Te study revealed that ICTs have an important role to play in the achievement of health outcomes in Zimbabwe. Both questionnaire and interview respondents attested to the usefulness of ICTs in the dissemination of health information to young people. This is in line with Scott et al. (2017) underscoring the importance of mobile phones and online platforms in reaching large audiences with health information. Conversely the study revealed that ICTs can also be used to collect performance measures about health care outcomes, enabling them to assess where improvements are needed. These findings concur with Shankar et al. (2017), championing ICTs for their efficiency and effectiveness in data, collection, processing and analysis. It was also shown that e-health information systems are critical in providing the data and collaboration platforms needed by health professional to provide quality health care in an efficient manner. Similarly the same tools were propelled for reducing workload, improving workflow in health institutions, as well as enhancing care for chronic diseases like diabetes, asthma and hypertension. These results are similar to findings from previous studies, such as Wass (2017)'s study in Sweden. Most interview respondents heralded ICTs for reducing costs and increasing efficiency, with electronic health records and telemedicine being championed for reducing time and costs of clinical services. The positive role played by ICTs in reducing costs and increasing efficiency has been cited by several scholars among them (Rosewell et al., 2013).

In the same vein, the study supported the critical role played by ICTs in HIV/AIDS prevention, treatment and care. The results of the study indicated that ICTs help in the provision of basic HIV/AIDS knowledge and in the provision of information about HIV/AIDS testing, counselling and care centers. These results agree with Cordova et al. (2015) underscoring the versatility of ICTs in enabling more efficient and real-time communication between social workers and their targeted groups. Similarly the results indicated that ICTs play a very crucial role in the gathering of data about health issues and health outcomes, enabling the design and implementation of effective intervention programmes to deal with the health conditions. This is in line with the OECD (2010), pointing out that ICTs facilitate the automated collection and processing of data which can be easily accessed, facilitating benchmarking and identifying opportunities for quality improvement. In addition the finding revealed that ICTs help improve access to HIV/AIDS health care services. These results support several studies, including Nhavoto (2017) whose study championed the role of telemedicine in expanding the outreach of health services in Mozambique. In the same vein. This is in agreement with Rosewell et al. (2018) revealing that ICTs tools can be used to deliver critical health services to people in remote areas with little access to health facilities, from diagnosing HIV and AIDS to prescription and monitoring. The results of the study pointed out to the importance of ICTs in enhancing the quality and efficiency of HIV/AIDS treatment and care. The study also went on to champion the usefulness of ICTs in providing psychological support to families handling HIV/AIDS patients. This is in concurrence with Fernandez et al. (2016) explaining that broadcast, telephony, social media and online platforms can be used to disseminate information on ways of coping with HIV/AIDS in the family and community. Thus the bulk of the study were incurrence with empirical and theoretical literature. These findings further support the VAM theory which points out that perceived usefulness and perceived value are the main factors leading to the adoption of ICTs (Kim et al., 2007).

Findings from the study also identified a number of ICTs used in HIV/AIDS programming in Hatcliffe. These included the use of mobile phones to deliver HIV/AIDS information and healthcare and the usage of websites to deliver HIV/AIDS information. These results are in support of Brady et al. (2015) underscoring the effectiveness of ICTs in information dissemination and health care provision. It was revealed that social media and other online platforms are being used for discussing sexual and reproductive health and HIV/AIDS issues. These results are in line with Chikonzo (2018) who found that many organisations specializing

in HIV/AIDS programming were targeting the youth in Harare through the use of platforms like Facebook, Twitter and Whatsapp to engage them on issues to do with HIV/AIDS. The research also revealed the use of eHR to share and access patient data and teleconsultation in the treatment and care for HIV/AIDS patients. This is similar to Kibaara (2010) who also found eHR, teleconsultation and other ICTs being used in HIV/AIDS health care centres in Nairobi in Kenya. However the research did not find the use of ICTs to monitor whether one is taking their medications as a prominent HIV/AIDS programming strategy in Hatcliffe. This is contrary to Fernandez et al. (2016) underscoring the crucial role taken by ICTs in improving patient discipline and surveillance.

The research went on to focus on the major barriers to the use of ICTs in HIV/AIDS programming. The research findings showed that the major challenges hindering the use of ICTs in HIV/AIDS programming included poor internet connectivity, poor network coverage and unreliable electricity supply, making the technologies less reliable. This is in line with the value-based model which postulates the negative role played by technicalities such as these in hindering the effective use of ICTs (Hsu and Lin, 2016). The research findings were also in concurrence with Osunyomi and Grobbelar (2015) who found network issues as one of the major barriers preventing some HIV/AIDS programmes from adopting modern ICTs. The research also found out that poor ICT infrastructure and shortage of financial resources were detrimental to the utilisation of ICTs in the prevention and treatment of HIV/AIDS in Hatcliffe. Lack of infrastructure and resources has been cited by several scholars including Gregory and Tembo (2017) as one of the major factors hindering the use of ICTs in health care in African countries. Similarly the respondents identified insufficient training among health professional as one of the challenges encountered in the delivery of health care services using ICTs. Basher and Roy (2011) concur with this, highlighting the importance of training for health professional to be skilled and proficient in their use of e-health platforms. The VAM theory also points out to sacrifices as involving the time needed to master the use of a technology, and goes on to point out how such sacrifices may affect perceived value, hence intention to use a technology (Kin et al., 2007). These research further pointed out to the need to capacitate health institutions with ICT, human and financial resources, improve internet connectivity and electricity availability, in order to enhance the effective utilisation of ICTs in HIV/AIDS programming in Hatcliffe and other areas across Zimbabwe.

4.6 Chapter summary

This chapter focused on presenting, analysing and interpreting the results of the study. The chapter started by the response rate and the demographic characteristics of the questionnaire respondents, including gender, age, marital status, religion and education. The chapter then focused on the main results of the study, which were grouped into quantitative and qualitative findings. Within each of the two study methodologies the results were also based on the main objectives of the study. Thus they started from findings concerning concerning how ICT infrastructures impact population health outcomes in health delivery systems, the role of technology in the prevention and treatment of HVI/AIDS, the ICT tools used to combat HIV/AIDS, the challenges of using ICTs in programmes for the prevention and treatment of HIV/AIDS. The final part of the chapter discussed the results of the study in the context of theoretical and empirical literature.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.0 Introduction

This chapter is mainly focused on the summary, the conclusions and the recommendations of the study. The chapter starts by summarising the research findings that were presented, analysed and interpreted in chapter four. After that the chapter focuses on deriving the main conclusions of the study based on the research objectives. The research then proffers recommendations to various stakeholders, including the government, health institutions, young

people and development partners. The chapter goes further to recommend future researches that should be carried out in order to improve knowledge on the usage of ICTs in HIV/AIDS programming.

5.1 Summary of findings

The research involved 16 young people aged 16-24 in Hatcliffe who took part in a questionnaire survey. It also involved 7 key informants from National AIDS Council, SAYWHAT, Action AIDS Trust, Social services department, Musasa, and health service providers operating in Hatcliffe who participated in semi-structured interviews. Percentages, mean scores and standard deviations were used to analyse quantitative data from the young people while qualitative data from interviews with key informants was analysed using thematic analysis. The findings were based on the research objectives as follows.

5.3.1 ICT infrastructures impact population health outcomes in health delivery systems

The research first sought to explore how ICT infrastructures impact population health outcomes in health delivery systems. Findings from the study indicated that most of the respondents considered ICTs to be crucial in the achievement of health outcomes. The questionnaire respondents were asked to indicate their levels of agreement based on a scale of 1 to 5 concerning the benefits of ICTs to health care delivery. The mean score and standard deviation results indicated that the majority of them were of the opinion that ICTs help in improving quality and efficiency in health care, reducing operating costs of clinical services, improved access to health care, and enhancing speed in health care communication. They also agreed that the use of ICTs result in reduced workload for health care staff, improvement in care for chronic diseases (e.g. diabetes, asthma, hypertension etc.) and availability of more information concerning the performance of the health system.

The majority of the key informants indicated that ICTs are very instrumental in the dissemination of health information to young people, enhancing access and efficiency in obtaining patient information and improving the quality and effectiveness of health care. They also concurred that the use of ICTs help in enhancing access to health services and improving the outreach of health care services. The majority of the interviewees further propelled ICTs for improving workflow and reducing staff workload.

5.3.2 Role of technology in HIV/AIDS programming

In addition, the research sought to examine the role of technology in HIV/AIDS programming. Most of the young people were of the perception that ICTs could play an important role in

HIV/AIDS programming in Hatcliffe. Through a 5-point agreement level scale they identified several benefits that are derived from using ICTs in HIV/AIDS programming. The majority of them agreed that ICTs are instrumental in providing basic knowledge and information about HIV/AIDS, benefits of HIV counselling and testing and about HIV testing and care centres. They went on to agree that ICTs are crucial as they can improve access to HIV/AIDS health care services, provide psychological support to families handling HIV/AIDS patients and in Gathering research data on HIV/AIDS. From the interview data most respondents concurred about the importance of ICTs in disseminating information about HIV/AIDS and improving the availability of reliable and accurate data on HIV/AIDS issues. In addition, most of the key informants were of the view that ICTs are very crucial in improving access to HIV/AIDS treatment and care, as well as the quality and efficiency of HIV/AIDS treatment and care.

5.3.3 Available ICT infrastructure in HIV/AIDS programming in Hatcliffe

The research also sought to determine the available ICT infrastructure in HIV/AIDS programming in Hatcliffe. Findings from the questionnaire survey indicated the use of ICTs in a number of activities involving HIV/AIDS programming. The majority of the respondents agreed that mobile phones are used to deliver healthcare and HIV/AIDS information, that websites are used to deliver HIV/AIDS information and that social media is used for discussing sexual and reproductive health issues. They however disagreed that ICTs are used to monitor whether one is taking their medications. In the same vein the key informants revealed the use of social media, mobile and computer applications in disseminating information, data collection and communication. At the same time they pointed out to the use of electronic health records, telemedicine and teleconsultation in HIV/AIDS treatment and care.

5.3.4 Bottlenecks of ICT infrastructure in HIV/AIDS programming

The study further wanted to establish existing bottlenecks of ICT infrastructure in HIV/AIDS programming. In this regard, the majority of the young people in Hatcliffe indicated that they hand smart phones. However they revealed that there are several problems which may affect the use of the smart phone in e-health provision, in particular poor internet connectivity, poor signal strength and poor network coverage. They went on to show their agreement on a number of factors drawn from literature as major challenges hindering the usefulness of ICTs in HIV/AIDS programming. These included poor mobile network and internet connectivity and unreliable electricity supply. The questionnaire respondents also agreed that shortage of sufficiently trained health personnel and financial resources are some of the barrier to the use

of ICTs in HIV/AIDS programming. Poor mobile network and internet connectivity and unreliable electricity supply were also cited by interviewees as major impediments to the use of ICTs in the prevention and treatment of HIV/AIDS. In addition to that the interviewees identified other barriers including lack of sufficient ICT infrastructure and insufficient skills among health professionals in using ICTs for delivering health services.

5.2 Conclusion

Following the above research findings, the research came up with a number of conclusions in fulfilling the research questions. The research concluded that ICT infrastructures have a positive impact population on health outcomes in health delivery systems. They help in improving quality and efficiency in health care, reducing operating costs of clinical services, improved access to health care and enhancing speed in health care communication. In addition, the use of ICTs result in reduced workload for health care staff, improvement in care for chronic diseases and availability of and information regarding the performance of the health system. ICTs also facilitate the effective access to patient data and data on health outcomes enabling health professionals to be efficient and effective in providing health care services.

The study also concluded that ICTs are instrumental in HIV/AIDS programming they help dissemination knowledge and information about the prevention, treatment and care for HIV/AIDS. Apart from that, the usefulness of ICTs lie in improving access to HIV/AIDS health care services, enhancing quality and efficiency in health care services and in providing psychological support to families handling HIV/AIDS patients. ICTs further improve the availability of reliable and accurate data on HIV/AIDS issues and uptake of interventions, enabling proper decision-making to enhance HIV/AIDS programming.

The research further concluded that the e-health care platforms and services used in HIV/AIDS programing include Hatcliffe the following;

- Electronic Health Record
- Social media and websites
- M-Health
- Telemedicine
- Teleconsultation
- Virtual healthcare teams
- ePrescription

However the research concluded that there are a number of bottlenecks to the utilisation of ICTs in HIV/AIDS programming. These encompass unreliable electricity supply and poor network and internet connectivity. Also, shortage of sufficiently trained health personnel and financial resources to invest in ICT infrastructure and services are among the major barriers to the use of ICTs in HIV/AIDS programming. By the same token, insufficient or antiquated ICT infrastructure is among the major challenges hindering the effective utilisation of ICTs in the prevention, treatment and care for HIV/AIDS.

5.3 Recommendations

The research recommended that health institutions should;

- Train health professionals on the utilisation of e-health platforms. They should organise workshops, webinars and training sessions to inform and train health professional in ICTs. This would enable them to better utilise ICTs in delivering health services
- Improve the use of ICTs in health care institutions so as to provide skills and experience as well as making ICTs more acceptable in HIV/AIDS programming.
- Back-up internet connection and electricity supply to ensure that the usage of ICT platforms in health care is not interrupted.
- Mobilise financial resources from internal revenue sources, the government and developmental partners form them to be able to buy, install, maintain and utilise ICT infrastructure in HIV/AIDS programming.

The research also recommended that the government should;

- Allocate financial resources for the digital transformation of health care facilities to ensure they are effectively able to utilise ICTs in health care.
- Sensitise health institutions on the need to adopt modern ICTs in HIV/AIDS programming and the general achievement of health care outcomes. This would encourage them to take up and make use of such technologies in providing quality, efficient and accessible health care.
- It should invest in ICT and electricity infrastructure and engage partners in order to improve network connectivity and the reliability of electricity supply so that health institutions, young people and other target groups are able to access e-health services without interruption.

Young people should;

- Empress communications and discussions on sexual and reproductive health as well as HIV/AIDS on social media and other online platforms. This will benefit them a great deal since such platforms enable real-time interactive communication thus improving their knowledge and information about HIV/AIDS and relevant health matters.

To developmental organisations the research recommended that they should;

- Make use of ICTs in programmes for the prevention and treatment of HIV/AIDS. This would significantly improve the effectiveness of their programmes enabling them to attain the intended health outcomes.
- Organise workshops and training sessions for health care professional in order for them to be able to effectively utilise ICTS in health care services provision.
- Assist local health institutions with ICT infrastructure and resources in order to capacitate them to effectively use digital technologies in delivering health services.

5.4 Chapter summary

This chapter was mainly focused on the summary, the conclusions and the recommendations of the study. The chapter started by summarising the research findings that were presented, analysed and interpreted in chapter four. After that the chapter focused on deriving the main conclusions of the study based on the research objectives. The research then proffered recommendations to various stakeholders, including the government, health institutions, young people and development partners.

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APPENDIX A: QUESTIONNAIRE FOR YOUNG PEOPLE
QUESTIONNAIRE

Instructions

- You are not allowed to write your name on this questionnaire in order to protect the anonymity of your responses
- Answer the questions below by writing a tick or an X in the boxes provided
- Be as sincere as possible since the confidentiality of your responses is guaranteed
- Please try as much as possible to answer all questions in this questionnaire
- Use the following key in answering agreement level questions

Agreement level	**Key**
Strongly agree	SA
Agree	A
Uncertain	UN
Disagree	D
Strongly Disagree	SD

SECTION A: Personal Information

1. Gender □Male □Female
2. What is your age …..
3. What is your marital status □Single □Married □Divorced □Widowed
4. What is your religion □Christian □Islam □Hindu □African Traditional □Other (Specify)…….
5. Level of education □No formal education □Primary education □O level □A level □Certificate □Diploma □Degree □Postgraduate qualification

Section B: How ICT infrastructures impact population health outcomes in health delivery systems

6. Do you think ICTs have a role to play in improving the health of your community?

□Yes □No □Not sure

How far do you agree that the following are the main benefits of using ICT tools in maintaining the health of the community?

		SA	A	U	D	SD
7	Improving quality and efficiency in health care					
8	Reducing operating costs of clinical services					
9	Improved access to health care					
10	Availability of more information concerning the performance of the health system					
11	Improvement in care for chronic diseases (e.g. diabetes, asthma, hypertension etc)					
12	Enhanced speed in health care communication					
13	Reduced workload for health care staff					

14. Are there any other benefits of using ICTs in delivering health care that you know?

……
……
……
……

Section C: ICT tools used to combat HIV/AIDS

15. Are there any technological platforms (cell phone, social media, TV/Radio) that are used in HIV/AIDS prevention and treatment in you area?

□Yes □No □Not sure

How far do you agree that the following are ICT tools used in HIV/AIDS prevention and treatment?

		SA	**A**	**U**	**D**	**SD**
16	Use of mobile phones to deliver HIV/AIDS information and healthcare					
17	Use of websites to deliver HIV/AIDS information					
18	Use of social media for discussing sexual and reproductive health					
19	Use of ICT to monitor whether one is taking their medications					

20. Do you know anyone who has received advice or medical instructions through their mobile phone, computer or similar devices? □Yes □No

21. Are there any other ways that information and communication technologies are used in relation to combating the spread of HVID/AIDS?

……
……
……
……

Section D: The role of technology in the prevention and treatment of HVI/AIDS

22. Do you think information technology can play an important role in programmes to fight against HIV/AIDS?

□Yes □No □Not sure

To what extent do you agree that the following are the main benefits of using information and communication technologies in programmes for the prevention and treatment of HIV/AIDS?

		SA	**A**	**U**	**D**	**SD**
23	Providing basic knowledge about HIV/AIDS					
24	Providing information about the benefits of HIV counselling and testing					
2	Providing information about HIV testing and care centres					
26	Improving access to HIV/AIDS health care services					
27	Providing psychological support to families handling HIV/AIDS patients					
28	Gathering research data on HIV/AIDS					

29. Are there any other benefits of using ICTs in combating HIV/AIDS that you know?

……
……
……
……

Section E: Challenges of using ICTs in programmes for the prevention and treatment of HIV/AIDS

30. Do you have a cell phone? □Yes □No

31 Do you have a smart phone? □Yes □No

32. Are there any network challenges in your area?

□Yes □No

If you answer is yes, what sort of challenges are they?

……
……

How far do you agree that the following are the main challenges of using ICT tools in HIV/AIDS prevention and treatment?

		SA	**A**	**U**	**D**	**SD**

33	Poor mobile network and internet connectivity					
34	Unreliable electricity supply					
35	Shortage of sufficiently trained health personnel					
36	Shortage of financial resources for investing in health ICT equipment					
37	Lack of interest in ICT-based health care tools					

38. Are there any other challenges of using ICTs in combating HIV/AIDS that you know?

……
……
……
……

Thank you for your time and cooperation

APPENDIX B: INTERVIEW GUIDE FOR KEY INFORMANTS
INTERVIEW GUIDE

1. What do you understand by the term HIV/AIDS programming?
2. How is ICT infrastructure used in achieving health outcomes in the health delivery system in Zimbabwe?
3. What sort of ICT tools are used in HIV/AIDS programming in Hatcliffe?
4. How are these tools used in achieving HIV/AIDS prevention and treatment objectives?
5. What do you think are the main benefits of using ICTs in HIV/AIDS programming in Hatcliffe?
6. Are health institutions in and around Hatcliffe properly resourced to utilise ICTs for HIV/AIDS prevention and treatment?

7. What are the major barriers to the use of ICTs in HIV/AIDS programming in Hatcliffe?
8. What do you think health institutions should do to improve the effectiveness of ICTs in enhancing HIV/AIDS prevention and treatment in Zimbabwe?
9. What should be done by other key stakeholders such as the government and developmental organisations in improving the effectiveness of ICTs in enhancing HIV/AIDS prevention and treatment in Zimbabwe?

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Chipo Makoni Dissertation

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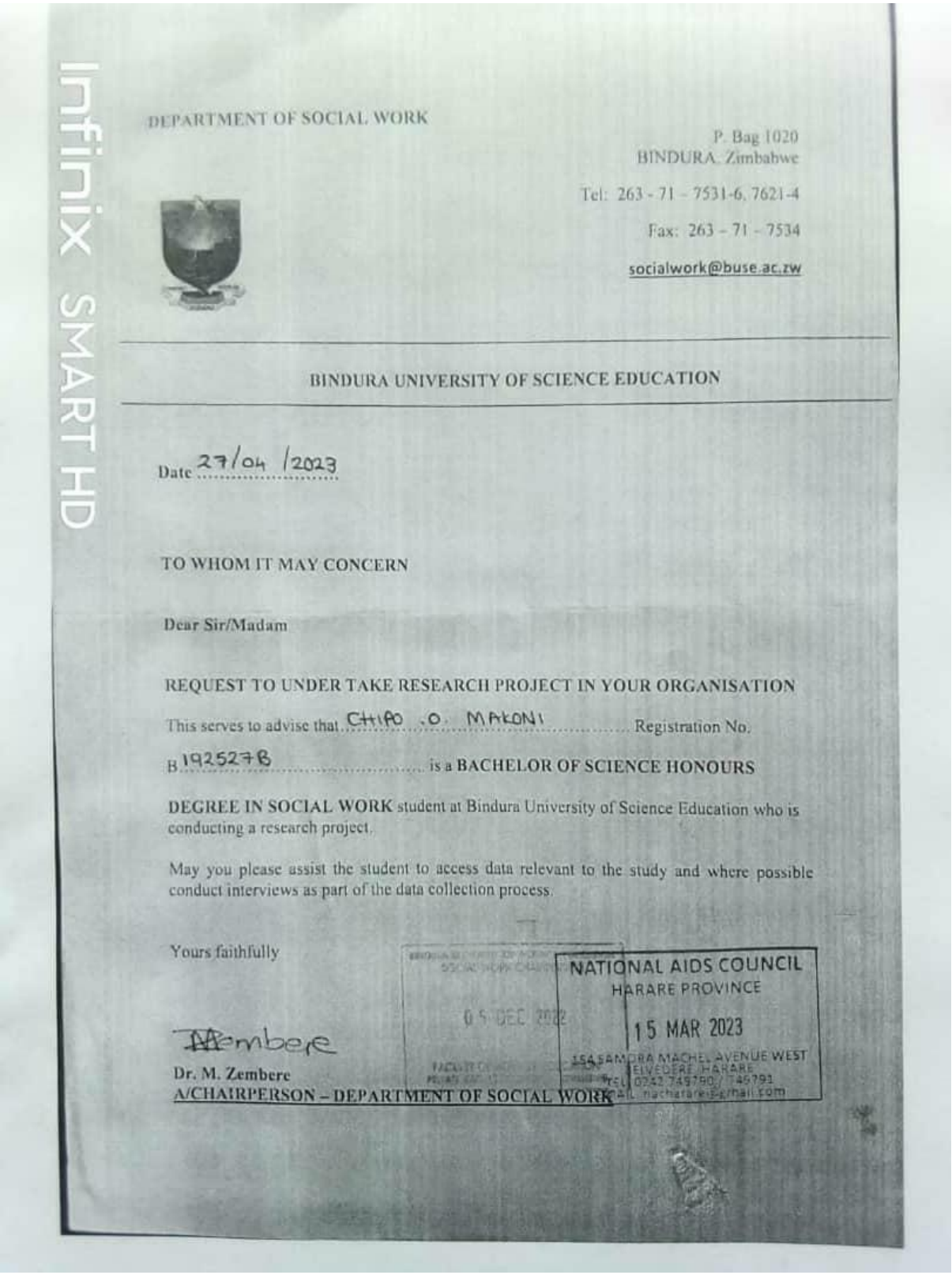
DATA COLLECTION LETTER



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BINDURA UNIVERSITY OF SCIENCE EDUCATION

Date 27/04/2023

TO WHOM IT MAY CONCERN

Dear Sir/Madam

REQUEST TO UNDER TAKE RESEARCH PROJECT IN YOUR ORGANISATION

This serves to advise that CHIPO .O. MAKONI Registration No.

B1925278 is a BACHELOR OF SCIENCE HONOURS

DEGREE IN SOCIAL WORK student at Bindura University of Science Education who is conducting a research project.

May you please assist the student to access data relevant to the study and where possible conduct interviews as part of the data collection process.

Yours faithfully

05 DEC 2022

NATIONAL AIDS COUNCIL
HARARE PROVINCE
15 MAR 2023
154 SAMORA MACHEL AVENUE WEST
BELVEDERE, HARARE
TEL: 0242 745790/ 745791
E-MAIL: nachararei@gmail.com

Dr. M. Zembere
A/CHAIRPERSON – DEPARTMENT OF SOCIAL WORK