

**INFORMATION AND COMMUNICATION TECHNOLOGY ADOPTION IN
HIV AND AIDS COMPREHENSIVE CARE CENTERS IN NAIROBI COUNTY,
KENYA**

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DECLARATION

This thesis is my original work and has never been presented for degree or other awards in any other university.

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DEDICATION

This work is dedicated to my parents, wife Annet, sons Mutwiri, Muriuki, Mugendi, brothers and sisters for providing the necessary motivation and encouragement.

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TABLE OF CONTENTS

CONTENTS	PAGE
DECLARATION	i
DEDICATION	iii
ACKNOWLEDGEMENTS.....	iv
TABLE OF CONTENT.....	iv
LIST OF TABLES.....	x
LIST OF FIGURES.....	xii
ABBREVIATIONS AND ACCRONYMS.....	xiii
OPERATIONAL DEFINATION OF TERMS	xxvi
ABSTRACT.....	xvii
CHAPTER ONE: INTRODUCTION.....	1
1.1 Background of the study	1
1.2 Problem Statement	3
1.3 Study justification	5
1.4 Hypotheses of the Study.....	6
1.5 Objectives of the Study	6
1.5.1 General objective	6
1.5.2 The specific objectives were.....	6
1.6 Significance and Anticipated Output.....	7
1.7 Theoretical and Conceptual framework	8

1.7.1 Theoretical Framework.....	8
CHAPTER TWO: LITERATURE REVIEW	16
2.1. Overview	16
2.2 HIV and AIDS global situation	16
2.3 HIV and AIDS in Kenya	16
2.4 Comprehensive Care Centers	17
2.5 ICT sector in Kenya	18
2.6 ICT adoption and health sector	19
2.7 ICT and fight against HIV and AIDS	20
2.8 Perceptions on ICT adoption in healthcare	23
2.8.1 Perceived attributes of ICT adoption	26
2.8.2 Perceived normative factors of ICT adoption.....	27
2.8.3 Perceived Barriers and Facilitators of ICT adoption	28
2.9 Factors influencing ICT adoption	29
2.9.1 Individual factors.....	29
2.9.2 Organizational factors.....	32
2.9.3 Technological factors.....	34
2.9.4 External environment factors.....	37
CHAPTER THREE: METHODOLOGY	42
3.1 Research Design.....	42
3.2 Variables	42

3.2.1 Independent variables	42
3.2.2 Dependent variable	43
3.3 Study area	43
3.4 Location and history of Nairobi County	44
3.4.1 Justification of study area	45
3.5 Target population and sample size determination	46
3.5.1 Target population	46
3.5.2 The study population	46
3.6 Sampling techniques and sample size	46
3.6.1 Sampling techniques	46
3.6.2 Sample size	48
3.7 Data collection procedures and instruments.....	51
3.7.1 Questionnaires	51
3.7.2 Focused group discussions	52
3.8 Pretesting of research instruments.....	52
3.9 Logistical and ethical considerations	53
3.10 validity and reliability.....	53
3.10.2 Reliability	54
3.11 Data management and analysis	55
3.11.1 Study variables.....	55
3.11.2 Data analysis	56

CHAPTER FOUR: RESULTS	58
4.1 Introduction	58
4.2 Socio-demographic characteristics of the respondents	58
4.2.1 Distribution of respondents based on type of facility.....	58
4.2.2 Distribution of the participants based on age	59
4.2.3 Distribution of respondents by gender.....	60
4.2.5 Distribution of respondents based on education levels	60
4.2.6 Distribution of respondents based on economic levels	61
4.2.7 Distribution of respondents by profession.....	61
4.3 ICT Adoption by health workers	64
4.3.1 ICT accessibility by health workers	64
4.3.2 Health workers ICT adoption	67
4.4 Health workers perceptions on ICT drivers and contributors of ICT adoption.....	71
4.4.1 Health workers perceptions on ICT drivers.....	72
4.4.2 Health workers perceptions of ICT contributors	77
4.5 Relationship between adoption levels and health workers Perceptions of ICT	80
drivers and ICT contributors	80
4.5.1 Perceptions on ICT drivers	80
4.5.1.1 ICT access.....	80
4.5.2 Relationship between perception of contributors of ICT and adoption levels .	90
4.6 Relationship between factors influencing health workers adoption of ICT and adoption status.....	95

4.6.1 Individual factors	95
4.6.1.1 Relationship between gender and adoption status	96
4.6.2 Relationship between health workers ICT adoption status and.....	100
Organizational factors.....	100
4.6.2 Relationship between health workers ICT adoption status and.....	101
Organizational factors.....	101
4.6.3 Relationship between health workers ICT adoption status and.....	109
Technological factors	109
4.6.4 Relationship between health workers ICT adoption status and external	116
environment factors	116
4.7 Predictors of ICT adoption status of health workers in HIV and AIDS Comprehensive Care Centers	121
4.7.1 Perception predictors	122
4.7.2 Individual predictors.....	122
4.7.3 Organizational predictors.....	123
4.7.4 Technological predictors.....	124
4.7.5 External environmental predictors.....	124
CHAPTER FIVE: DISCUSSION.....	126
5.1 Demographic characteristics of the respondents	126
5.2 Health workers ICT adoption status	129
5.3 Health workers perceptions of ICT drivers and contributors	134
5.4 Factors determining ICT adoption	142

5.5 Predictors of ICT adoption status.....	150
CHAPTER SIX: SUMMARY, CONCLUSIONS AND RECOMMEDATIONS....	159
6.1 Introduction.....	159
6.2 Summary of the main findings.....	159
6.3 Implications of the findings.....	161
6.4 Conclusions.....	163
6.5 Recommendations.....	165
6.6 Further research.....	166
REFERENCES.....	167
APPENDIX 1: Questionnaire for Health Workers.....	179
APPENDIX 2: FOCUS GROUP GUIDE.....	189
APPENDIX 3: CONSENT FORM.....	191
APPENDIX 5: Authority letter from Kenyatta University Ethics Review.....	194
Committee.....	194
APPENDIX 6: Authority letter from Council for Science and Technology.....	195
APPENDIX 7: License from Council for Science and Technology to conduct.....	196
research.....	196
APPENDIX 8: Authority letter from Ministry of Health.....	197
APPENDIX 9: Map of Nairobi County.....	198

LIST OF TABLES

Table 3.1: An outline of HIV and AIDS CCCs	50
Table 3.2: Reliability Coefficients.....	55
Table 3.3: Statistical tests.....	56
Table 4.1: Social - Demographic Characteristics of respondents.....	63
Table 4.2: Accessibility of ICT items by health workers.....	65
Table 4.3: Responses in respect of ICT items measuring adoption.....	69
Table 4.4: Health workers ICT adoption by selected ICT items.....	70
Table 4.5: Responses on perceptions on the ten drivers of ICT Adoption.....	74
Table 4.6: Overall perception on each of the ten drivers of ICT adoption.....	75
Table 4.7: Responses in respect of perceptions to ICT contributors	77
Table 4.8: Overall perceptions on each ICT contributors.....	78
Table 4.9: Relationship between adoption status and health workers perceptions of ICT drivers.....	89
Table 4.10 Relationship between overall ICT Drivers perception and adoption status...	90
Table 4.11: Relationship between adoption status and health workers perception of ICT Contributors.....	94
Table 4.12 Relationship between overall ICT contributors perceptions and adoption.....	95
Table 4.13: Individual factors that influence ICT adoption.....	96
Table 4.14: Relationship between adoption status and individual factors adoption.....	100
Table 4.15: Organizational factors that influence ICT adoption.....	101
Table 4.16: Relationship between adoption status and organizational factors.....	108

Table 4.17: Technological Factors influencing ICT adoption by health workers.....	110
Table 4.18: Relationship between adoption status and technological factors.....	115
Table 4.19: External environment factors influencing health workers ICT adoption....	116
Table 4.20: Relationship between adoption status and external environmental factors..	121
Table 4.21: ICT drivers' perception predictors of health workers adoption status.....	122
Table 4.22: Individual variable predictors of ICT adoption.....	123
Table 4.23: Organizational predictors of ICT adoption status.....	123
Table 4.24: Technological predictors of health workers ICT adoption status.....	124
Table 4.25: External environment predictors of ICT adoption status.....	125

LIST OF FIGURES

Figure	Page
Figure 1.1: Conceptual framework.....	15
Figure 3.1: Map of Nairobi County.....	44
Figure 4.1: Distribution of respondents by type of facility.....	59
Figure 4.2: Overall ICT accessibility.....	66
Figure 4.3: Overall ICT accessibility by type of facility.....	67
Figure 4.4: Overall ICT adoption Status of Health Workers.....	71
Figure 4.5: Overall Perceptions for ICT drivers.....	76
Figure 4.6: Overall Perceptions for ICT contributors.....	79

ABBREVIATIONS AND ACRONYMS

AIDS	Acquired Immune Deficiency Syndrome
ART	Anti-Retroviral Therapy
ARV	Anti-Retroviral drugs
CCCs	Comprehensive Care Centers
DIO	Diffusion of Innovation
FBO	Faith based organization
FGDs	Focused Group Discussions
GIS	Geographical Information Systems
GOK	Government of Kenya
HIV	Human Immuno-deficiency Virus
ICT	Information communication technology
ISPs	Internet service providers
NACP	National AIDS Control Programmes
NGOs	Non-Governmental Organizations
PLWHA	People Living with HIV and AIDS
PMCTC	Prevention of mother to child transmission
TAM	Technology Acceptance Model
TPB	Theory of Planned Behavior
TRA	Theory of reasoned Action
UNAIDS	United Nations Programme on HIV and AIDS
UNGASS	United Nations General Assembly Special Session on HIV and AIDS
UNICEF	United Nations Children Education Fund

USAID	United States Agency for International Development
UTAUT	Unified Theory of Acceptance and Usefulness of Technology
VCT	Voluntary Counseling and Testing
WHO	World Health Organization

OPERATIONAL DEFINATION OF TERMS

Customer/Patients' Satisfaction- Customer satisfaction is transaction-specific, that is, it is the outcome resulting from a particular consumption experience, such as a hospital visit.

Quality of service - This refers to the customer's judgment of the overall excellence or superiority of the service.

Perceived Quality of service- The perceived service quality by consumers refers to a comparison of customer expectations of a particular service provider with customer perceptions of its actual performance.

Adoption- This is a process whereby an individual receives, accepts and is receptive of new ideas and techniques.

Mal adoption – means inadequate adoption of ICT.

Information and Communication Technology- This is the integration of software, hardware and telecommunications systems to retrieve, store, manipulate and transmit data to acquire knowledge for an organization.

Behaviors- This is the action and reaction of a person or system in relation to specified circumstances.

Contributors- To give donate or supply in common with others either negatively or positively.

Inhibitors- Something that restraints, blocks, suppresses or slows a process.

Technology readiness - propensity to accept or reject technology.

Perception- ability to see, hear or become aware of something through the senses.

ICT drivers- these are mechanisms that assist in adoption and actual usage of ICT.

ICT voluntariness – acceptance and usage of ICT out of one own accord.

ICT responsiveness – ability of ICT systems to complete assignments within a given time.

ICT access – to obtain and use ICT hardware and software.

ICT quality of systems – quality of both communication hardware and software.

ICT specifications – systems standards and technical specifications.

ICT relative advantage – advantages that ICT provides.

ICT reliability – high degree of confidence in ICT systems.

ICT flexibility – ICT dynamism and ability to offer simple solutions

ICT assurance – ability to give reliable and valid results

ICT predictors – factors that contribute to a final result of ICT adoption

ICT optimism – tendency to expect best possible outcomes.

ICT Insecurity – lack of confidence or assurance.

ICT innovativeness – ability of ICT systems to provide new ideas and processes

Site aesthetics – design of ICT systems setup.

Ease of navigation – ability to operate systems easily.

Competitive pressure – competition from organization offering similar services.

Patients' pressure – demands from patients for efficient services.

National values and culture – collective programming of mind by a society.

ABSTRACT

In the last decade, information and communication technology (ICT) has offered huge potential to answer many of the challenges that HIV and AIDS Comprehensive Care Centres (CCCs) face in provision of quality services in Nairobi County, Kenya. The objective of the study was to investigate health workers and patients' ICT adoption status, identify their perceptions about ICT, determine factors that influence ICT adoption and determine the real predictors of ICT adoption status of health workers in HIV and AIDS CCCs in Nairobi County. This was a cross sectional descriptive study. Participants (N = 196) consisted of health workers drawn through proportionate stratified random sampling from twenty eight HIV and AIDS CCCs from both public and private hospitals in the study area. Questionnaires from 183 (93%) respondents were correctly filled and returned. Data analysis reflected 183 respondents. Data was collected from the health workers using questionnaires and also from the patients attending HIV and AIDS CCCs through focus group discussion (FGDs). The collected data was analyzed quantitatively and qualitatively. Quantitative data was analyzed with the use of Predictive Analytic Software (PAS) Version 19. Inferential and descriptive statistics were used. Qualitative data was analyzed by use of content analysis. The results showed that most (57%) of health workers had not adopted ICT. Results indicated that there is significant relationship between respondents status of ICT adoption and type of CCC ($\chi^2 = 0.117$; $df = 1$; $p = 0.032$) with those from private CCCs more likely to adopt compared to those from public ones. The findings revealed that majority (77%) of health workers have positive perception of ICT drivers and ICT contributors (68%). Findings showed that most (47%) respondents with positive perceptions were more likely to adopt ICT. The results also showed significant relationship between adoption and health workers' perceptions of ICT access, personalization, security, site aesthetics, flexibility and optimism. Chi-square results at 0.05 probability error revealed significant relationship between adoption and factors of ICT training, quality of systems, information intensity, management support, technological resources, financial resources, complexities, compatibility, affordability, information security, image of facility, competitive pressure and patients' pressure. Multiple Regression results showed that the perception predictors were ICT access, personalization and information security. Findings showed that some of the factors that predict adoption status are ICT quality of systems ($\chi^2 = 0.000$; $df = 1$; $p = 0.000$), information intensity ($\chi^2 = 19.422$; $df = 4$; $p = 0.001$), financial resources ($\chi^2 = 0.395$; $df = 1$; $p = 0.030$), technological resources ($\chi^2 = 0.395$; $df = 1$; $p = 0.030$) and patients' pressure ($\chi^2 = 0.006$; $df = 1$; $p = 0.037$). The study recommends policies that will help the management of CCCs improve ICT infrastructure and capacity building in order to optimize ICT adoption by health workers. It also recommends enactment of laws and regulations which will favour factors that influence ICT adoption and the actual predictors. This will lead to improved services that will be effective and efficient in HIV and AIDS Comprehensive Care Centers.

CHAPTER ONE: INTRODUCTION

1.1 Background of the study

All over the world, mankind has been battling with HIV and AIDS since early 1980's. This battle has not been won since no cure for the disease has been found. The World Health Organization has set up several programs to fight the disease through safe sex practices, care, treatment and support, prevention, advocacy of behavioral change and use of condoms among other methods (USAID, 2013). But the disease continues to wreck havoc throughout the world. Over the years, HIV and AIDS has become a major threat to the socio-economic development in the world especially in economically poor countries. A total of 35.2 million people worldwide were living with HIV and AIDS in the year 2012 (WHO, 2013). Of these, about 10 million were in Africa.

According to KAIS (2012), there were about 1.9 million Kenyans infected with HIV/AIDS at the end of 2011 representing the national prevalence of 5.6%. In Nairobi county, the prevalence rate of HIV/AIDS is 4.9% with the total population being 3,138,295 (GOK, 2010). The total number of patients utilizing the services of the comprehensive care centers is 14,650 as compared to about 276,170 infected patients in the county. The concept of CCCs was started by UNAIDS in the year 2000 in order to manage and control HIV and AIDS.

The term Information Communication Technology evolved in the 1970s. It illustrates any technology which helps manufacture, manipulate, accumulate, communicate or

broadcast information. In late 1970s the concept became more advanced with the development of microcomputers. Since then ICT has been used world over in Business, Medicine, Science and Engineering and in Integrated Information Systems. Kenya developed its ICT national policy in 2005 which focused on development of ICT infrastructure, skills, legislation, coordination and monitoring (GOK, 2011).

In the developed world, ICT has been fully integrated in the Health Sector. Equally, newly industrialized nations have shown that ICT can enhance health service delivery (UNAIDS 2011). In western countries, one can identify several examples of ICT-based HIV/AIDS preventive education solutions. People from Sub-Saharan Africa have not received the same benefits from ICT in health care as people in industrialized nations. There is significant untapped potential to use technology in order to improve the quality of HIV and AIDS programs in developing countries (Bada *et al.*, 2011).

Technological advancement witnessed by the corporate sector during the nineties has changed the way business needs to be conducted. Information communication Technology (ICT) has introduced new paradigms and is increasingly playing a significant role in improving the service delivery in both corporate and health sectors. ESNET (2011) argues that continuous advances in Information and Communications Technology (ICT) as well as the decreasing costs have afforded institutions the impetus to explore alternatives and to incorporate technology into

their operational processes and strategies. Vision 20-30 was developed in 2008 as the Blue Print for National Development. One of the major objectives is to have ICT integrated in all sectors of the economy. According to Tove *et al.* (2008), ICT has helped corporate and other institutions to increase productivity and enhance service delivery to clients. It has helped to improve the quality of services offered and decreases lead-times and costs. According to Banda *et al.* (2011), ICT is seen as one of the most important solutions in order to provide HIV and AIDS preventive education and curative services for all members of the society.

1.2 Problem Statement

HIV and AIDS remains a public health challenge in Kenya. In fact the Government declared HIV and AIDS a national disaster on 25th November 1999 (GOK, 2000). There were about 1.9 million Kenyans infected with HIV and AIDS at the end of 2011, representing the national prevalence of 5.6% (KAIS 2012). The Kenya ICT Board was established under state corporations Act Cap.446 on 19th February 2007 to help harness and integrate ICT in all sectors of the economy. Literature review has shown that ICT coverage in Kenya is below accepted levels in the world. It is far below other emerging African economies such as Egypt, South Africa, Nigeria and Tunisia. ICT coverage is also low in CCCs. While remarkable strides have been made in adopting ICT in sectors like Education and Banking, little has been realized in the Health Sector and more so in HIV and AIDS programmes in Kenya (Makau, 2010). The ministry of Health has developed the Health Information Systems (HIS). But the system is only for data collection and management. Only CCCs in referral,

Provincial and District Hospitals have partially adopted and integrated ICT in their operations. This translates to less than 2% of total facilities (GOK, 2011).

In spite of the numerous advantages that ICT offers in provision of quality services in prevention, PMCTC, VCT, Psychosocial, data collection and management of HIV and AIDS pandemic, CCCs may not be adequately prepared in terms of support and resources. Furthermore CCCs may not be adequately prepared in adopting new methods of ICT and the new developments. The consequence in many cases is that new ICT is introduced to staff and patients who have not received any form of training on how to adopt and apply yet, ICT potentially is a major driver in improving the service delivery in the health sector.

Few empirical studies have been carried out to determine ICT adoption levels of patients and health workers and effectiveness of the same on service delivery. Moreover, the body of knowledge regarding ICT in HIV and AIDS CCCs services is generally lacking and no adequate systematic compilation of information for reference or knowledge transfer exists. There is a gap in knowledge regarding the situation of ICT application in HIV and AIDS CCCs services with a view of improving quality of services offered. The factors that influence ICT adoption, interventions and strategies of adopting and actually applying technology need to be understood. This study was designed to investigate and describe these factors and suggest ways to enhance ICT adoption and application so that CCCs can improve the quality of services to HIV and AIDS patients.

1.3 Study justification

As a member of United Nations, Kenya has an obligation to implement the millennium development goal in combating HIV and AIDS. ICT adoption and integration in CCCs programmes will improve quality of services and scale-up uptake by clients. It will help service providers to be more efficient and effective. Ultimately this will help Kenya achieve the UNAIDS Millennium strategic goals of: (i) Reducing sexual transmission of HIV by half(ii) To eliminate vertical transmission and reduce maternal mortality by half(iii) Universal access to ART (iv) TB deaths reduced by half (v) Social protection strategies developed and all PLWAs access essential care. According to Muathe (2010), adoption and integration of ICT in our HIV and AIDS Programmes will enhance uptake of services and help reverse the negative impact the pandemic has had in our national economy and social fabric. This will move Kenya towards middle level income country as envisaged in the Vision 2030.

In spite of the foregoing, limited research has been conducted on ICT and fight against HIV and AIDS. Studies focus has largely been on other factors such as human resources, facilities, equipment and drugs. As a result little attention has been given to ICT particularly in its role in combating HIV and AIDS and more so in Kenya. Literature review has shown that studies on ICT and fight against HIV and AIDS have been carried out in developed countries and other parts of the world. In Kenya, most of the studies have concentrated on Antiretroviral Therapy (Oyore, 2010), Family caregivers (Lucy, 2010), prevalence rates (Nyanchera, 2010) human

resources and drugs. This study has explored a localized or Kenyan situation. The role and impact of ICT has not been adequately addressed then leaving room for research such as this one to be undertaken in Nairobi County, Kenya with hope of understanding adoption levels in CCCs settings.

1.4 Hypotheses of the Study

- i. Factors that influence ICT adoption are not significantly associated with ICT adoption status in services offered by HIV and AIDS CCCs in Nairobi County.
- ii. Perceptions on ICT do not significantly influence ICT adoption status in services offered by HIV and AIDS CCCs in Nairobi County.
- iii. Predictors of ICT adoption are not significantly associated with ICT adoption status in services offered by HIV and AIDS CCCs in Nairobi County.

1.5 Objectives of the Study

1.5.1 General objective

To investigate the adoption of Information and Communication Technology in services offered by HIV and AIDS Comprehensive Care Centers in Nairobi County, Kenya.

1.5.2 The specific objectives were

- i. To determine ICT adoption status of health workers in HIV and AIDS CCCs in Nairobi County.
- ii. To identify the health workers and HIV and AIDS patients' perceptions about ICT adoption in services offered in HIV and AIDS CCCs in Nairobi County.

- iii. To establish factors influencing ICT adoption in HIV and AIDS Services offered by the CCCs in Nairobi County.
- iv. To determine the predictors of ICT adoption in services offered by HIV and AIDS CCCs in Nairobi County.

1.6 Significance and Anticipated Output

The results of this study will assist management of Comprehensive Care Centers in the strategic planning for improvement of quality of service to enhance overall patient satisfaction in Comprehensive Care Centers. The results of this study will be used to come up with ways of improving services and therefore scaling access and uptake of comprehensive care centers as one of the means of combating HIV and AIDS pandemic. The outcome shall not only help people living with HIV and AIDS in Nairobi county but also in the other parts of the country. This study will also help the agencies that are dealing with the control of the HIV/ AIDS pandemic to come up with policies that can improve the accessibility and utilization of services among HIV/AIDS patients in comprehensive care centers. The study will be useful to future academicians, scholars and researchers who may be interested to carry this subject further on. Lastly it is envisaged that from the findings of this study a framework of ICT adoption will be developed by stakeholders and then will be designed to improve the quality of services in HIV and AIDS.

1.7 Theoretical and Conceptual framework

1.7.1 Theoretical Framework

This study was guided by the following theoretical adoption Models which have been empirically applied to understand ICT adoption behaviors in health care systems. The theoretical foundation of ICT in organizations is drawn from ICT adoption and technological acceptance models. These are Diffusion of Innovation Theory (DIT), Behavioral adoption theories which include Theory of Planned Behavior (TPB) and Theory of Reasoned Action (TRA), Theory of Interpersonal Behavior (TIB) and Technology Acceptance Model (TAM).

1.7.1.1 Diffusion of Innovation Theory

One of the models that have received much attention for the study of ICT adoption in healthcare is the Diffusion of innovation (DIT) (Rogers, 1995). This model suggests that there are three main sources influencing the adoption and diffusion of innovation. These are perceptions of innovation characteristics, characteristics of the adopter and contextual factors (Berwik, 2003). According to a review of numerous empirical studies (Rogers, 1995), perceptions of the characteristics of an innovation are the most critical factors for its diffusion. There are five perceived characteristics of innovation: 1) relative advantage is the degree to which the innovation is perceived as better compared to the status quo; 2) compatibility is the degree to which the innovation is perceived as being consistent with existing values and practices among potential adopters; 3) complexity is the degree of difficulty perceived regarding the use of the innovation; 4) triability represents the possibility

for a potential adopter to experiment the innovation on a small scale; and 5) observability is the degree to which the result of the innovation are visible to the potential adopters.

With respect to individual factors, the DOI proposes five categories of adopters that are based on the distribution curve of the diffusion process, which follows a relatively normal distribution. These are: (1) innovators, (2) early adopters, (3) early majority, (4) late majority, (5) laggards. Individuals in each category present specific characteristics and personality traits that have been found to influence their adoption behavior. The DIT also suggests that contextual factors, such as organizational culture, resources and leadership, influence the rate of diffusion of innovations. However these factors are not considered in this synthesis since the focus is on ICT adoption at the individual decision-making level. One of the main critiques that have been expressed with regard to this model is its lack of specificity. As Chau *et al.* (1997) argue, the DIT was developed to explain the diffusion of any innovation and the relationship it posits between concepts such as innovation's characteristics and adoption behavior are not explicit.

1.7.1.2 Theories of Reasoned Action and planned behavior

These two models are very similar since the Theory of Planned Behavior (TPB) (Ajzen, 1985; 1991) constitutes an extension of the Theory of Reasoned Action (TRA) (Fishbein *et al.* 1975). Both models were developed in the field of social psychology so as to understand a variety of human behaviors. These models are

often referred to as intention-behavior theory since they consider intention as the direct precursor of behavior.

The TRA (Fishbein *et al.* 1975) postulates that the realization of a given behavior (B) is predicted by the individual intention (I) to perform this behavior. In turn, the individual intention is formed by two antecedents: attitude towards the behavior (ATB) and subjective norm (SN). ATB represents the evaluation of the advantages and disadvantages associated with the performance of a given behavior, weighted by their relative importance. SN is the individual's perception that significant others will approve or disapprove the behavior in question, weighted by individual's motivation to comply.

However, some behaviors might not be totally under volitional control, suggesting that they require specific resources, skills, or opportunities for an individual in order to perform them. Therefore, the TPB (Ajzen, 1985; 1991) proposes to add the perception of behavioral control (PBC) the person's evaluation of the barriers related to the realization of the behavior and his or her perceived capacity to overcome them as a direct determinant of the behavior. Furthermore, the PBC can also act as an indirect determinant of the behavior by influencing intention. According to these models, the influence of external variables, such as age, gender and personality traits, is usually mediated through theoretical constructs.

Both the TRA and the TPB have shown good predictive validity to explain behavior and behavioral intention (Armitage *et al.*, 2001). Furthermore, these theories have

been successful to explain different behaviors of healthcare professionals (Godin *et al.*, 1998; Legare *et al.*, 2005; Levin, 1999). However, empirical evidence shows that the relationship between behavioral intention and actual behavior is not always strong (Armitage *et al.*, 2001), indicating that other factors may intervene in the actualization of intentions (Cooke *et al.*, 2004).

1.7.1.3 Theory of Interpersonal Behavior

Another model that has been used to understand acceptance behaviors to ICT is the Theory of Interpersonal Behavior (TIB) (Triandis, 1980). Essentially, the TIB is similar to the other intention-behavior models in that it also proposes a set of psychological factors that influence the realization of a behavior. However, the TIB specifies that three direct determinants influence behavior: intention, facilitating conditions and habit. Intention refers to the individual's motivation regarding the performance of a given behavior. Facilitating conditions represent perceived factors in the environment that can ease or impede the realization of a given behavior. Habit constitutes the level of routinization of a given behavior, i.e. the frequency of its occurrence.

According to the TIB, the behavioral intention is formed by the attitudinal normative beliefs. Attitudinal beliefs are formed by an affective (affect) and a cognitive (perceived consequences) dimension. Affect represents an emotional state that the performance of a given behavior evokes an individual, whereas perceived consequences refer to the cognitive evaluation of the probable consequences of the

behavior. The TIB also incorporates two different normative dimensions: social and personal norms. Social norms are formed by normative and role beliefs. Normative beliefs consist of the internalization by an individual of referent people or groups' opinion about the realization of the behavior, whereas role beliefs reflect the extent to which an individual thinks someone of his or her age, gender and social position should or should not behave. The personal normative construct of the TIB is formed by personal normative belief, the feeling of personal obligation regarding the performance of a given behavior, and self-identity, the degree of congruence between the individual's perception of self and the characteristics he or she associates with the realization of the behavior.

When compared to other intention-behavior models, the TIB has a wider scope since it also considers cultural, social and moral factors. The TIB is also sensitive to cultural variations that affect the realization of behaviors within specific groups of the society, such as healthcare professionals (Facione, 1993). However, a possible critique to the TIB might be its relative complexity since it considers many independent predictors. This is why empirical studies do not usually apply this model in its integrity. Nevertheless, the comprehensiveness of the TIB constitutes its major strength (Gagnon, 2006).

1.7.1.4 Technology Acceptance Model

The Technology Acceptance Model (Davis, 1989) was developed based upon the TRA specifically for understanding user acceptance of information technology. In its

original version, the TAM is similar to the TRA, considering intention as the direct determinant of behavior, while attitude and social norms being the predictors of intentions (Davis, 1989). The specificity of the TAM is that it decomposes the attitudinal construct found in previous models into two distinct factors: perceived ease of use and perceived usefulness. However, the TAM has been simplified over time and the attitudinal and normative components have been dropped from the model, leaving (Venkatesh *et al.*, 2003). Many studies have empirically tested the TAM for the prediction adoption behaviors for various technologies (Ma & Liu, 2004). TAM has also being applied to understand healthcare professionals' acceptance of ICT (Hu *et al.*, 1999; Croteau *et al.*, 2002).

The TAM has the particularity of being ICT-specific and it proposes a set of beliefs that can be measured among various groups of users (Davis, 1989). However, some authors have criticized the applicability of the TAM to the study of healthcare professionals' behaviors (Croteau *et al.*, 2002). Various efforts have been done to extend the TAM either by introducing variables from other theoretical models or by examining antecedents and moderators of perceived ease of use and perceived usefulness.

1.7.1.5 Conceptual framework

This study was guided by the ICT adoption Model which is adopted from Rashid *et al.* (2001). It was also informed by the Technology Readiness theory by Parasuraman (2002). This model explains the factors that influence adoption and use of ICT by

individuals and organizations. These factors are individual, organizational, technological and external environment. According to technology beliefs continuum the ultimate behavior would be resistant to technology, neutral or receptive to technology.

Technology readiness refers to people's propensity to embrace and use new technologies for accomplishing goals in home life and at work. It does not just refer to possessing technical skills; it is much more a function of people's beliefs and feelings about technology. The relative strengths of the positive and negative beliefs determine a person's receptivity to technology. The elements of the theory are the Contributors which comprise of optimism and innovativeness and inhibitors made of discomfort and insecurity (Parasuraman, 2002).

As shown in Fig. 1.1, the conceptual framework consisted of factors that influence ICT adoption, health workers ICT perceptions and ICT contributors as independent variables while ICT adoption levels were the dependent variables.

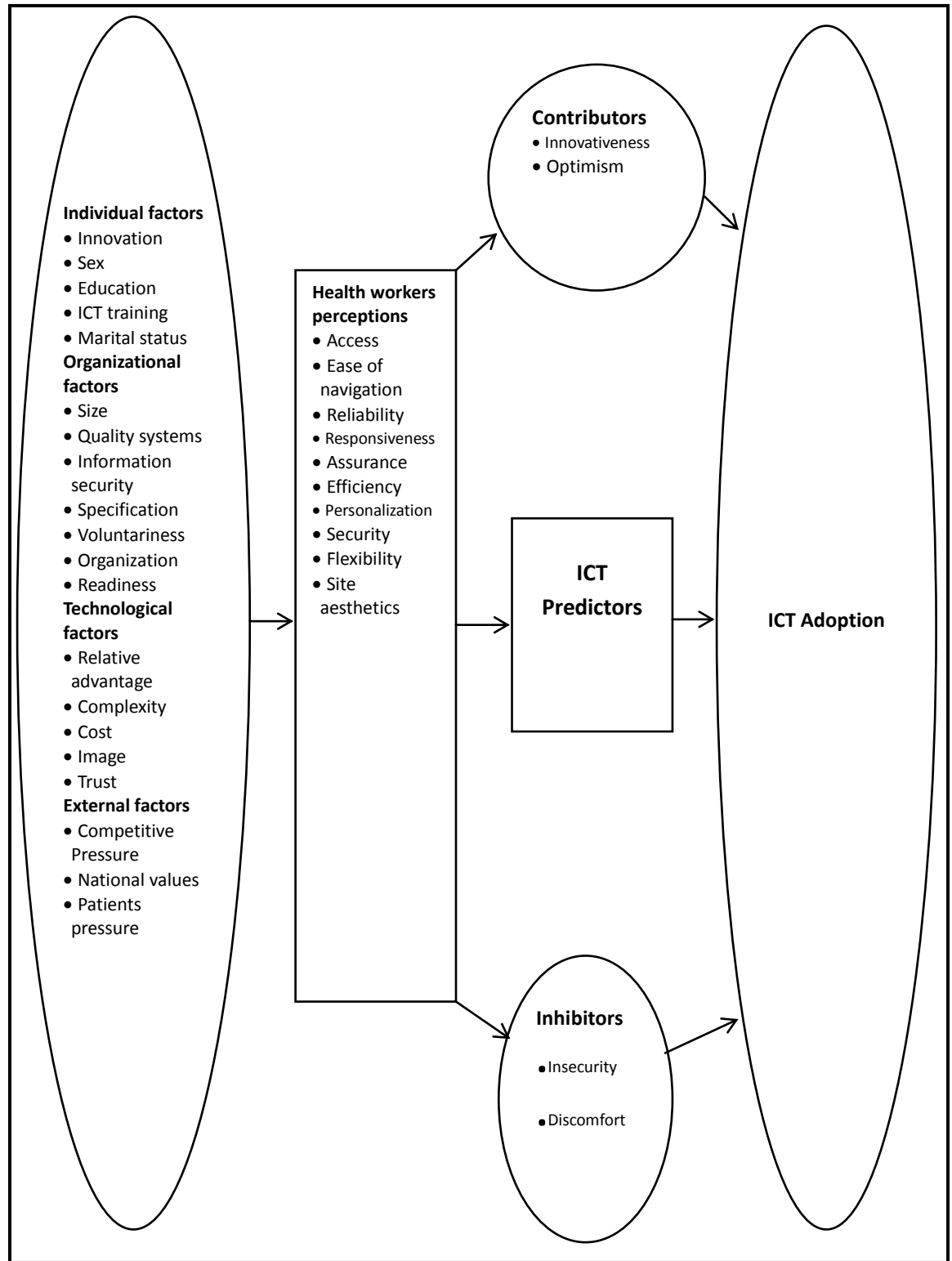


Fig. 1.1 Conceptual Framework: Adopted and modified from Rashid *et al.* (2001) and Parasuraman (2002)

CHAPTER TWO: LITERATURE REVIEW

2.1. Overview

This chapter reviews the literature related to the topic of study. It specifically looks at HIV and AIDS situation in Kenya and gives an analysis of ICT adoption in relation to services offered in HIV and AIDS CCCs.

2.2 HIV and AIDS global situation

At the end of 2010, an estimated 34 million people were living with HIV and AIDS worldwide (UNAIDS, 2011). According to the World Health Organization (WHO, 2010), an estimated 2.9 million people were newly infected with the disease worldwide. Out of this number, 1.9 million were in Sub-Saharan Africa accounting for about 70%. In addition HIV and AIDS continues to be the leading cause of death in the region with 2.6 million AIDS related deaths reported in the year 2009.

2.3 HIV and AIDS in Kenya

Over 300,000 infections are usually reported every year in Kenya and due to the high magnitude of prevalence in Kenya, Government declared HIV/AIDS a national disaster on 25th November 1999. A presidential decree that resulted in the formation of the National AIDS Control Council (NACC) as corporate body to deal with HIV/AIDS issues (GOK, 2000). According to NACC (2009), the HIV epidemic in Kenya peaked in the late 1990s with an overall prevalence of over 14% in adults. It declined over the next decade to average at about 5.6%. There were about 1.9 million Kenyans infected with HIV and AIDS at the end of 2011, representing the

national prevalence of 5.6%. Nyanza province had the highest prevalence of 15.1%, Nairobi 4.9%, Coast 4.3%, Rift valley 3.7%, Western 5.6%, Eastern 3.7%, Central 3.8% with North Eastern having the least at 2.1% (KAIS, 2012). According to NACC (2009), Prevalence rates among the urban population are 8.4% as opposed to 6.7% in rural areas. Age and sex differentials are considerable with HIV prevalence peaking among women (13.3% among the 30-34 years age group) a decade earlier than among men (10.2%, among the 40-44 years age group). It is estimated that about 800 new infections occur every day with 700 deaths being reported over the same period. Over 50% of hospital beds are occupied by HIV and AIDS patients (NACC, 2009). According to NACC (2009), Kenya is experiencing a mixed and geographically heterogeneous HIV epidemic with characteristics of both a generalized epidemic among the main stream population and a concentrated epidemic among most at risk populations.

2.4 Comprehensive Care Centers

The concept of comprehensive care center (CCCs) was developed by UNAIDS and WHO around 2000 in order to combat HIV and AIDS pandemic in a more effective and efficient manner. It was started in Nairobi County in the year 2000 to play a leading role in prevention, treatment, care and support for PLWHA. All facilities in the County were started by International Centre for AIDS treatment and care program (ICAP) to offer nutritional care and support for PLWHA among other services. CCCs recognize that stigma and discrimination is a critical element in combating HIV and AIDS pandemic in the community. It emphasizes the need for

HIV and AIDS activities to be mainstreamed in the core activities of the community (Pathfinder International, 2006). Currently, there are 155 CCCs offering services to about 276,000 HIV and AIDS patients in Nairobi County. The following core services have been integrated in almost all CCCs in Kenya in accordance with UNAIDS strategic goals by 2015: (i) Prevention services. (ii) Prevention of mother to child transmission (iii) Voluntary Counseling and testing services. (iv) HIV care and treatment services (v) Psycho-Social and economic support services.

2.5 ICT sector in Kenya

While the growth of the ICT sector in Kenya has been significantly influenced by global trends, it can be evaluated in terms of number of fixed and mobile telephone lines, the number of computers and services, Internet Service Providers (ISPs), the number of Internet users, broadcasting stations and market share of each one of them (EPZA 2005). Telkom Kenya is today the only fixed national operator and arrangements are underway to license a second national operator. The Government has liberalized the mobile cellular market and currently there are three mobile cellular operators. These are Safaricom Ltd., Airtel International and Orange Communications Ltd (EPZA 2005).

By September 2011, there were 240,000 fixed telephone line subscribers and about 21 million cellular mobile subscribers. This translates into fixed tele-density of 0.75 per hundred inhabitants for fixed and 9.75 per hundred inhabitants for mobile against the world average of 19 and 21 respectively. It is also lower than that of many African countries like Tunisia (11.3% and 16.9%) and Egypt (10.8% and 17.7%)

respectively. There are about 121,000 applicants on the fixed telephone waiting list (GOK, 2011).

By April 2011, there were over 300 registered ISPs, over 200 of which were active, approximately 4,030,000 users and over 4000 cyber cafes and telephone bureaus. There were also about 2,000,000 personal computers in active use at the beginning of 2010 giving the number of computers per hundred inhabitants as 1.6. The total international Internet bandwidth was 28 Mbps, i.e. 0.9 Mbps per 100 inhabitants, which is above Uganda (0.4) and Tanzania (0.5) but is below South Africa (12.4), Tunisia (7.6) and Algeria (5.0) (EPZA,2011).

The Government has licensed 16 television stations and 27 FM radio stations. Although electronic media services have experienced rapid growth over the last 8 years, it is estimated that 60% of the population have access to television and 90% have access to radio services. In terms of geographic coverage, the radio and television coverage by the Kenya Broadcasting Corporation are 90% and 50% of the Kenyan landmass, respectively (EPZA, 2011).

2.6 ICT adoption and health sector

According to Simba (2004), ICT brought opportunities and challenges to developing countries in their efforts to strengthen health management. In the wake of globalization they had to take the advantage. Silber (2003) asserts that most developed nations have e-health infrastructure in order to provide safe, efficient and high quality customer centered healthcare. According to GOK (2010),there are over

7000 health facilities in Kenya. 48% are manned by GOK, 13% by Faith Based Organizations, 1% by local authorities, 2% by NGO, 2% by communities. 34% are privately owned. In terms of category, 45% are dispensaries, 10% Health centers, 10% hospitals, 30% medical clinics and 5% Nursing homes. All the Hospitals and Nursing Homes which constitute only 15% have the basic ICT infrastructure in place. According to Muathe (2010), literature on ICT use in Health sector is scanty and inconsistent. Literature reviewed little useful information on ICT use especially in lower level facilities. Nairobi has 387 facilities which include 147 dispensaries, 69 health Centers, 43 hospitals, 109 Medical clinics and 19 Nursing homes. According to Division of Health Information Systems most health facilities in Nairobi County have the necessary ICT infrastructure in place and the health workers have basic knowledge and training (GOK, 2011).

2.7 ICT and fight against HIV and AIDS

As we enter the fourth decade of the AIDS epidemic, the world has halted and began to reverse the spread of HIV and AIDS as per Millennium Development Goal 6. Adoption and integration of ICT in CCCs can chart a new course towards UNAIDS vision of zero discrimination, zero new HIV infections and zero aids related deaths through universal access to effective HIV prevention, treatment, care and support (UNAIDS, 2011).

According to Okpaku (2003), ICTs over the years have been used for different purposes like development but now the question that remains unclear is how ICT can be used effectively in the fight against the HIV AIDS pandemic. The dynamics of

contemporary existence require a much higher level of individual and group knowledge and information than used to be the case when such capacity was considered to be necessary only for the professional. In the case of HIV/AIDS, there is a need to create a minimum threshold. The capacity of ICT, especially through broadcast as well as network information access and diffusion, offers a simple and relatively inexpensive way to create this basic HIV/AIDS knowledge threshold (Okpaku, 2003).

Voluntary counseling and testing of HIV and AIDS is a critical component in CCCs. Bada *et al.* (2011) observes that ICT such as mobile phones, electronic and print media can be very effective in communicating information on HIV testing places and counseling services. He established that e-mail based on-line counseling in schools had a success rate of about 90% in Uganda.

Given skewed proportions between patients and healthcare facilities, in addition to the reality of remote small populations with little medical facilities, electronic health programmes provide the only affordable means of delivering critical services, from diagnostics to prescription and monitoring (Okpaku, 2003). The virtual elimination of mother to child transmission is possible by 2015. According to UNICEF (2010), when ICT was integrated in PMTCT services in Asia-Pacific the coverage of services increased from 9% in 2004 to 32% in 2009 while newborn children infected with HIV and AIDS decreased by 18% over the same period (WHO, 2009). UNAIDS aims at ensuring universal access to ART for PLWAs. More than 5.2 million PLWAs are receiving HIV treatment worldwide. However, more than 10

million PLWAs are still waiting for this life saving treatment (UNAIDS 2011). Utilizing various forms of ICT, Rwanda been able to create and monitor a health system that allows both urban and rural populations to benefit from service. Over the course of the last five years, it has achieved universal access to HIV therapy (Agnes, 2011).

Tuberculosis (TB) is a leading cause of illness and death for PLWAs (WHO, 2009). In this regard, e-health can be useful in monitoring treatment and defaulter tracing while ICT applications can be used for research for innovative TB diagnostic and treatment options. Admire *et al.* (2009), found that Geographic Information Systems (GIS) increased TB defaulter tracing to over 90% in Vulundilela, South Africa.

A major part of the challenge of HIV/AIDS is the economic, social and psychological debilitation it foists on the patients and their families (KDHS, 2008). ICT modalities such as broadcast, print, telephony, networked education and other personal information sharing applications are the perfect way to achieve this goal in countering HIV and AIDS pandemic. Studies conducted in Botswana revealed that susceptibility and vulnerability reduced by about 50% in households which had access of these ICT modalities (Okpaku, 2003).

A major challenge in the War against HIV/AIDS is the paucity and accuracy of information and data (both statistical and episodic) on all aspects of the infection, spread, impact and control. ICT offers the best response to this challenge. The innovative use of broadcast technology, especially of radio, and the establishment of

the infrastructure for online or networked information gathering through the Internet and Intranet would greatly enhance the scope and quality of such information and data collection mechanisms and processes (Bada *et al.*, 2011).

2.8 Perceptions on ICT adoption in healthcare

According to Diffusion of Innovation Theory by Rogers (1995), perceptions of innovation characteristics is one of the main sources that influence the adoption and diffusion of innovations such as ICT in healthcare systems. He further argues that there are five perceived characteristics which include: 1) relative advantage which is the degree to which the innovation is perceived as better as compared to the status quo; 2) compatibility which is the degree to which the innovation is perceived as being consistent with the existing values and practices among the potential adopters; 3) complexity which is the degree of difficulty perceived regarding the use of the innovation; 4) triability which represents the possibility for a potential adopter to experiment the innovation ; and 5) observability which is the degree to which the results are visible to the potential adopters. However, according to Chau *et al.* (1997), the Diffusion of Innovation Theory was developed to explain the diffusion of any innovation and the relationship it posits between concepts such as innovations characteristics and adoption behavior are not explicit. It therefore lacks specificity.

The Theory of Reasoned Action (Fishbein *et al.*, 1975) has it that realization of a certain behavior is predicted by the individual intentions. These intentions are in turn formed by two antecedents: attitude towards the behavior and subjective norm. The

former represents the evaluation of the advantages and disadvantages of associated with the performance of a given behavior weighted by their relative advantage. The latter is the adopter's perception that significant others will approve or disapprove the behavior in question compared by the motivation to comply. However, according to Ajzen (1991), some behaviors might not be totally under volitional control. They may require specific resources, skills or opportunities for an individual to perform them. In his Theory of Planned Behavior he added the perception of behavioral control. This explains the adopter's evaluation of the barriers related to the realization of the behavior and the perceived capacity to overcome them.

In his Theory of Interpersonal Behavior, Triandis (1980), states that there are three perceived determinants of ICT adoption which include intension, facilitating conditions and habit. Intention is the adopters' motivation regarding the performance of a given behavior. Facilitating conditions are the perceived factors in the environment that can ease or impede the adoption. Habit constitutes the level of frequency of a given behavior. However the theory is complex and considers many independent predictors.

The Technology Acceptance Model (Davis, 1989) was specifically developed to understand user acceptance of information technology. The model suggests that there two distinct perceived predictors of ICT. These are the perceived ease of use and perceived usefulness. Its major strength is that it is ICT specific and has been applied to understand healthcare professionals' acceptance of ICT (Huet *al.*, 1999; Croteau *et al.*, 2002).

In an overview of ICT theoretical models and application, Gagnon (2006) reported that ICT perceptions can be grouped into three broad categories; 1) Perceived Attributes which refers to users perceptions towards the technology and their evaluation of the consequences of adopting it, 2) Perceived Normative Factors which refers to social factors that include social norm, role beliefs and professional norm and 3) Perceived Barriers and Facilitators to ICT acceptance and adoption. Parasuraman (2002), asserts that in order to understand ICT adoption, it is critical to understand the users' perceptions on inhibitors and contributors of technology acceptance and ultimate adoption. Moore *et al.* (1991), postulates that perceptions rather than objective technology attributes have been found to be more relevant to technology acceptance.

For the purposes of this study, perceptions of health workers on various aspects of ICT adoption were probed. Specific targeted areas included ICT access, ease of navigation efficiency, personalization, security, site aesthetics, reliability, responsiveness, assurance and flexibility. In addition, their perceptions on inhibitor and contributors of ICT adoption were interrogated. According to Gagnon (2006), a synthesis of studies on ICT adoption in health care reveal three broad categories of factors on perceptions on ICT adoption by health workers. These categories are: 1) perceived attributes 2) perceived normative factors and 3) perceived barriers and facilitators.

2.8.1 Perceived attributes of ICT adoption

This category refers to users' perception towards the technology and their evolution of consequences of adopting it. Thus, the five characteristics of an innovation from the DOI, the attitudinal construct found in the TRA, TPB and TIB as well as the concept of perceived usefulness and perceived ease of use from the TAM are considered (Gagnon, 2006). Hebert *et al.* (1994), have analyzed factors influencing nurses' adoption of computerized medical records. They used a combination of the DOI, TRA and TAM. Their model was fairly strong by explaining 77% of the variance in intention to use the technology. Perceived relative advantages, compatibility with usual work patterns, and results demonstrability was associated with intention. Other empirical studies using the DOI have also found support for the use of this model in order to explain physician' adoption of the telemedicine (Spaulding *et al.*, 2005) and the internet (Chew *et al.*, 2004). In all the studies based upon the DOI that were reviewed, relative advantage was the strongest predictor of ICT acceptance.

A study of telemedicine adoption among physician in Hong Kong based upon the TPB (Hu *et al.*, 1999), reported that attitude was the principal determinant of physicians' intention to use telemedicine. A similar study applied the TAM to assess predictors of telemedicine acceptance among physicians and found that 44% of the variant was explained by perceived usefulness (Hu *et al.*, 1999). Conversely, perceived ease of use did not influence the significantly its adoption. Crotau *et al.* (2002) used an adoption of TAM to explore the factors affecting telemedicine

adoption by two groups of physician in Canada. Likewise, perceived usefulness was the main predictor of telemedicine adoption in both groups, while perceived ease of use was associated to adoption in only one of the groups. A modified version of the TAM was applied to explore physicians' intention to use internet (Chismar *et al.*, 2003). The model explained 59% of the variance in intention with perceived usefulness being the only significant predictor of intention.

2.8.2 Perceived normative factors of ICT adoption

Normative factors are not accounted for explicitly neither in the DOI nor the TAM, although many researches using this model have added a social or normative component to their frameworks (Chismar *et al.*, 2003; Croteau and *et al.*, 2002). In most of the studies on telemedicine adoption by physicians, social factors have not been significant (Croteau *et al.*, 2002; Hua *et al.*, 1999). Similar findings have been found with respect to physicians' adoption of the internet where subjective norm was not a significant predictor (Chismar *et al.*, 2003). As Succi *et al.* (2002) have pointed out normative factors considered in psychosocial models might not be adapted to the study of healthcare professionals' behavior. Thus, these authors suggest testing the influence of other normative components, such as the perceived impact of using the technology on professionals' status.

In contrast, study based upon the TIB explained a high 81% of the variance in physician intention to use was perceived social norm, role beliefs, and professionals' norm. Other studies of ICT acceptance among health workers have indicated significant influence of social factors. For example Hebert *et al.* (1994), found that

perceived support from the Director of Nursing significantly influenced nurses' intention to adopt computerized healthcare records.

2.8.3 Perceived Barriers and Facilitators of ICT adoption

Many studies have explored barriers and facilitators to ICT adoption in healthcare but only a few used an explicit theory to assess them. Using the TPB as their theoretical framework, Hu *et al.* (1999) found that telemedicine. These authors used three items to assess perceived control: proper training, technology access, and in-house technology expertise. Furthermore, Chau *et al.* (2002) proposed a combined model to study telemedicine acceptance in which perception of behavioral control was a significant predictor of intention. However, these findings have not been supported by empirical studies of telemedicine adoption in which behavioral control did not influence significant intentions (Gagnon *et al.*, 2003; Coteau *et al.*, 2002).

With respect to the relationship between intention to use ICT and subsequent behavior, a longitudinal study has shown that, depending on the specific tasks considered about 51% of physicians who intended to adopt information technologies in their practice actually did so in the following year (Lai *et al.*, 2004). This study also explored factors that influenced the translation of intention to computerize into actual computerization. These factors referred to the number of tasks physicians intended to computerize the number of tasks already computerized, and a physicians' positive attitude towards computerizations.

2.9 Factors influencing ICT adoption

2.9.1 Individual factors

Successful ICT adoption by enterprises requires the active participation of the company head or owner (Raymond *et al.*, 1982). This is because the head makes most of long-term planning decisions including ICT decision and has overall control of the organization financial and human resources. It is usually the responsibility of the in charge to recognize opportunities and threats within the chosen target (Mathay, 2000). This argument was supported by Rashid *et al.* (2001) that the owner's innovation affects ICT adoption.

Lack of knowledge on how to use technology and low computer literacy were contributory factors to non-adoption of ICT (Kirby *et al.*, 1993). Kiarie *et al.* (2006) indicates that the in charge lack of awareness of technology and its perceived benefits is a major barrier to take up of e-commerce and e-health. Organizations will generally lack the human and technological resources needed for ICT adoption because they follow daily operations and lack the time to understand the benefits of new technologies (Bresnahan *et al.*, 2002). Those firms that adopt ICT have within them someone who has a reasonable amount of knowledge of the specific technology in general.

The development of ICT related skills is central to process of organizational change. Ednar *et al.* (2005) suggests that organization investment in assets that are complimentary to ICTS may contribute to more raising the relative demand for stalled labor than the diffusion of ICTS themselves. In this context, firms with

relatively high proportions of stalled workers would be expected to have a comparative advantage in minimizing the cost both ICT adoptions and learn how to make the best and most beneficial use of ICT. For example, highly educated workers are likely to be better equipped in responding to the new product development opportunities made possible by ICTS. In the areas of new products and services, highly skilled workers would be expected to adapt more quickly to the new forms of work organization than low skilled workers. Regarding investment in ICT training, all other factors being equal, less of such training will be necessary in firms with pre-existing high level of skill (Muathe, 2010).

A skilled and knowledgeable work force is closely associated with successful implementation of technology (Allison, 1999). Indeed a highly skilled work force is the key to increased competitiveness and sustainable growth of enterprises (Gaskill *et al.*, 1993). Demand for highly knowledgeable and skilled work force places a lot of pressure upon organizations to improve or update their current knowledge and skills. This is particularly so especially in health care systems where new ideas and challenges are often experienced (Bingi *et al.*, 2000). But due to shortage of skills this has been cited as one of the challenges facing ICT adoption. To cope with rapid changes about by ICT requires regular training which CCCs may lack capacity to provide due to inadequate resources (Muathe, 2010).

The Department of Trade and Industry found that most marketers were not aware of the opportunity presented to them by advanced information technology and especially newly emerging E-health and internet health information found in

websites (DTI 1998, 1999). Rashid *et al.* (2001) notes that closely networked awareness, understanding and acceptance of ICT was a distinct lack of ICT skills by enterprise heads with the latter being perceived to be the most significant factor in adoption of ICT. While examining the dilemma of African countries in the wake of the ICT, Sonaike (2004) asserts that the ongoing efforts by western companies to expand connectivity in the continent are completely driven by profit intentions. This could lead to unnecessary form of techno-dependence. This also makes organizations techno-dependent and could be a factor in developing ICT applications that are customized to health related organizations particularly in Kenya context and thus reducing their ability to adopt ICT (Muathe, 2010).

Employee's age was also found to have significant influence of ICT adoption. According to Rice *et al.* (2003), ICT users in USA tend to be young. Age, however may not be significant factor in determining the use of all ICT. Some studies in USA have shown that with respect to the use of mobile phone, age did not appear to be significant predictor even though with respect to the internet a clear age threshold existed whereby inclusion fall after age of 55 (Waham *et al.*, 2004). This means that internet and mobile phone users are not necessarily the same group of people. The difference could be attributed to the fact that mobile phones and the internet have different functions. In relation to gender, Venkatesh *et al.* (2000), found a high intention to adopt and utilize technology by men than by women.

Morris *et al.* (2005) notes that the subjects of prior research in technology acceptance have been predominantly male. However, currently females are joining

the field of ICT. However, the studies were based on developed countries like USA Britain and Canada. The situation might be different in developing countries such as Kenya where gender inequality exists (Makan, 2010). Morriss *et al.* (2005) asserts that in a country where the work force is young, homogenous and is specifically in the 31-40 years ICT is more likely to be adopted. The effect of age as demography variable is usually minimal because it is expected that younger people would be more motivated to use ICT especially because ICTs have only recently been factored in the school curriculum in Kenya (Muathe, 2010). Although the literature reviewed has led to important understanding of the effects of individual factors on ICT adoption, it is based on organizations in the developed countries and little seem to have been done on African countries and more so to HIV and AIDS CCCs in Kenya.

2.9.2 Organizational factors

It has been argued that organizational factors such which include size, quality systems, information intensity, specialization and management support are significant in ICT adoption. The size of an organization is a determining variable in the decision to adopt ICT (Igbaria *et al.*, 1996). Indeed, it is a key parameter hindering adoption of ICT. Large enterprises have the resources and infrastructure necessary to facilitate the adoption of ICT. On the contrary, small ones are less likely to adopt ICT because they often lack resources and capacity (Karki *et al.*, 2004). He further asserts that this situation is brought out by such factors like operating in a strong competitive environment, lack of finances and professional skills.

The quality of ICT systems is an important driver behind user satisfaction. It also determines end users' intention to use and actual usage (Delone *et al.*, 2003). Organizations that are linked to internet trading tend to be more entrepreneurial risk takers and have original innovations (Poon *et al.*, 1999). The relative proactive approach of company heads to rapid ICT changes is mandatory. Other key features in this process are implementation, managerial commitment and perception of ICT benefits (Poon *et al.*, 1999).

Moore *et al.* (1991), argue that actions of individuals are more directed by the perception of voluntariness than by real voluntariness. This is because users may have compulsion to adopt ICT even when it is not compulsory at the working place. Venkash *et al.*(2003) asserts that voluntariness has often been assumed as two-way by some authors while others have looked at it as a continuous variable. The issue with the binary view is that it doesn't cater for different uses of the ICT adoption process. The requirements to use the system by different employees might create challenges to think of ICT voluntariness in only binary terms (Muathe, 2010).

Agarwal *et al.* (1997) have suggested that practically, users may look at different degrees of voluntariness in accepting and adopting ICT. In this case, voluntariness may be scientifically ordinal idea (either mandatory or voluntary) in academic research. The fact that perceived voluntariness is a range of different levels of alternatives it would be wrong to conclude that a system is compulsory only when users don't want to use it but must use it (Venkatesh *et al.*, 2000).They further argue that the theoretical role of voluntariness in technology acceptance and actual usage

has been tested in many forms. When use of a process is perceived as mandatory in the work place, the intention of using the system may be predicted by subjective norms. This view of ICT voluntariness suggests that attitude is more important when ICT adoption is a matter of individual choice and less so when organizations pressurize the workers (Makau, 2010).

2.9.3 Technological factors

The third set of factors influencing ICT adoption is the technological aspects. They include complexity, compatibility and relative advantage. Financial, human resources and trust in ICT by end users will definitely determine ICT adoption (Chan *et al.*, 2002). Among the technology adoption models studied by academicians, the Technology Acceptance Model (Davis, 1989), is the most informative in ICT. Its major strength is that it demystifies the attitudinal concept found in other models into two different factors. They are ICT ease of use and usefulness. This model has also been used to understand ICT adoption by healthcare professionals (Croteau *et al.*, 2002). However some authors have criticized the applicability of TAM to the study healthcare professionals.

Many efforts have been made to expand the theory by introducing other variables from other theoretical models or by studying moderators and antecedents of perceived ease of use and perceived usefulness (Gagnon, 2006). Institutions have the choice of ICT that conform to certain internal work values and experience. This makes them to minimize the perceived risks and make minimal changes. This leads to less resistance in ICT adoption (Muathe, 2010).

Rogers (1995) observed that in health related organizations, compatibility of ICT with work needs, values and experiences of the user is a crucial determinant in making the decision to accept ICT. He further observed that the high value put on the therapeutic relationship between a patient and a Therapist cannot be underestimated since it is an important tool in the therapeutic process. Moreover, an innovation that is perceived not aligned to the process will be rejected by health care professionals (Rogers, 1995). Theo *et al.*(2002) assert that the incompatibility of a new ICT system with existing work procedures, value systems and infrastructures negatively affects the attitudes of the users. This increases their resistance to change which in turn prevents ICT adoption. Chau *et al.*(2002) notes that compatibility may influence behavioral intention directly through output expectancy and effort expectancy. They further observed that compatibility of e-health technology significantly influences the perceived usefulness.

The relative advantage of a given technology influences its acceptance and adoption. Rashid *et al.* (2001), Poon *et al.* (1999) and Seyal *et al.* (2003) have it that a positive perception of a technology should provide a motivation for its adoption. They further argue that the degree of relative advantage is finally expressed in terms of profits, cost reduction, worldwide client database, rapid access and distribution of information and improvement of services.

Thong (1999) argues that financial, human and technological resources play a very important role in adoption of new technologies. In the case of health institutions, even if the health workers perceive the adoption of ICT as important, the facilities

may not have enough resources to adopt. This poses a major obstacle to CCCs in adopting ICT. Acute financial and organizational constraints often cause health workers in developing world to lag behind in ICT adoption as compared to their counterparts in developed world.

According to Singh (1986), innovation is more likely to happen in the presence of organizational slack because it buffers its downside risk and also because the legality of experimenting is less likely to be queried in more resource controlled work places. Therefore lack of resources encourages innovation. Nolan (1979) asserts that organizations should ensure innovations by maintaining low control and high slack. Huge volumes of uncommitted resources is a factor that positively affects innovation in response to organizational decline while lack of resources and expertise are normally assumed to be a major setback to ICT adoption (Mone *et al.*,1998).

When service providers perceive the use of ICT device as improving their status within their work place most likely they will adopt ICT. Van Heerden *et al.* (1995) argue that organizations try to enhance their images so that they increase their credibility among customers. Succi *et al.*(1999) found that a client's perception is crucial for success and that a strong image is an effective way of differentiation. Therefore end-users are more likely to be influenced by the impact of the use of new technology on their professional status. But studies have shown that social process of subjective norm and image might not significantly influence the decision to adopt ICT. This could be attributed to changing nature of end users in the way they make decisions. It could also be due to reliance on their own testing rather than that of

others (Muathe, 2010). Belief in the technology in regard to patient information, confidentiality and maintaining health worker and patient relationship has considerable influence upon decision makers of health facilities in ICT adoption. According to Haynes *et al.* (1998), trust may result in positive networking with other enterprises, governments and consumers.

2.9.4 External environment factors

External environment factors such as competition from outside, state of ICT infrastructure, relationship between service providers and consumers, political systems, culture and national values form the last set of factors influencing ICT adoption. Palvia *et al.* (2002), observes that political systems and Government policies in particular, are the most important variables influencing ICT adoption. Societal cultural factors such as norms, values and attitudes are also crucial determinants of ICT adoption (Straub, 1994). The effect of the external environment is important throughout the ICT adoption decision making process (Makau, 2010).

Several researchers have studied the possible effect of competition pressure on the adoption of ICT (Cragg *et al.*, 1993 and Iacovou *et al.*, 1995). However, Thong (1999) argues that competitive pressure has little influence on ICT adoption. Competitive pressure on ICT adoption decisions arises when organizations presume that competitors may have comparative advantage as a result of ICT adoption (Tung *et al.*, 2005). This contradiction creates room for more research in this area.

In spite the fact that African countries are expanding and extending communications systems, the current state of ICT infrastructure is still a major problem and remains a threat to continents full participation in the information society (Mansell *et al.*, 1998). Cash constrained national treasuries and limited investment opportunities are two major factors reducing infrastructural developments. Nevertheless, despite severe constraints in telecommunication and infrastructural developments the most dynamic is the internet, which is growing rapidly (Muathe, 2010).

Lack of telecommunications infrastructure includes poor internet connectivity, lack of fixed telephone lines for end user dial-up access and the underdeveloped state of the internet service providers (Kapuruandara *et al.*, 2004). According to Wicander *et al.*(2006), although many African countries have taken steps to improve their ICT infrastructure, great variation still exists between regions and countries. For example, in Africa over 30 countries still have less than one telephone line per 100 people (tele-density).This is in contrast to the average global penetration of 13 telephone lines per 100 inhabitants (Evusa, 2005). Low tele-density of fixed telephone lines has contributed to low ICT usage in Kenya (Kashorda, 2007). Many countries in Africa are however expanding ICT telecommunication networks but coverage in rural areas where about 70-80 percent of population live remains uncovered (Ochara *et al.*, 2008).

Kenya's telecommunications monopoly policy approach is not compatible with the global ICT objective (Mulunga, 1994). However, this policy and the organizational structure have followed the postal and telegram telecommunication (PTT) monopoly

approach traditionally followed in European countries and most of Africa. Nevertheless, the telecommunication policy in Kenya has now been influenced by wave of change towards increased competition that swept across advanced economies of the world. According to KP and TC (2000), the motivation to start the move towards liberalization was a desire to improve efficiency. This was by introducing competition and having the private sector share the increasing financial burden of supplying ICT terminal equipment.

According to Muathe (2010), in regard to provision of services, multiple operators are fairly competing in various market areas. This is based on policy of private sector operating in a competitive environment that ensures consumer interests. While the expansion of ICT sector in Kenya has been significantly influenced by ICT global trends, it can be examined in terms of fixed and mobile telephone lines (Evusa, 2005). Telkom Kenya is today the only fixed national operator with Bell Communications LTD. operating in Northern Kenya. The Kenya government has liberalized the mobile cellular market which has three operators namely: Safaricom Limited, Airtel International and Orange mobile networks. External pressure is mostly from customers. However, suppliers also have some influence. The influence of customer pressure has been recognized as one of the major factors in ICT adoption (Sillence *et al.*, 1998).

The symbiotic relationship between the pressure of suppliers and that of consumers on the adoption of ICT is an important factor. Rashid *et al.* (2001), notes that this factor depends on the traits of the suppliers and buyers such as the geographical

distance, habits, tradition and purchase behavior. Another common form of external pressure affecting ICT adoption comes from client demands such as branded firms requiring ICT adoption.

According to Cheptais (1996), there is enough evidence that ICT issues caused by the impact of a political system such as control and pressure by authorities may affect ICT adoption. According to Rashid *et al.* (2001), governments could be the most powerful institutions affecting ICT innovation. According to studies done by International Labor Organization (ILO 2001), the internet is used more widely where political and civil rights and freedoms are in place. The political will affect the conditions in which ICT is managed and developed (Pelvia *et al.*, 2002).

According to Evusa (2005), the greatest handicaps for development of internet services have been the regulatory restrictions. This is because access to the customers and international bandwidth is controlled by Telecom Kenya limited. These sentiments have been supported by Kasharda (2007) who has suggested that the problem of ICT adoption is partly caused by inadequate legal and regulatory framework. Since legislation differs from country to country, so will its influence on ICT. According to Muathe (2010), in some countries certain types of telecommunication equipment may be outlawed in order to protect local data and information processing industries. Other countries may require that hardware and software be bought locally. In a review of mobile telephony, Munith (2003) found that there is need for policies aimed at removing barriers to the implementation of ICT infrastructure.

Hodas (1993) argued that cultural factors play an important role in creating a negative attitude towards ICT hardware such as computers. This is because of the tendency for computers to make life too mechanized thus contributing to resistance from service providers in accepting them. Straub (1994) found that an important reason for disappointing results in transferring technology from one culture to another is that the decision makers who engage in such transfers lack sufficient knowledge of either the importers cultural conditions or nature of technology or both. He argued that importing a technology into developing countries without enough understanding of national culture can result in incompatibility between the culture and the technology.

Silverstone *et al.* (1996) and Straub *et al.* (1997), maintain that all individuals live and work within a cultural environment. This entails certain values, norms, attitudes and practices which are more or less dominant. They serve as shared source of socialization and social control. Hofstede (1997) and Martinez (1999), observed that one of the major challenges facing developing countries is to make ICT an integral part of the people's culture. Evumban *et al.* (2006) concluded that the significant variation in internet diffusion and ITC implementation and acceptance between countries could be due to national culture. Unfortunately, very few studies have tried to examine the effect of national culture on the adoption of ICT and health care in Kenya. Given this gap in literature, this study aimed at testing the effect of national culture on ICT adoption within HIV and AIDS CCCs in Nairobi County.

CHAPTER THREE: METHODOLOGY

3.1 Research Design

The research design adopted is descriptive cross sectional survey. Gay (1981) defines survey as an attempt to collect data from members of a population with respect to one or more variables. The design was used because of its convenience in collecting extensive data from a large sample of respondents within a short time (Miller, 1991). It was also appropriate since according to Mugenda *et al.* (2003), it seeks to obtain information that describes existing phenomena by asking individuals about their perceptions, attitudes, behaviors or values. The purpose of descriptive designs is to observe, describe and document aspects of a situation as it naturally occurs in a given population and data is collected at one time (Brink *et al.*, 1998).

3.2 Variables

3.2.1 Independent variables

The study considered independent variables which are:

- i. Social-demographic characteristics (sex, age, marital status, education levels, income, knowledge, and training).
- ii. Factors influencing ICT adoption by health workers.
- iii. Health workers perceptions of ICT drivers.
- iv. ICT contributors and inhibitors.
- v. ICT predictors.

3.2.2 Dependent variable

The dependent variable is ICT adoption.

3.3 Study area

According to KAIS (2012), Nairobi County has 155 HIV and AIDS Comprehensive Care Centers. One Hundred (100) of them are private while fifty five (55) are public. They are distributed across the eight administrative Divisions. Central Division has 22, Dagorreti 25, Embakasi 20, Kasarani 22, Kibera 15, Makadara 17, Pumwani 16 and Westlands 18. In regard to ICT, the County has the highest concentration and also the highest (70%) population which is ICT literate (CCK, 2011). Fig. 3.1 illustrates the study area.

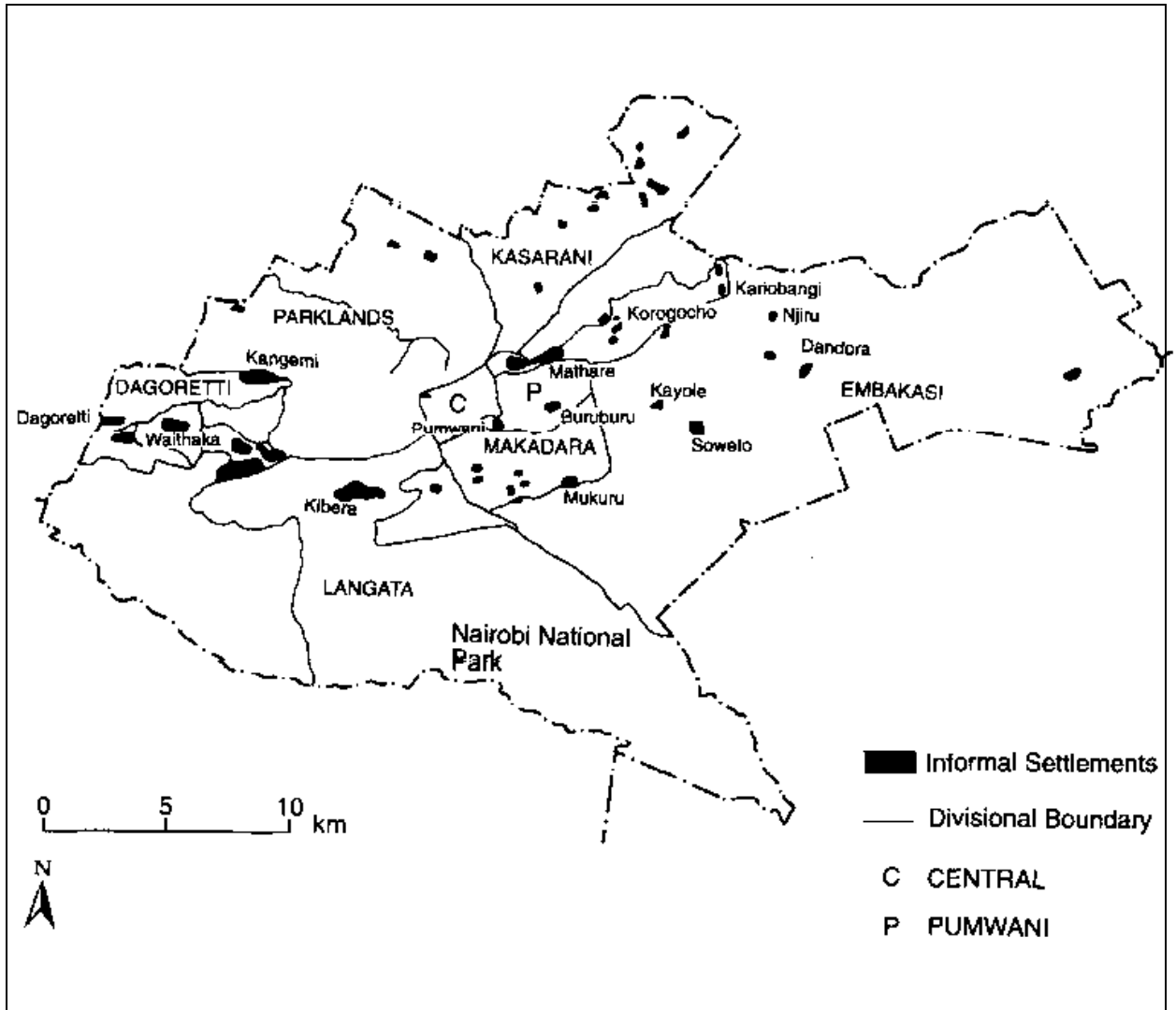


Figure 3.1 Map of Nairobi County: www.flickr.com/photos/albertknyaniinima

3.4 Location and history of Nairobi County

The study was carried out in Nairobi County which is an administrative county in Kenya. It was founded in 1889 as a railway camp. It is the capital city of Kenya and occupies 684 square kilometers. It is located at $1^{\circ} 17' 0''$ S $36^{\circ} 49' 0''$ E. The county has a population of 3,138,295 (2009 census). It lies at 1,795 meters (5889ft) above sea level and enjoys a moderate Subtropical highland climate. The mean maximum temperature is 24° C (50° C). The Ngong hills, located to the west of the city and the

Nairobi National Park are the most prominent geographical features of the county. The Nairobi River and its tributaries traverse through the county. Karura Forest is in Northern Nairobi. The county borders Machakos County to the East, Kiambu to the North, Nakuru to the West, Kajiado and Narok to the South. It has eight administrative locations namely: Central, Dagoretti, Embakasi, Kasarani, Kibera, Makadara, Pumwani, Westlands.

3.4.1 Justification of study area

The first case of HIV and AIDS was confirmed at Kenyatta referral Hospital in 1983. By the end of 1985, 26 cases had been reported in the same hospital. According to GOK (2010), HIV and AIDS in Nairobi County is a major health problem with the current prevalence averaging 8.8%. With regard to bed occupancy, about 50% of the hospital beds are occupied by patients with HIV and AIDS related diseases. It is estimated that about 2% of all adults lived with the virus at the end of 2007 (KAIS, 2007). The high prevalence rates can be attributed to the fact that Nairobi county is the capital city and highly cosmopolitan. It is home to the largest slum dwellings in the country which include Kibera and Mathare (AVERT, 2010). High risk groups such as the commercial sex workers and long distance drivers also contribute to these high rates since the county serves as the transit point for destinations within and outside the country (GOK, 2010). The county was also selected because it has the highest concentration of ICT infrastructure. It also has the highest population which is ICT literate of about 70% (CCK, 2011).

3.5 Target population and sample size determination

3.5.1 Target population

The target population included all HIV and AIDS patients whose total number was about 300,000 and health workers in CCCs in Nairobi County whose population was 332.

3.5.2 The study population

3.5.2.1 Inclusion criteria

Participants for the study included sampled patients visiting selected HIV and AIDS Comprehensive Care Centers, aged above 18 years and willing to participate. It also included sampled health workers who consented to participate from these HIV and AIDS Comprehensive Care Centers in Nairobi County.

3.5.2.2 Exclusion Criteria

Patients below 18 years and those not willing to participate were excluded. Health workers who did not consent and those who had worked in the CCCs for less than three months were also excluded.

3.6 Sampling techniques and sample size

3.6.1 Sampling techniques

3.6.1.1 Study area

Nairobi County was purposively selected for the study. Purposive sampling is where the sample is arbitrarily selected because characteristics, which they possess, are deemed important for the research (Sproul, 1988). This is because the county is grouped among the areas which have had high HIV prevalence rates at 8.8% (KAIS, 2007).

3.6.1.2 Comprehensive Care Centers

Stratified random sampling was used to select HIV and AIDS CCCs from both public and private facilities for the study. All 6 CCCs in public hospitals were included. 6 CCCs in private hospitals were included. This was intended to offer diverse and varied characteristics especially with regard to social-economic backgrounds. Using multistage stratified sampling 16 CCCs in Health Centers were selected, 8 from public health Centers and 8 from private ones.

3.6.1.3 Primary respondents

For the purposes of this study, health workers were purposively selected as the primary respondents. This was informed by the fact that they are the service providers in the HIV and AIDS CCCs. The respondents within the facilities were selected using proportionate stratified sampling where all cadres of Health Workers were included. Proportionate sampling is where the numbers in the groups selected for the sample reflect the relative numbers in the population as a whole (Robert, 2004).

3.6.1.4 Focused group discussions

In order to obtain additional information, HIV and AIDS patients were included in the study. This information was used to verify and triangulate responses from health workers. Systematic random sampling was used to select CCCs where FGDs were carried out. Only 4 FGDs were carried out. This was due to time and financial constraints. HIV and AIDS patients were selected using systematic random sampling. Participants were organized in groups of 10 for easy management.

3.6.2 Sample size

A sampling frame of about 332 Health Workers was drawn from all CCCs. A sample frame is the set of people that have a chance to be selected given the sampling approach that is chosen (Fowler, 1993). Sample size was calculated according to the formulae recommended by Fisher *et al.*(1998) for sample size determination symbolized by the following function

$$N = \frac{Z^2 p.q.D}{d^2}$$

N = Sample size

Z = Standard normal deviate (1.96) which corresponds to 95% confidence interval.

P = Proportion of occurrence of the variable of focus (which is 0.5 where the figure is not known).

Q =The proportion of non-occurrence of the variable of focus (which is 1- P =0.5)

D = Degree of accuracy = 0.05

D= Design effect (which is 1for homogenous population)

The calculation

$$n = \frac{(1.96)^2 \times 0.5 \times 0.5 \times 1}{0.0025} = 384$$

But since the estimate population of Health Workers was less than 10000, the following formula was used:

$$nf = \frac{n}{1 + \left(\frac{n}{N}\right)}$$

Where: nf = the desired sample size (when the population is less than 10,000)

n = the desired sample size (when the population is more than 10,000)

N = the estimate of the population size

The calculation: $\frac{384}{1 + (384/332)} = 178$

The sample size for this study was 178 Health workers but for the purpose of this study, 196 respondents were recruited to cater for bias and also improve 'P' values and hence better results. HIV and Aids patients formed the focused group discussions. All 28 facilities in charges and CEOs were included in the study. An outline of these facilities is contained in Table 3.1.

Table 3.1: An outline of HIV and AIDS Comprehensive Care Centers where the study was done.

CCC Name	Category of CCC	Eligible population	Sample	Proportion Percentage (%)
Kenyatta national Hospital	Public	20	12	6
Mbagathi Hospital	Public	18	11	6
Spinal Injury Hospital	Public	14	8	4
Mathare Mental Hospital	Public	11	6	3
Pumwani Maternity Hospital	Public	18	11	6
Mama Lucy Kibaki Hospital	Public	9	5	2.5
Mater Hospital	Private	20	12	6
Nairobi West Hospital	Private	15	9	4.5
Nairobi Womens Home	Private	17	10	5
Gertrude's Hospital	Private	14	8	4
St'Mary's Community Hospital	Private	15	9	4.5
Karen Hospital	Private	11	6	3
Kasarani Health Centre	Public	10	6	3
Ngara Health Centre	Public	10	6	3
Makadara Health Centre	Public	10	6	3
Kangemi Health Centre	Public	8	5	2.5
Lang'ata Health Centre	Public	8	5	2.5
Embakasi Health Centre	Public	7	4	2
Nascop VCT	Public	9	5	2.5
Jerusalem Health Centre	Public	10	6	3
Swop Health Centre	Private	13	8	4
Maria Immaculate Health Centre	Private	13	8	4
Family Health Options Health Centre	Private	11	6	3
Makadara M Sisters Health Centre	Private	11	6	3
Ruai Catholic Health Centre	Private	10	6	3
St Joseph Health Centre	Private	10	6	3
Afya Medical Centre	Private	5	3	1.5
Tabitha Health Centre	Private	5	3	1.5
TOTAL		332	196	100

3.7 Data collection procedures and instruments

3.7.1 Questionnaires

Data was collected using interview schedule and focus Group discussions (FGDs) with the assistance of three research assistants (RAs). The RAs were trained on data collection techniques and procedures before beginning the research process. The researcher ensured that RAS familiarized themselves with the study with regard to the purpose, objectives, and variables under study, interview conditions and instruments. They were however, closely monitored, guided and supervised by the researcher through out the study. Interview schedule was the main data collection tool targeting the primary respondents who were the health workers. Interview schedule was chosen because it enables the researcher to obtain in-depth data from the respondents since it allows for probing, high response rate and personal interaction. It also allows for clarifications of questions to the respondents and therefore gives room for flexibility without changing the meaning of the questions. The questions for the interview schedule were both open (for qualitative data) and closed ended (for quantitative data). Blending approach allows great depth of understanding and insight than what is possible with one approach. It also helps overcome biases contained in each method (Robert, 2004). The interviews were administered in English. They lasted for between one hour to one and half hours and the responses were recorded through note taking.

3.7.2 Focused group discussions

These were conducted with HIV and AIDS patients in order to obtain additional information to verify and triangulate those from the Health workers. FGDs allow respondents to react to and respond and therefore build upon responses of other group members. This synergetic effect of group setting may result in production of data or ideas that might not be captured in individual interviews (Stewart *et al.*, 1990). They aim to encourage free discussion and debate among a group of persons with an effect which is not achievable in a one on one interview. There were four FGDs with 10 HIV and AIDS patients each. The FGDs sessions lasted for two hours on average. The researcher facilitated the FGDs with the help of research assistant who took notes during the session.

3.8 Pretesting of research instruments

The questionnaires were pretested at Athi River Health Center Comprehensive Care Center. A sample of 10 health workers was interviewed for the pretesting of the questionnaire. Pretesting was done before the actual study to ensure that the items tested what they were intended to (validity) and that they consistently measured the variables under study. Focused Group discussion pretesting was done using a group of 10 HIV and AIDS patients at the same Health Center. Any important corrections, clarifications, suggestions and omissions highlighted during the pre-testing exercise were then adopted and used to improve the study instruments.

3.9 Logistical and ethical considerations

A letter of introduction was obtained from the Graduate School of Kenyatta University (Appendix 4). Research authorization was sought from the Ministry of Education, Science and Technology (Appendix 6) and Kenyatta University Ethics Review Committee (Appendix 5). Clearance was sought from the Director of Public Health and Sanitation (Appendix 8). The purpose of the study was explained by the researcher to all participants who gave written or verbal consent. All information obtained was treated with confidentiality. Participants were at liberty to terminate the interview at will. The benefits and possible side effects of the study were also clearly explained to the respondents by the researcher and research assistants. Address of the Chairman, Kenyatta University Ethics Review Committee and those of the supervisors were given to participants in case of any queries regarding the study.

3.10 validity and reliability

3.10.1 Validity

Validity is the accuracy and meaningfulness of inferences, which are based on the research results. In other words, validity is the degree to which results obtained from the analysis of the data actually represent phenomenon under study (Mugenda *et al.*, 2003). Validity therefore, has to do with how accurately the data obtained in the study represents the variables of the study. The sampling techniques adopted ensured randomization and representativeness to cater for internal and external validity.

3.10.1.1 Internal validity

To ensure internal validity, random sampling techniques were used and homogeneity of selected population was ensured. Blocking of some of the extraneous variables such as demographic characteristics was done by including and measuring them.

3.10.1.2 External validity

For purpose of this study, random selection of a large sample was used to enhance external validity. This made the sample more representative. Comparison of findings with the previous studies found in external was also done. In addition expert opinion from the supervisors and ICT experts was sought to enhance validity.

3.10.2 Reliability

Reliability is a measure of the degree to which research instruments yields consistence results or data after repeated trials. Reliability decreases random error (Mugenda *et al.*, 2003). The Cronbach's alpha was used to test the reliability of research tools and instruments. Using SPSS Version 19 Software, Cronbach's alpha coefficients were calculated to estimate the reliability of the instruments of this research. As advised by Sekaran (2003), coefficients which are less than 0.6 are considered poor, coefficients greater than 0.6 but less than 0.8 are considered acceptable and coefficients greater than 0.8 are considered good. The Alpha measures internal consistency by establishing if certain item measures the same construct. Table 3.2 shows that ICT adoption levels, had the highest reliability of ($\alpha=0.829$) followed by perception on ICT Adoption ($\alpha = 0.757$), then perceptions on ICT drivers ($\alpha = 0.721$) then Individual factors ($\alpha = 0.711$) and Organizational

factors with ($\alpha = 0.629$) and finally, technological factors ($\alpha = 0.634$) and external environment ($\alpha = 0.621$). The average Cronbach's alpha reliability coefficient for the instrument was 0.702, which is acceptable. The results in Table 3.2 indicate reasonably high alphas and that the questionnaire was generally a reliable measure.

Table 3.2: Reliability Coefficients

Scale	Cronbach's Alpha	Number of Items
ICT adoption levels	0.829	10
Perception on ten dimensions of ICT	0.757	10
Perceptions on four drivers of ICT	0.721	4
Individual factors	0.711	9
Organizational factors	0.689	14
Technological factors	0.634	5
External Environment	0.621	10

3.11 Data management and analysis

3.11.1 Study variables

The study consisted of several independent and dependent variables for the research objectives. Chi-square was used to measure relationships while Multinomial Logistic Regression was used to determine predictors. Table 3.3 illustrates the variables and the selected statistical test.

Table 3.3: Statistical tests

VARIABLES		STATISTICAL TEST	
Independent variables	Dependent variables	Relationship	Prediction
Social-Economic-gender,education,marital status,age,designation	ICT adoption	χ^2	Multi-nomial logistic regression
Ten drivers of ICT adoption-access,ease,efficiency,personalization ,security,responsiveness,assuarance,site aesthetics,reliability,flexibility	ICT adoption	χ^2	Multi-nomial logistic regression
Four contributors of ICT readiness-innovativeness, optimism,discomfort,insecurity	ICT adoption	χ^2	Multi-nomial logistic regression
Individual,Technological, Organizational,External factors	ICT adoption	χ^2	Multi-nomial logistic regression

3.11.2 Data analysis

Data collected was analyzed using the Predictive Analytic Software (PAS) version 19. Descriptive and inferential statistics were used. Descriptive statistics utilize numerical and graphical methods to look at relationships between variables. They include measures of central tendency such as the mean, mode and median. Measures of variability like the range and standard deviation were also used. Frequency distributions were utilized. Inferential statistics utilizes sample data to make estimates, decisions or other generalizations about a large set of data (McClave *et al.*, 2000). For this study Chi-square and Regression tests were used. Chi-square test of significance at a probability of error of 0.05 was used to determine relationships between independent and dependent variables. It was appropriate since both variables used in the study were measured at nominal and categorical levels of

measurement. The levels of significance were set at $P < 0.05$. In order to determine the actual predictors of the adoption levels, Multinomial Logistic Regression (MLR) was used. It was appropriate since dependent data was reduced to two levels of adoption (ICT adoption and ICT mal-adoption). Qualitative analysis was done to analyze the respondents' perceptions, views and opinions. Data checking and cleaning was done simultaneously during data collection to ensure completeness and consistency. Data was transcribed, coded and labeled in order to conduct content analysis and draw conclusions.

CHAPTER FOUR: RESULTS

4.1 Introduction

This chapter presents the findings of the research undertaken. These are covered under each objective and hypothesis.

4.2 Socio-demographic characteristics of the respondents

The Socio-demographic characteristics evaluated in this study included the respondents' age, gender, level of education, marital status, economic levels and profession.

4.2.1 Distribution of respondents based on type of facility

The results in Fig. 4.1 show respondents distribution based on type of facility. In total, there were 196 respondents sampled (n=196). However, 183 questionnaires were correctly filled and returned (n = 183) representing a response rate of 93% which was considered high. The study results indicated that most (51%) of the sampled health workers were from private CCCs while public ones consisted 49%. Indeed this distribution reflects the general staffing of health workers in CCCs in Nairobi County, Kenya.

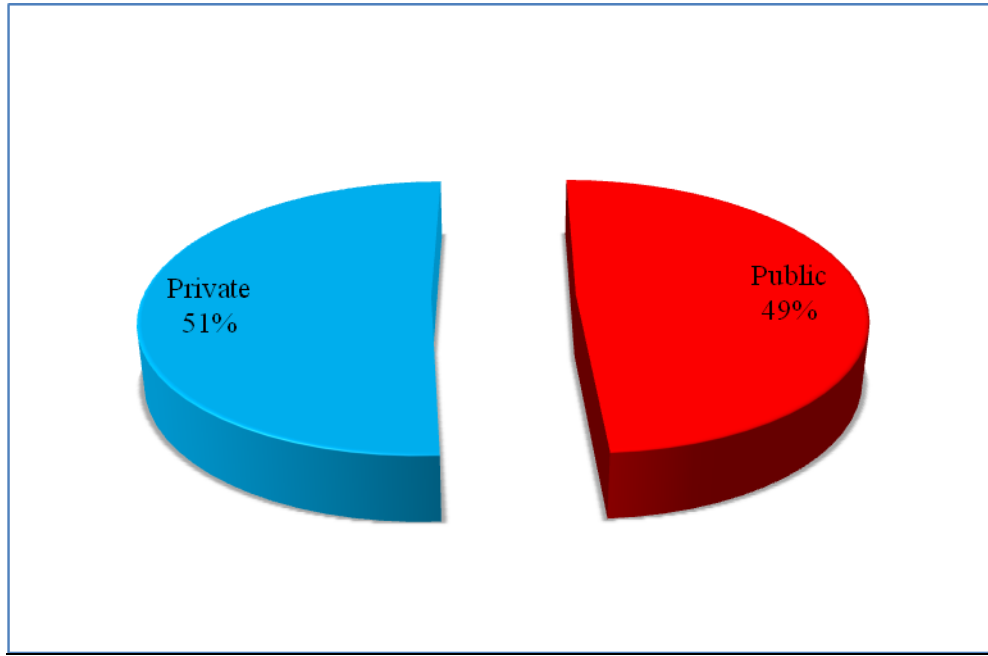


Fig 4.1 : Distribution of Respondents by type of facility

4.2.2 Distribution of the participants based on age

The results in Table 4.1 show the health workers social-demographic characteristics. Overall, results of the study show that majority (45%) were in age bracket of 31-40 years followed by 23-30 years (34%), 41-50 years (9%), 18-22 years (8%) and above 50 years (4%) were least. The study reveals that in public CCCs the largest (47%) proportion of health workers was recorded in the age bracket 31-40 followed by 23-30 (34%), 41-50 years (10%), 18-22 years (7%) while above 50 years consisted the least (2%). In private CCCs the largest proportion (45%) was observed among health workers in age brackets 31-40 followed by 23-30 years (34%), 41-50 years (9%), 18-22 years (8%) while above 50 years had least (4%). In regard to public and private CCCs, Chi-square test results ($\chi^2 = 0.217$; $df = 4$; $p = 5.774$) showed that

there was no significant relationship between age of the respondents and type of CCC.

4.2.3 Distribution of respondents by gender

The overall results indicate that most (69%) respondents were females while males constituted 31%. In public CCCs majority (67%) were females while males constituted 33%. In private CCCS, most respondents (71%) were females while males were least (29%). Results of Chi-square test ($\chi^2 = 3.451$; $df = 1$; $p = 0.063$) indicated that there is no significant relationship between respondents gender and type of CCC.

4.2.4 Distribution of respondents based on marital status

The results indicate that overall, majority (48%) of respondents were married, 43% were single, 7% were widows while widowers were least (2%). In public CCCs most (58%) were actually married, 33% were single, 7% were windows and only 2% were widowers. In private CCCs most (52%) were single, 39% were married, 8% were widows while only 1% constituted widowers. Results of Chi-square test ($\chi^2 = 1.516$; $df = 3$; $p = 0.679$) revealed that there is no significant relationship between respondents marital status and type of CCC.

4.2.5 Distribution of respondents based on education levels

As indicated, the study results showed that overall, most (39%) respondents had a diploma, 38% had a Bachelor's degree, 18% had a Masters, 3% had Ph. D while only 2% had a high school certificate. In public CCCs the largest proportion (67%)

was observed among Bachelor degree holders followed by Masters (17%), Diploma (11%), Ph.D. 3% while High School Certificate holders were least (2%). In private CCCs, the largest proportion (67%) was recorded among diploma holders, followed by those with a master degree (19%), Bachelor holders (10%), Ph.D. holders (3%) while those with High School Certificate were least (3%). Results of Chi-square test ($\chi^2 = 2.789$; $df = 4$; $p = 0.004$) indicated that there is significant relationship between respondents level of education and type of CCC with participants from private CCCs having higher levels of education.

4.2.6 Distribution of respondents based on economic levels

The analysis of the results indicates that overall, majority (81%) of respondents were in 'above poverty' economic bracket, 17% were in 'neutral' while only 2% were in 'below poverty' line. In public CCCs majority (78%) of the respondents were in 'above poverty' line followed by those who were 'neutral' (18%) while 'below poverty' line were least (4%). In private CCCs, the largest proportion (84%) of respondents was recorded in 'above poverty' line bracket, followed by those who were 'neutral' (16%) while none (0%) was in 'below poverty' line. Results of Chi-square test ($\chi^2 = 1.190$; $df = 2$; $p = 0.552$) showed that there is no significant relationship between respondents economic status and type of CCC.

4.2.7 Distribution of respondents by profession

The study results show the distribution of sampled health workers by profession. Majority (20%) were Nurses followed by Doctors and Clinical officers with an equal proportion (19%), Pharmacists (15%), Laboratory Technicians (11%), records

officers (10%), Counselors (5%) while ‘others’ were only 1%. In public CCCs, the largest proportion (22%) recorded were Nurses, clinical officers (19%), doctors (17%), Records Officers (14%), pharmacist (11%), Laboratory Technicians while ‘Others’ were least (0%). In private CCCs, majority (23%) was recorded among Doctors, followed Clinical Officers (19%), Pharmacist and Nurses (18%), Laboratory Technicians (13%), Records Officers (5%), counselors (7%) while “Others” were least (1%). In regard to public and private CCCs, results of Chi-square test ($\chi^2 = 4.132$; $df = 7$; $p = 0.764$) indicated that there is no significant relationship between the respondents’ profession and type of CCC.

Table 4.1: Social demographic Characteristics of respondents (N = 183)

Variable	Type of CCC				Chi-square Tests		
	Public		Private		χ^2	df	p
	Frequency	Percentage	Frequency	Percentage			
Age							
18-22	6	7	9	10	0.217	4	5.774
23-30	31	34	32	34			
31-40	42	47	41	44			
41-50	9	10	8	9			
Above 50	2	2	3	3			
Gender							
Male	30	33	27	29	3.451	1	0.063
Female	60	67	66	71			
Marital Status							
Single	30	33	48	52	1.516	3	0.679
Married	52	58	36	39			
Widow	6	7	7	8			
Widower	2	2	2	1			
Education Levels							
High school	2	2	1	1	2.789	4	0.004
Diploma	10	11	62	67			
Bachelor Degree	60	67	9	10			
Master Degree	15	17	18	19			
PhD Degree	3	3	3	3			
Economic Levels							
Below Poverty	4	4	0	0	1.190	2	0.552
Line	16	18	15	16			
Neutral	70	78	78	84			
Above Poverty							
Line							
Profession							
Doctor	15	17	20	23	4.132	7	0.764
Pharmacist	10	11	17	18			
Clinical Officer	17	19	18	19			
Nurses	20	22	17	18			
Lab Technicians	9	10	12	13			
Records Officers	13	14	5	5			
Counselors	6	7	3	3			
Others	0	0	1	1			

4.3 ICT Adoption by health workers

4.3.1 ICT accessibility by health workers

In order to investigate health workers ICT adoption, ten ICT items were purposively selected to investigate ICT accessibility. They included electronics patients records, fixed and mobile telephones, Computers (both hardware and software), emails, internet, social media, electronic media, print media, Satellite systems and websites. Results in Table 4.2 show accessibility of ICT by health workers.

Results revealed that majority (66%) of respondents had access to electronic patients records while 34% did not. In regard to fixed and mobile phones, most (71%) of those interviewed had access while only 29% did not. A massive majority (93%) of the respondents had access to computers while only 7% did not. In contrast a huge majority of those interviewed (84%) did not access email facility while about 16% had access to the same. It also emerged that a sizeable majority (81%) of the respondents did not access the internet with about 19% accessing the facility.

The results also revealed that most (85%) of the same respondents did have access to social media while 15% had access to this form of ICT. On the contrary, majority (54%) of those interviewed had access to electronic media with about 46% not accessing the same. In regard to print media, majority (55%) of respondents had access while about 45% did not access. The results showed that a huge majority (98%) of health workers didn't access satellite systems while only 2% accessed this form of ICT. The same trend was observed whereby majority (67%) of those interviewed did not access websites while only 33% had access to this form of ICT.

Table 4.2: Accessibility of ICT items by health workers (n = 183)

Item	Response	
	Yes	No
Electronic patient records	120(66%)	63(34%)
Fixed and mobile Phones	130(71%)	53(29%)
Computers	170(93%)	13(7%)
E-mail	30(16%)	153(84%)
Internet	35(19%)	148(81%)
Social Media	27(15%)	156(85%)
Electronic media	98(54%)	85(46%)
Print Media	100(55%)	83(45%)
Satellite systems	3(2%)	180(98%)
Websites	60(33%)	123(67%)

After each ICT item was analyzed, a two level likert scale was used to measure the overall ICT accessibility levels. The two possible responses were Yes and No. A ‘YES’ response was assigned 1 and ‘NO’ response was assigned zero. The minimum each respondent would have scored for the ten items was zero. The maximum one would have scored was 10. Respondents who scored between 0 and 4.9 were deemed to have low access to ICT while those who scored between 5 and 10 were deemed to have high ICT access. Overall scores were then computed to get the overall ICT accessibility levels. The results revealed that overall, most (57%) of those interviewed had low accessibility to ICT while those who had high accessibility of ICT were least (43%). The results are illustrated in Fig. 4.2.

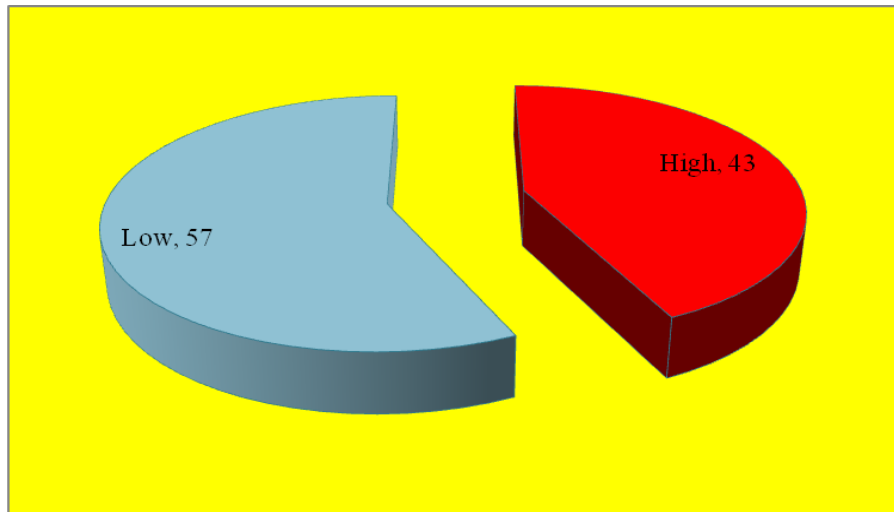


Fig 4.2: Overall ICT accessibility by health workers

The findings in Fig. 4.3 indicated that majority (50.5%) of health workers who had high accessibility to ICT was recorded among health workers in private CCCs while the highest percentage (56.8%) of those who had low accessibility to ICT was recorded in public CCCs. Results of Chi-square test ($\chi^2 = 4.185$; $df = 1$; $p = 0.041$) showed that there is significant relationship between respondents accessibility of ICT and type of CCC.

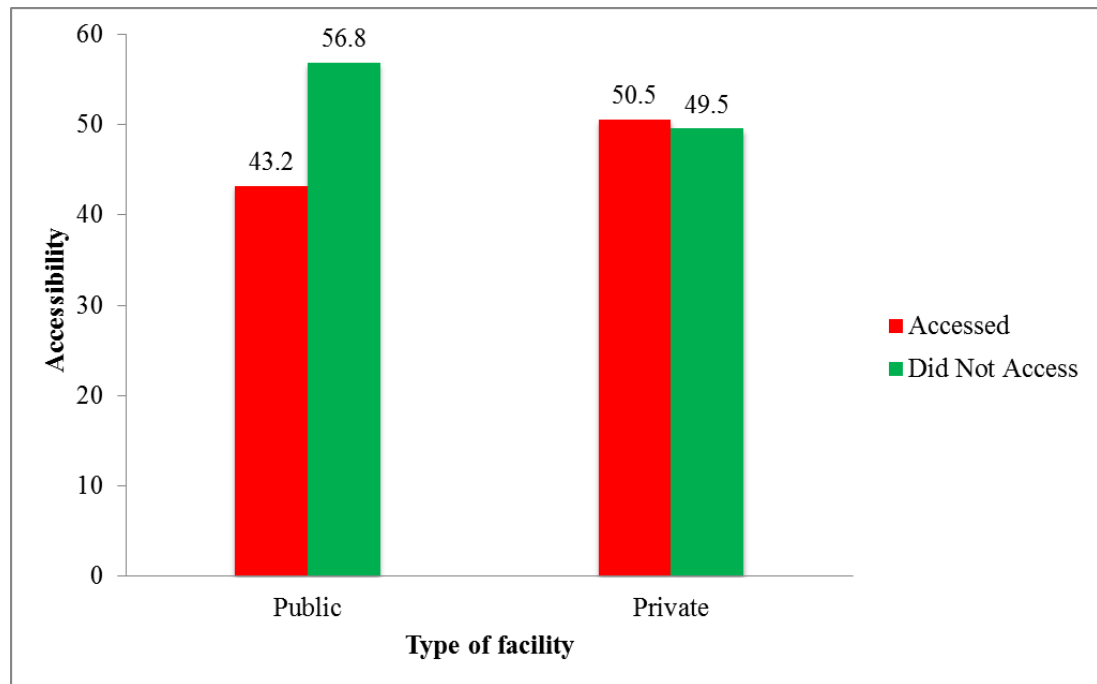


Fig 4.3: Overall ICT accessibility by types of facility

4.3.2 Health workers ICT adoption

One of the specific objectives of the study was to determine ICT adoption of health workers in HIV and AIDS CCCs. The health workers ICT adoption is an important component of services delivery in CCCs. In the study, ten items were purposively selected to measure ICT adoption of health workers. Reliability test was conducted using SPSS. The results yielded an alpha value of ($\alpha = 0.829$) which was considered high for internal reliability for a tool being used for the first time. In reference to selected items, the respondents were asked if they had adopted or not adopted that form of ICT. Each of the selected items was measured on a four level likert scale. The two possible responses were ‘yes’ or ‘no’, having the weights of 1 and 2 respectively. The responses to each item are shown in table 4.3.

Most (65.6%) of the respondents had adopted electronic patients records while only 34.4% had not. In regard to adoption of fixed and mobile phones, a majority (56.8%) had actually adopted while 43.2% of the respondents had not. Regarding the adoption of computers, both hardware and software, majority (51.4%) had not adopted while about 48.6% had actually adopted. In relation to use and adoption of e-mail facility a huge majority of those interviewed (84.2%) had not adopted while only 15.8% had adopted. The results indicated that majority of the respondents (65.1%) had not adopted internet facilities while 34.9% had adopted. The findings of the study revealed that most of the respondents (65.6%) had not adopted social media while about 34.4% had adopted.

The findings of the study revealed that most health workers (61.8%) had not adopted electronic media while only 38.2% had adopted. In regard to print media, most (67.7%) had actually adopted while only 32.3 % of the respondents had not adopted. When probed about the adoption of satellite systems, a huge majority of respondents (88.6%) had not adopted while a partly 11.4% had adopted disagreed. The analysis of results also indicates that most respondents (92.8%) had not adopted websites as an ICT facility while only 7.2% had adopted in CCCs services.

Table 4.3: Responses in respect of ICT items measuring adoption (n=183)

ICT Item	Response	
	YES	NO
Electronic records	120(65.6%)	63(34.4%)
Fixed and mobile	104(56.8%)	79(43.2%)
Computers	89(48.6%)	94(51.4%)
E-mail	29(15.8%)	154(84.2%)
Internet	64(34.9%)	119(65.1%)
Social Media	63(34.4%)	120(65.6%)
Electronic media	70(38.2%)	113(61.8%)
Print Media	124(67.7%)	59(32.3%)
Satellite systems	21(11.4%)	162(88.6%)
Websites	13 (7.2%)	170(92.8%)

After the individual analysis of the ICT items, the overall level of adoption was computed for each item. This was done by computing an overall score for the weighted responses. Consequently the minimum and maximum each respondent could score for each item was 10 and 20 respectively. These overall scores were then used to categories the respondents as having Mal -adopted (score of 10 - 15) or adopted (score of 16 - 20).

Results of the study indicate that a majority (65.6%) of the health workers had actually adopted electronic patients records with while those who had mal adopted being 34.4%. In regard to mobile and fixed phones most (63.4%) of the respondents had adopted with about 36.6% having mal adopted. Majority (56.8%) of the respondents had adopted use of computers while (43.2%) had not. In reference to use of e-mail services, a huge majority (71%) had mal adopted while only (21%) had adopted. Most (51.4%) of the respondents had not adopted use of internet services while those who had adopted were least (48.6%).

The findings revealed that a majority (59%) of those who were interviewed had mal adopted in the use of social media while about 41% had adopted. Most (53%) of the health workers had actually adopted use of electronic media while those who had mal adopted were 47%. In regard to print media a large majority (72.1%) of the respondents had adopted with a minority (27.9%) having mal adopted. The results showed that a majority of the respondents (65%) had mal adopted in the use of satellite systems while only 35% had adopted. Similarly, a huge majority (82.3%) of the participants had actually mal adopted in the use of websites while only 17.7% had adopted. The analysis of these results is as shown in Table 4.4.

Table 4.4: Health workers ICT adoption by selected ICT items (n=183)

Adoption aspects	Adoption level	
	Adoption	Mal-Adoption
Electronic Patients records	120(65.6%)	63(34.4%)
Fixed and mobile phones	116(63.4%)	67(36.6%)
Computer hardware and software	104(56.8%)	79(43.2%)
Email	53(29%)	130(71%)
Internet	89(48.6%)	94(51.4%)
Social media	75(41%)	100(59%)
Electronic media	97(53%)	86(47%)
Print media	132(72.1%)	51(27.9%)
Satellite systems	64(35%)	119(65%)
Websites	32(17.7%)	151(82.3%)

On the basis of their weights the responses were then scored with the minimum and maximum scores being 10 and 20 respectively for each respondent. These scores were further categorized into two adoption levels. Mal adoption (scores of 10 - 14) and adoption (scores of 16 - 20). The study thus adopted the two levels which formed the basis on which the predictors were determined in the study. Results in

Fig. 4.4 revealed that overall, majority (57%) of sampled health workers had mal-adopted while about 43% had adopted ICT. The largest proportion (53%) of those who had adopted was observed in private CCCs. When public and private CCCs were compared, results of Chi-square test ($\chi^2 = 0.117$; $df = 1$; $p = 0.032$) indicated that there is significant relationship between respondents levels ICT adoption and type of CCC.

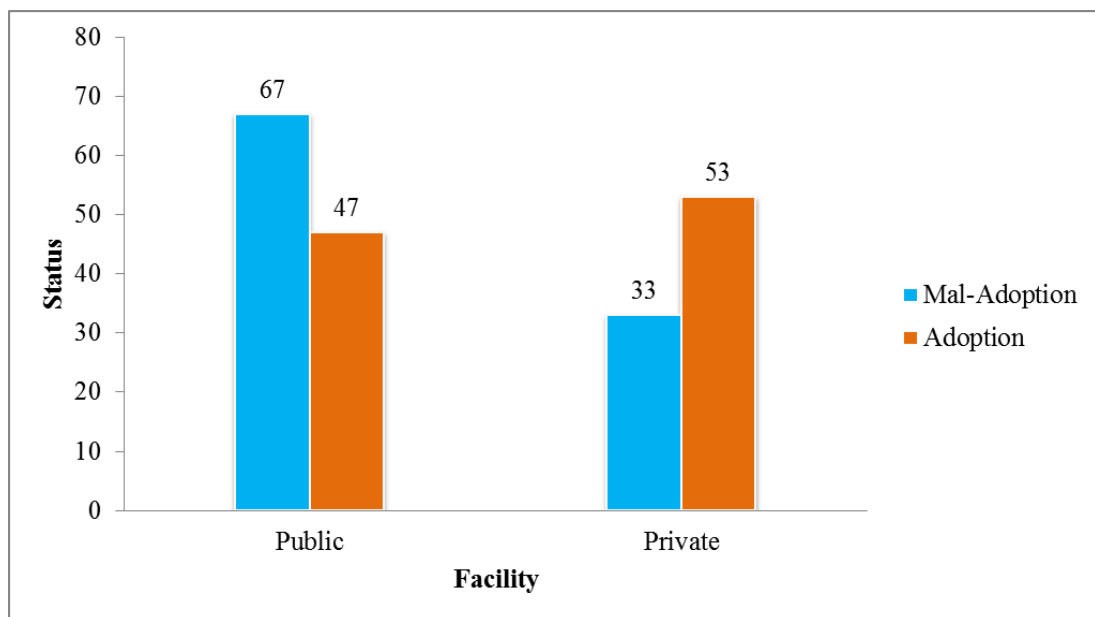


Fig 4.4: Overall ICT adoption Status of Health Workers

4.4 Health workers perceptions on ICT drivers and contributors of ICT adoption

An individual's perception of ICT drivers, inhibitors and contributors is critical and plays an important role on whether one adopts or refuses to accept new technologies. In order to establish the health workers perceptions of ICT drivers and contributors, fourteen items were purposively selected and a five level Likert scale was used to measure individual's perception per item. The responses were assigned weights or

scores according to whether the item was positively or negatively stated. For positively stated items the strongly agree response was assigned the highest weight of 5 while for the strongly disagree items the same response got the lowest weight of 1. To begin with, the items were analyzed to cater for the various components individually. That is those specially encompassing perception towards the ICT drivers and ICT contributors were analyzed separately.

4.4.1 Health workers perceptions on ICT drivers

A summary of the specific items used to compute this perception is analyzed in table 4.5. As is shown, a majority (49.7%) of the respondents strongly agreed that access as an ICT driver helped them adopt ICT, 19.1% agreed, 13.7% disagreed, 9.3% strongly disagreed, while 8.2% were neutral. In relation to efficiency, a majority (61.7%) strongly agreed, 12.6% were in agreement, about 10.9% strongly disagreed, 8.7% disagreed while a partly (6.0%) were neutral.

A majority (49.7%) of the respondents strongly agreed that ease of navigation as ICT driver helped them adopt, about 19.1% agreed, 32.8% were neutral, 15.3% disagreed, while only 6.0% disagreed. In regard to personalization of ICT, most (33.5%) of respondents were neutral, 23.5% strongly agreed, 19.7% merely disagreed, 15.3% agreed with only 8.2% strongly disagreeing.

The study findings indicate that most (33.3%) of all respondents strongly agreed that security or privacy of ICT helped them adopt ICT, 20.8% were neutral, 18. % disagreed, 16.9% agreed while only 10.9% strongly disagreed. The results indicate

that 25.7% of the respondents strongly agreed that responsiveness of ICT helped them adopt ICT, 25.1% disagreed, and 19.1% agreed 18.6% strongly disagreed with 11.5% being neutral.

In regard to Assurance or trust as an ICT driver, a majority (32.8%) of respondents indicated that they merely agreed that it helped them adopt ICT, 24% strongly agreed, 16.9% disagreed, 13.1% were neutral with a similar proportion of 13.1% strongly disagreeing. In relationship to site aesthetics as an ICT driver, the study reveals that most (35.5%) respondents strongly agreed that it helped them adopt ICT, 24.4% were neutral, 17.5% disagreed, and 12.6% strongly disagreed while the least (10%) agreed.

When asked about reliability as a driver of ICT, most respondents (33.3%) strongly agreed that it helped them adopt ICT, 26.8% were neutral, 15.3% disagreed, 14.2% strongly disagreed and only 10.4% merely agreed. The study results indicates that a majority (29.5%) merely agreed that flexibility as an ICT driver helped them adopt the same, about 27.3% strongly agreed, 26.8% disagreed, 8.7% strongly disagreed while a mere 7.7 % were neutral.

Table 4.5: Responses on perceptions on the ten drivers of ICT Adoption (n=183)

ICT Driver	Response				
	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Access	91(49.7%)	35(19.1%)	15(8.2%)	25(13.7%)	17(9.3%)
Efficiency	113(61.7%)	23(12.6%)	11(6.0%)	16 (8.7%)	20(10.9%)
Ease of Navigation	91(49.7%)	35(19.1%)	60(32.8%)	8(15.3%)	11(6.0%)
Personalization	43(23.5%)	28(15.3%)	61(33.3%)	36(19.7%)	15 (8.2%)
Security/Privacy	31(33.3%)	38(16.9%)	33(20.8%)	20(18.0%)	63(10.9%)
Responsiveness	47(25.7%)	35(19.1%)	21(11.5%)	6(25.1%)	34(18.6%)
Assurance/Trust	44(24.0%)	60(32.8%)	24(13.1%)	1(16.9%)	24(13.1%)
Site aesthetics	65(35.5%)	11(6.0%)	52(28.4%)	2(17.5%)	23(12.6%)
Reliability	61(33.3%)	19(10.4%)	49(26.9%)	8(15.3%)	26(14.2%)
Flexibility	50(27.3%)	54(29.5%)	14(7.7%)	49(26.8%)	6(8.7%)

After the individual analysis of the components of perception the overall perception was computed for each item. This was done by computing an overall score for the weighted responses consequently the minimum and maximum each respondent could score for each item were 1 and 5 respectively. These overall scores were then used to categorize the respondents as having a negative (score of 1-2.5) or positive (score of 2.6-5).

Results in Table 4.6 show that majority (62.8%) had a positive perception in regard to access as a driver of ICT adoption compared to 37.2% who had a negative perception. Most (57.9%) of respondents had a positive perception of ease of navigation while only 42.1% had a negative perception. Efficiency of ICT was perceived positively by majority (69.9%) of health workers with only 30.1% perceiving it negatively. The findings of the study show that security and privacy of ICT as a driver was perceived positively by most (70.5%) health workers in CCCs with a partly 29.5% having a negative perception.

In regard to responsiveness, most respondents (69.4%) had positive perception with only 30.6% perceiving it negatively. Assurance or trust of ICT was perceived positively by about 50.8% of the respondents with almost an equal proportion (49.2%) having a negative proportion. The findings revealed that most respondents (68.3%) had a positive perception in regard to site aesthetics while 31.7% had a negative perception. A majority of the respondents (54.6%) had a positive perception about reliability of ICT while only 45.4% had a negative perception. When probed about ICT flexibility, a majority of respondents (56.8%) had a positive perception while 43.2% had a negative perception. In relation to personalization of ICT most (77%) of health workers had a positive perception while only 23% had a negative perception

Table 4.6: Overall perception on each of the ten drivers of ICT adoption (n=183)

Aspect	Response	
	Positive	Negative
Access	115(62.8%)	68(37.2%)
Ease of navigation	106(57.9%)	77(42.1%)
Efficiency	128(69.9%)	55(30.1%)
Security/Privacy	129(70.5%)	54(29.5%)
Responsiveness	127(69.4%)	56(30.6%)
Assurance	93(50.8%)	90(49.2%)
Site aesthetics	125(68.3%)	58(31.7%)
Reliability	100(54.6%)	83(45.4%)
Flexibility	104(56.8%)	79(43.2%)
Personalization	141(77%)	42(23%)

After the individual analysis of the components of perception the overall perception was computed. This was done by computing an overall score for the weighted responses consequently the minimum and maximum each respondent could score from the ten items were 10 and 50 respectively. These overall scores were then used

to categorize the respondents as having a negative (score of 10 -30) or positive (score of 31-50). As shown in Fig. 4.5, over three quarters of health workers in CCCs (77%) exhibited a positive perception of ICT drivers as opposed to 23% who had a negative perception. A huge majority (81%) of those who had a positive perception was observed among health workers in Private CCCs. In regard to public and private CCCs, results of Chi-square test ($\chi^2 = 2.889$; $df = 1$; $p = 0.089$) showed that there is no significant relationship between respondents perceptions and type of CCC.

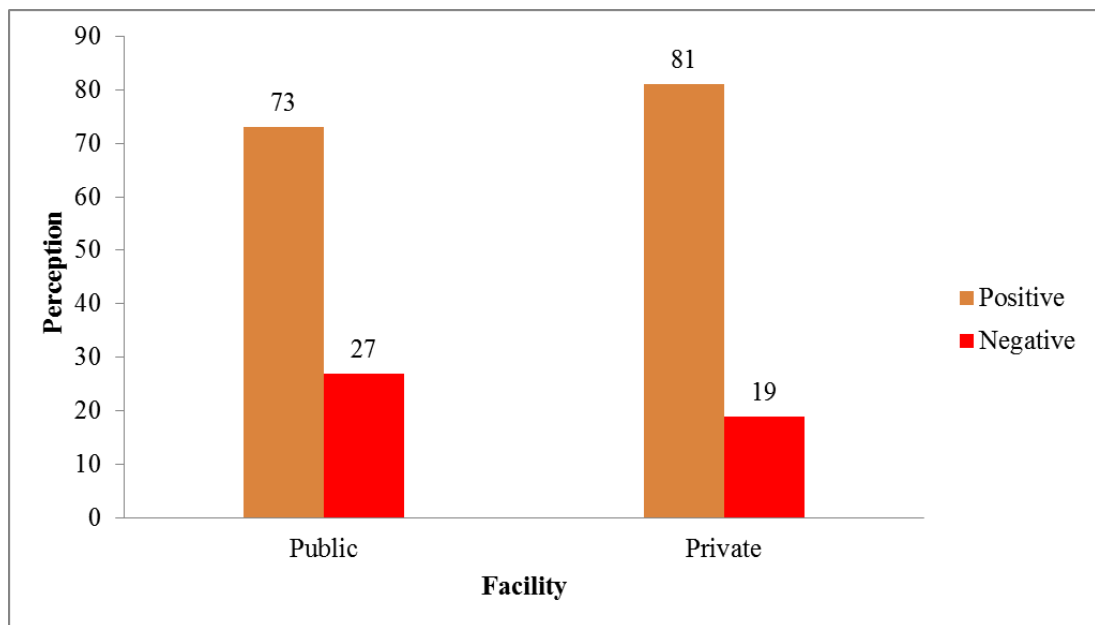


Fig 4.5: Overall Perceptions for ICT drivers

4.4.2 Health workers perceptions of ICT contributors

Table 4.7 shows a summary of individual items used to compute this aspect. Results of the study indicate that most (36.1%) health workers in CCCs strongly agreed that optimism was an important contributor in their ICT adoption, 26% merely agreed, 14.8% disagreed, 12.6% strongly disagreed and only 9.8% were neutral .When asked about innovation as a contributor to ICT adoption, a majority (32.8%) strongly disagreed, 29% agreed, 16.9% strongly disagreed, 15.8% disagreed while only 5.5% were neutral.

When the health workers in CCCs were probed about insecurity of ICT as an inhibitor of ICT adoption, majority (45.4%) disagreed, 25.1% strongly agreed, 14.2% strongly disagreed, 8.2% merely agreed while only 7.1% were neutral .When asked about discomfort as an inhibitor to ICT adoption, most (38.8%) respondents strongly disagreed, 21.9% strongly agreed, a similar proportion of 21.9% disagreed, 9.8% merely agreed while a minority (7.7%) remained neutral

Table 4.7: Responses in respect of perceptions to ICT contributors (n=183)

Perception aspect	Response				
	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Optimism	66(36.1%)	49(26.8%)	18(9.8%)	27(14.8%)	23(12.6%)
Innovation	60(32.8%)	53(29.0%)	10(5.5%)	29(15.8%)	31(16.9%)
Insecurity	46(25.1%)	15(8.2%)	13(7.1%)	83(45.4%)	26(14.2%)
Discomfort	40(21.9%)	18(9.8%)	14(7.7%)	40(21.9%)	71(38.8%)

After the individual analysis of the components of perception the overall perception was computed. This was done by computing an overall score for the weighted

responses consequently the minimum and maximum each respondent could score for each item were 1 and 5 respectively. These overall scores were then used to categorize the respondents as having a negative (score of 1-2.5) or positive (score of 2.6-5).

As indicated in table 4.8, the results of the study reveal that most (71.6%) health workers perceived optimism positively as a contributor to ICT adoption while only 28.4% perceived it negatively. The findings of the study showed that most (62.3%) perceived innovation positively as a contributor to ICT adoption while 37.7% perceived it negatively. The results also indicate that majority (61.7%) had a positive perception in regard to insecurity of ICT as an inhibitor of adoption while 38.3% perceived it negatively. However a majority (57.9%) of the health workers interviewed had a negative perception about discomfort as an inhibitor of ICT adoption while 42.1% had a positive perception.

Table 4.8: Overall perceptions on each ICT contributors (n=183)

Perceptions aspects	Response	
	Positive	Negative
Optimism	131 (71.6%)	52 (28.4%)
Innovation	114 (62.3%)	69 (37.7%)
Insecurity	113 (61.7%)	70 (38.3%)
Discomfort	77 (42.1%)	106 (57.9%)

After the individual analysis of the components of perception the overall perception was computed for each of the four items. This was done by computing an overall score for the weighted responses. Consequently, the minimum and maximum each respondent could score from the four items were 4 and 20 respectively. These overall

scores were then used to categorize the respondents as having a negative (score of 4-11.5) or positive (score of 11.6-20).

As shown in Fig. 4.6, a huge majority (68%) exhibited a positive perception of ICT contributors while only about 32% had a negative perception. The largest proportion (81%) of those who had a positive perception was also recorded among health workers in private facilities. When public and private CCCs were compared, results of Chi-square test ($\chi^2 = 0.040$; $df = 1$; $p = 0.219$) revealed that there was no significant relationship between respondents' perceptions of ICT contributors and type of CCC.

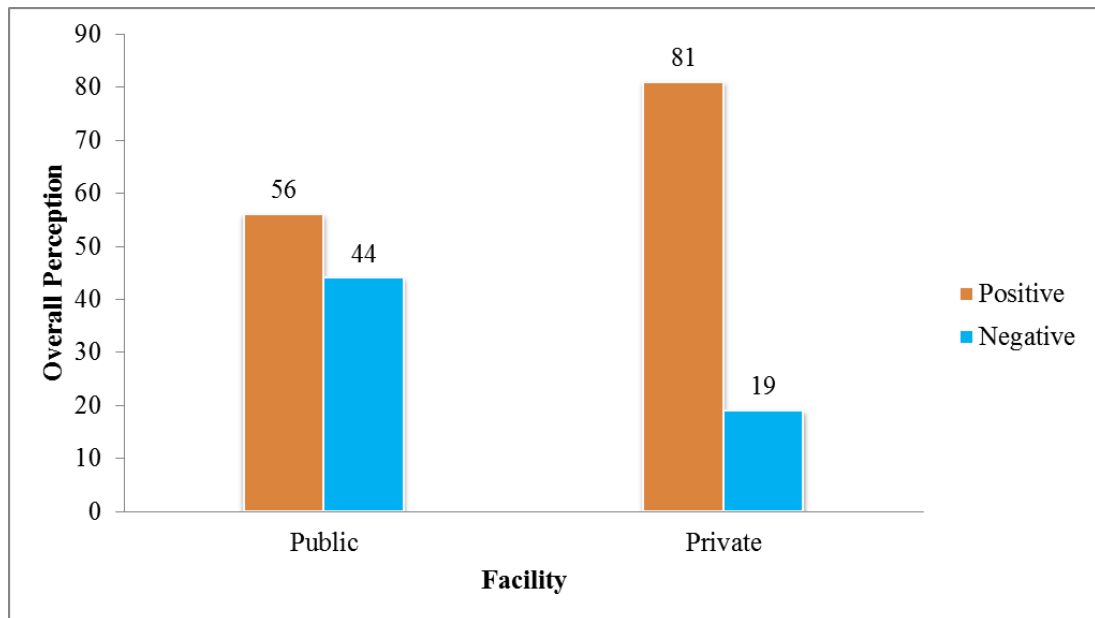


Fig 4.6: Overall Perceptions for ICT contributors

4.5 Relationship between adoption levels and health workers Perceptions of ICT drivers and ICT contributors

In the study it was hypothesized that ‘health workers perceptions of ICT drivers and contributors do not determine ICT adoption.’ The following section presents the results of the relationship between health workers adoption levels and their perception of ICT drivers and contributors.

4.5.1 Perceptions on ICT drivers

ICT acceptance and subsequent adoption requires that individuals have a positive attitude towards it. For the purposes of this study, ten ICT dimensions were purposively selected. Over all, over two thirds (77%) of health workers in CCCs were found to have a positive perception of ICT drivers. Findings illustrated in Table 4.9 indicate the relationship between adoption levels and each of the ICT drivers.

4.5.1.1 ICT access

As shown, the results indicate that the largest proportion (47%) of those who had adopted ICT was recorded among the health workers who had a positive perception of access as a driver of ICT. Results of Chi- square test ($\chi^2 = 7.128$; $df=1$; $p = 0.008$) showed that there is significant relationship between health workers perceptions of Access as an ICT driver and ICT adoption. When public and private CCCs were compared, results of Chi-square test ($\chi^2 = 13.269$; $df = 4$; $p = 0.010$) showed that there was significant relationship between respondents perception of ICT access and type of facility.

During FGDs with HIV and AIDS patients, convenient access to ICT was cited as a relevant prerequisite to ICT adoption. Most respondents in the discussion had a positive perception of ICT accessibility as a driver of ICT adoption and subsequent utilization. One of the patients reported:

“Availability and easy access of technology like computers makes it easier for ICT adoption, for example, if there is network connectivity you can use internet and make use of e-mails to communicate with your doctors.”

4.5.1.2 ICT ease of navigation

Results indicate that majority (62.9%) of those who had adopted ICT was recorded among health workers who had a positive perception of ease of navigation as an ICT driver. Results of Chi-square test ($\chi^2=0.141$; $df = 1$; $p=0.708$) showed that there is no significant relationship between adoption and health workers perceptions of ease of navigations and ICT adoption. In relation to public and private CCCs, results of Chi-square test ($\chi^2= 46.889$; $df = 4$; $p = 0.000$) indicated that there is significant relationship between respondents perception of ICT ease of navigation and type of CCC with more respondents from public CCCs having positive perception.

In the FGDs, the perceived ease of use emerged as one of the most significant aspects on ICT control and adoption. Most respondents were of the perception that the technology control and use may improve when the technology is considered easy to use. Understandably, the perceived level of ICT control and usage decrease when technology is considered complicated to use. One male HIV and AIDS patient said:

“I don’t require sophisticated telephone. I require a simple telephone with basic applications to enable me just communicate by way of short text messages and calls with my doctors.”

4.5.1.3 ICT efficiency

As the results bring out, the largest proportion recorded (53.3%) of those who had adopted ICT was among health workers who had a positive perception of efficiency as an ICT driver. The Chi-square test ($\chi^2= 0.540$; $df =1$; $p=0.463$) showed that there is no significant relationship between adoption and health workers perceptions of efficiency as an ICT driver. However, when public and private CCCs were compared, result of Chi-square test ($\chi^2=20.492$; $df = 4$; $p =0.000$) showed that there is significant relationship between respondents perception of ICT efficiency and type of CCC with more respondents from private facilities having positive perception.

During the FGDs with HIV and AIDS patients, ICT efficiency was viewed one of the most important dimensions of ICT adoption and utilization. Majority of the respondents were of the view that positive perception that ICT would improve CCC services and make them more efficient. One of the participants who had experienced the benefit of ICT efficiency observed:

“Since my CCC computerized my records, I spend little time at waiting bay even in pharmacy since all the details are available on the touch of computer button. It is wonderful.”

4.5.1.4 ICT personalization

Results indicate that the largest proportion (47.5%) of those who had adopted ICT was observed among health workers who had a positive perception of personalization as a key ICT driver. The results of Chi-square test ($\chi^2= 4.737$; $df=1$; $p=0.030$) indicated that there is significant relationship between health workers perceptions of personalization and adoption. In regard to public and private CCCs, results of Chi-square test ($\chi^2= 48.615$; $df = 4$; $p = 0.000$) indicated that there is significant relationship between respondents perception of ICT personalization and type of CCC with more respondents from public CCCs having positive perception

Customization of ICT emerged as a central focus area. Many respondents observed that each patient had different needs and therefore would require ICT that is specific to his needs. For example a patient who needs services may require a mobile telephone to enquire if drugs are available in the pharmacy while one who needs guidance and counseling may require using e-mail services. Generally, it was found that most participants had a positive perception of personalization of ICT as a major driver of ICT adoption. One of the HIV and AIDS patients on ARV observed:

“I personally require only a mobile telephone to enquire from the doctor if ARV drugs are in stock. I really do not need a computer to do that.”

4.5.1.5 ICT security

Results indicate that the largest proportion (53.5%) of those who had adopted ICT was observed among health workers who had a positive perception of security or

privacy as a driver of ICT. Results of Chi-square test ($\chi^2= 12.233$; $df = 1$; $p=0.000$) showed that there is significant relationship between health workers perception of security privacy and adoption. In regard to public and private CCCs, results of Chi-square test ($\chi^2= 22.717$; $df = 4$; $p = 0.000$) indicated that there is significant relationship between respondents perception of ICT security and type of ICT with more respondents from private CCCs having positive perception.

During FGDs, most of the participants had a negative perception on security of ICT. They had the view that unauthorized persons could easily access their information through computers and listening to conversations on telephone. One PMCT patient said:

“I really like using my telephone to talk to my nurses but sometimes I fear people near him/her may listen to our conversation.”

4.5.1.6 ICT responsiveness

Results in point out that majority (56.7%) of those who had adopted ICT was observed among health workers who had a positive perception of responsiveness. The results of Chi-square test ($\chi^2= 0.837$; $df = 1$; $p= 0.360$) showed that there is no significant relationship between health workers perceptions of responsiveness and ICT adoption. When public and private CCCs were compared, results of Chi-square test ($\chi^2= 12.215$; $df = 4$; $p = 0.016$) revealed that there is significant relationship between respondents perception of ICT responsiveness and type of CCC.

In the discussions held with HIV and AIDS patients, it emerged that most participants had a positive perception and belief that ICT is sensitive to their prevailing needs and actually offers a continuous search for useful needs that can cure those needs. Most of them agreed that use of ICT has really saved them time and cost of travelling to CCCs. One patient who was on guidance and counseling said:

“The use of telephone has saved me time and money. I don’t travel to my CCC whenever I need advice. I also use e-mail in case of any needed information.”

4.5.1.7 ICT assurance

The findings of the study point out that the largest proportion (48.4%) of those who had adopted ICT had a positive perception of assurance /trust. Results of Chi-square test ($\chi^2= 2.098$; $df = 1$; $p = 0.147$) showed that there is no significant relationship between health workers perception of assurance or trust of technology and ICT adoption. When public and private CCCs were compared, results of Chi-square test ($\chi^2= 14.637$; $df = 4$; $p = 0.006$) showed that there is significant relationship between respondents perception of ICT assurance and type of CCC with more respondents from private CCCs having positive perception. Attitude and perceived assurance to clients and facility managers is critical if they have to adopt any kind of technology. It emerged during FGDs that most HIV and AIDS patients had a positive perception of ICT assurance or trust. One of them said:

“I trust and always have confidence with the ICT systems in place. It has made it very easy to communicate with the service providers.”

4.5.1.8 Site Aesthetics

Results in point out that majority (50.4%) of those who had adopted ICT were recorded among health workers who had a positive perception of site aesthetics. Results of Chi-square test ($\chi^2=8.405$; $df=1$; $p=0.004$) indicated that there is significant relationship between health workers perceptions of site aesthetics as an ICT driver and adoption. When public and private CCCs were compared, result of Chi-square test ($\chi^2 = 22.284$; $df = 4$; $p = 0.000$) indicated that there is significant relationship between respondents perception of site aesthetics and type of CCC with more participants from public CCCs having positive perceptions.

In the FGDs held with the HIV and AIDS patients, it emerged that Site aesthetics or physical appearance of technology equipment may easily influence the attitude and perceptions of end-users. Most participants observed that they prefer ICT equipment that has simple features and placed conveniently for ease of use. One patient who frequently uses e-mails and internet in a cyber café explained:

“I normally visit the cyber-café and use the computer which offers privacy and that has simple applications. I specifically use yahoo mail because it is easy.”

4.5.1.9 ICT reliability

The results presented show that majority (57%) of health workers who had adopted ICT was observed among those who had a negative perception of reliability as an ICT driver. Results of Chi-square test ($\chi^2 = 0.003$; $df = 1$; $p = 0.959$) showed there is no significant relationship between health workers perception of reliability and ICT

adoption. In regard to public and private CCCs, results of Chi-square test ($\chi^2=14.441$; $df = 4$; $p = 0.006$) showed that there is significant relationship between respondents perception of ICT reliability and type of CCC with more respondents from private CCCs having positive perception.

Most HIV and AIDS patients had a positive perception of ICT reliability as an ICT driver. During FGDs they observed that correct technical functioning, accuracy of service delivery and service information is critical in ICT adoption. This is explained by one participant:

“For us as patients we expect the ICT to always function so that we can get required information on time and not spend whole day in CCC simply because of computer breakdown.”

4.5.1.10 ICT flexibility

From the results, a larger proportion (63.5%) of those who had adopted ICT was recorded among health workers who had a negative perception of flexibility as a driver of ICT. Chi- square test results ($\chi^2 = 4.318$; $df = 1$; $p = 0.003$) showed that there is significant relationship between health workers perception of flexibility of ICT and adoption. When public and private CCCs were compared, results of Chi-square test ($\chi^2 = 5.925$; $df = 4$; $p = 0.052$) showed that there is no significant relationship between respondents perception of ICT flexibility and type of CCC.

The desire to work and communicate in a friendly environment was echoed by most participants in a FGD session. They perceived flexible use of ICT as a motivating factor to ICT adoption. For example, one patient explained:

“We have discussed with my doctors and agreed that it is not compulsory I use short text messages to communicate, I can also use e-mail, and whichever is convenient to both of us.”

Table 4.9: Relationship between adoption status and health workers perceptions of ICT drivers (N = 183)

ICT Perception variables	Adoption status				Chi-square tests		
	Mal adoption		Adoption		χ^2	df	P
	Frequency	Percentage	Frequency	Percentage			
Access							
Positive	61	53	54	47	7.128	1	0.008
Negative	43	63.2	25	36.8			
Ease of Navigation							
Positive	40	37.7	66	62.3	0.141	1	0.708
Negative	64	83.1	13	16.9			
Efficiency							
Positive	60	46.7	68	53.3	0.540	1	0.463
Negative	44	80	11	20			
Personalization							
Positive	74	52.5	67	47.5	4.737	1	0.030
Negative	30	71.4	12	28.6			
Security							
Positive	60	46.5	69	53.3	12.233	1	0.000
Negative	44	81.5	10	18.5			
Responsiveness							
Positive	55	43.3	72	56.7	0.837	1	0.360
Negative	49	87.5	7	12.5			
Assurance							
Positive	48	51.6	45	48.4	2.098	1	0.147
Negative	56	62.2	34	37.8			
Site Aesthetics							
Positive	62	49.6	63	50.4	8.405	1	0.004
Negative	42	72.4	16	27.6			
Reliability							
Positive	43	43	57	57	0.003	1	0.959
Negative	61	73.5	22	26.5			
Flexibility							
Positive	38	36.5	66	63.5	4.318	1	0.003
Negative	66	48.1	13	51.9			

4.5.1.11 Overall ICT drivers perceptions

Results in Table 4.10 indicate that overall, majority (95%) of respondents who had adopted had positive perception of ICT drivers. Results of Chi-square test ($\chi^2 = 4.201$; $df = 1$; $p = 0.040$) revealed that there is significant relationship between respondents perceptions of ICT drivers and adoption.

Table 4:10: Relationship between overall ICT Drivers perception and adoption status (N = 183)

Adoption status	Perception		
	Positive	Negative	Total
Adoption	75 (95%)	4 (5%)	79 (100%)
Mal adoption	66 (64%)	38 (20%)	104(100%)
Total	141(77%)	42 (23%)	183 (100%)

4.5.2 Relationship between perception of contributors of ICT and adoption levels

An individual perception of contributors and inhibitors of ICT is crucial and an important aspect of acceptance and subsequent adoption of new technologies. Selected aspects of ICT contributors which were studied included ICT optimism, ICT innovation, ICT insecurity and ICT discomfort. Overall, over two thirds (69.40%) of all health workers exhibited a positive perception of the contributors of ICT. Analyses of each item results are contained in Table 4.11.

4.5.2.1 ICT Optimism.

Results indicate that the highest proportion (54.1%) of those who adopted ICT was recorded among health workers who had a positive perception of optimism as a contributor to ICT adoption. A test of significance using Chi-square yielded results ($\chi^2 = 7.943$; $df = 1$; $p = 0.005$) indicating there is significant relationship between health workers perception of optimism and ICT adoption. In regard to public and private CCCs, results of Chi-square test ($\chi^2 = 7.243$; $df = 4$; $p = 0.124$) showed that there is no significant relationship between respondents perception of ICT optimism and type of CCC.

In the Focus group discussions, it was found that most of the respondents felt that positive view of ICT, belief that it offers more control, is flexible and efficient promotes ICT adoption and usage. It was generally perceived positively that optimism was an important ICT driver. One patient said:

“We will use the computers and even telephone if they will assist us gets better services. We believe they will.”

4.5.2.2 Innovation

Results point out that the highest proportion (56.1%) of those who had adopted ICT was observed among health workers who had a positive perception of innovation as a contributor to ICT adoption. Results of Chi-square test ($\chi^2 = 0.161$; $df = 1$; $p = 0.688$) showed that there is no significant relationship between health workers perceptions of innovation and ICT adoption. However, when public and private

CCCs were compared, results of Chi-square test ($\chi^2 = 21.960$; $df = 4$; $p = 0.000$) revealed that there is significant relationship between respondents perception of ICT innovation and type of CCC with more participants from public CCCs having positive perception.

In the discussions held, it was generally agreed that the health providers and patients who tend to be technology pioneers and thought leaders will embrace and adopt ICT as opposed to those who are not innovative. One female patient observed:

“If you want to benefit from ICT you must be eager to learn how it works however difficult it is. Our doctors must lead from front and show us the way.”

4.5.2.3 ICT Insecurity

The results presented illustrate that a larger proportion (62.8%) of those who had adopted ICT was recorded among health workers who had a positive perception of insecurity as a contributor. The results of Chi-square test ($\chi^2=0.004$; $df=1$; $p=0.952$) showed that there is no significant relationship between health workers perception of insecurity as an inhibitor to ICT and adoption. When public and private CCCs were compared, results of Chi-square test ($\chi^2= 45.664$; $df = 4$; $p = 0.000$) revealed that there is significant relationship between respondents perception of ICT insecurity as an inhibitor of adoption and type of CCC with more participants from private CCCs having positive perception. The perceived lack of control over technology and a feeling of being overwhelmed by it emerged as an issue of concern. During FGDs most respondents agreed that if you hold this view on ICT then you are most likely

not to adopt and use ICT. This would apply to both the patients and health workers.

One of the participants observed:

“If we and our doctors think these equipment is complicated and we cannot learn how to use them then we are going nowhere. This is a major inhibitory ICT adoption.”

4.5.2.4 ICT Discomfort

As the results show that the largest proportion (63.6%) recorded of those who had adopted ICT was among health workers who had a positive perception of discomfort as an ICT inhibitor (63.6%). The Chi-square test ($\chi^2 = 0.003$; $df = 1$; $p = 0.959$) yielded results which showed that there is no significant relationship between health workers perception of discomfort as an inhibitor of ICT adoption and ICT adoption. When public and private CCCs were compared, results of Chi-square test ($\chi^2 = 3.010$; $df = 4$; $p = 0.556$) indicated that there is no significant relationship between respondents perception of ICT discomfort as an inhibitor of adoption and type of CCC.

Distrust of technology and skepticism about its working properly is a major inhibitor to ICT adoption and utilization. It was generally agreed during FGDs by most participants that insecurity would lead to its rejection. One patient observed:

“We must learn to trust our systems. If we feel that they won’t work or fear that systems will go down, then we won’t succeed.”

Table 4.11: Relationship between adoption status and health workers perception of ICT Contributors (N = 183)

ICT Perception variables	Adoption status				Chi-square tests		
	Mal Adoption		Adoption		χ^2	Df	P
	Frequency	Percent	Frequency	Percent			
Optimism							
Positive	60	45.9	71	54.1	7.943	1	0.005
Negative	44	84.6	8	15.4			
Innovation							
Positive	50	64	64	56.1	21.960	4	0.000
Negative	54	78.3	15	21.7			
Insecurity							
Positive	42	37.2	71	62.8	0.004	1	0.952
Negative	62	88.6	8	11.4			
Discomfort							
Positive	28	36.4	49	63.6	0.003	1	0.959
Negative	76	71.7	30	28.3			

4.5.2.5 Overall ICT contributors perceptions

Findings in Table 4.12 revealed that most (76%) of respondents who had adopted ICT had positive perception of ICT contributors. Results of Chi-square test ($\chi^2 = 2.752$; $df = 1$; $p = 0.027$) indicated that there is significant relationship between respondents perception of ICT contributors and adoption status.

Table 4: 12 Relationship between overall ICT contributors perceptions and adoption (N =183)

Adoption status	Perceptions		
	Positive	Negative	Total
Adoption	60 (76%)	19 (24%)	79 (100%)
Mal adoption	65 (63%)	39 (37%)	104 (100%)
Total	125 (71%)	58(71%)	183 (100%)

4.6 Relationship between factors influencing health workers adoption of ICT and adoption status

In the study it was hypothesized that ‘factors influencing adoption of ICT do not significantly determine health workers ICT adoption in HIV/AIDS Comprehensive Care Centers.’ The following section presents the results of the relationship between adoption levels and factors influencing ICT adoption. For the purpose of this research four categories of these factors were purposively selected. They included individual, organizational, Technological and external environmental factors.

4.6.1 Individual factors

The study sought to establish individual factors that determine health workers ICT adoption in CCCs. Responses in respect of each variable are contained in Table 4.13. The detailed analysis of the study findings are illustrated in table 4.14. When asked whether the gender of a health worker determined ICT adoption or not, a majority (83.1%) of respondents disagreed while only 16.9% concurred. The results indicate that most respondents (56.3%) also disagreed that age of the health workers determined whether they would adopt ICT while 43.7% agreed.

It was also established that most respondents (68.3%) felt that innovation was a determining factor in ICT adoption while 31.7% didn't concur. The results also indicate that majority of respondents (65.6%) felt that training was an important determining factor of an individual ability to adopt ICT with only about 34.4% dissenting.

Table 4.13: Individual factors that influence ICT adoption (n=183)

Factor	Response	
	Yes	No
Gender	31 (16.9%)	152 (83.1%)
Age	80 (43.7%)	103 (56.3%)
Innovation	125 (68.3%)	58 (1.7%)
ICT Training	120 (65.6%)	63 (34.4%)

4.6.1.1 Relationship between gender and adoption status

Results in Table 4.14 show that the largest proportion (61.3%) of those who had adopted was observed among health workers who agreed that gender was a factor in adopting ICT. Results of Chi-square test ($\chi^2= 4.995$; $df = 1$; $p=0.454$) indicated that there is no significant relationship between health workers opinion about gender as an influencing factor of ICT adoption and actual adoption. When public and private CCCs were compared, results of Chi-square test ($\chi^2= 29.396$; $df = 1$; $p = 0.000$) revealed that there is significant relationship between respondents opinion on this aspect and type of CCC with more respondents from private CCCs concurring.

Gender was one of the themes that emerged as an individual factor determining ICT adoption in FGD sessions. Respondents stated that gender has direct impact on behavior intention. Most respondents generally agreed that men were more likely to

adopt ICT since they like discovering new ideas. It also emerged that women perceive ICT as hard and masculine, which is associated with men. One female patient explained:

“For us women we don’t have time to go to computers. These are difficult tasks which belong to men.”

4.6.1.2 Age

As the results indicate the highest proportion (46.2%) of health workers who had adopted ICT was observed among health workers who were of the opinion that age is a determining factor of adoption. Chi-square test ($\chi^2=0.550$; $df=1$; $p=0.002$) showed that there is significant relationship between health workers opinion and age as an influencing factor and ICT adoption. In regard to public and private CCCs, results of Chi-square test ($\chi^2= 14.232$; $df = 1$; $p = 0.000$) revealed that there is significant relationship between respondents opinion on this aspect and type of CCC with more respondents from public CCCs concurring.

Age was identified as being strongly associated with ICT adoption. Respondents indicated that age may affect individual characteristics on responses to system acceptance criteria. Most respondents agreed that younger people had curiosity to discover and also had ample time since they did not have other duties as compared to old people. One male patient said:

“The youth have all the time to learn and discover how to use ICT such as computers and phones since they do not have other duties such as feeding the family and paying school fees.”

4.6.1.3 ICT training

The results presented illustrate that the highest proportion (60.8%) of those who adopted ICT was recorded among health workers who had some form of ICT training. Chi-square test ($\chi^2=3.098$; $df=1$; $p=0.038$) showed that there is significant relationship between ICT training and adoption. In regard to public and private CCCs, results of Chi-square test ($\chi^2= 25.174$; $df = 1$; $p = 0.000$) showed that there is significant relationship between respondents view of this aspect and type of CCC with more respondents from private facilities concurring.

Training on ICT was found to be a major contributing factor for ICT adoption by both patients and health workers. They agreed it would go a long way in helping them adopt existing ICT and emerging ones which would eventually lead to better services in CCCs. During one of the FGD session one patient observed:

“We would greatly appreciate using ICT such as phones, computers and emails but we don't know how to use them. If we are trained on how to use these gadgets we will use them. For example, we will write messages to our doctors and nurses whenever we have any problems.”

4.6.1.4 Health workers innovation

Results illustrates that the highest proportion (53.6%) of those who adopted ICT was observed among health workers who were of the opinion that an individual's innovativeness can influence his or her ability to adopt ICT. Chi-square test ($\chi^2=1.456$; $df = 1$; $p = 0.214$) showed there is no significant relationship between health workers opinion on innovations as an influencing factor of ICT adoption and adoption. When public and private CCCs were compared, results of Chi-square test ($\chi^2= 0.074$; $df = 1$; $p = 0.786$) revealed that there is no significant relationship between respondents view of this aspect and type of CCC.

The participants discussed issues relating to personal innovation by both health workers and patients in helping both of them adopt ICT in CCCs. Some respondents identified personality traits such being a technology pioneer and thought leader. Most participants generally agreed that they would readily adopt ICT in CCCs service if the health workers showed them how it works. This was supported by one of the participants who said:

“The health workers should teach us how to use our telephones and computers to access information on CCCs Service. We are ready to learn since it can make our lives better.”

Table 4.14: Relationship between adoption status and individual factors adoption (N = 183)

Factor variable	Adoption status				Chi –square tests		
	Mal adoption		Adoption		χ^2	df	P
	Frequency	Percentage	Frequency	Percentage			
Gender							
Yes	12	38.7	19	61.3	4.995	1	0.454
No	92	60.5	60	39.5			
Age							
Yes	43	53.8	37	46.2	0.550	1	0.002
No	61	59.2	42	40.8			
ICT Training							
Yes	47	39.2	73	60.8	3.098	1	0.038
No	57	90.5	6	9.5			
Innovation							
Yes	58	46.4	67	53.6	1.456	1	0.214
No	46	79.3	12	20.7			

4.6.2 Relationship between health workers ICT adoption status and Organizational factors

The study sought to establish the organizational factors that determined the health workers ability to adopt ICT in delivery of services. The results indicates that majority of the respondents (54.1%) felt that the size of the facility was not a determining factor in ICT adoption while about 45.9% concurred. On the contrary, 76.0% of the health workers concurred that the quality of ICT systems was a determining factor of ICT adoption with only 24% dissenting.

When asked about information intensity, 74.2% of the respondents agreed that it was a determining factor with only 25.8% dissenting. Results showed that ICT

specialization was considered by most respondents (59.6%) as a determine factor of ICT adoption while about 40.4% did not agree. Similarly, a majority (71.6%) of respondents felt that management support was an important organizational factor in determining health workers ICT adoption while only 28.4% were of contrary opinion.

The same trend was observed when respondents were asked about technological resources where most (71.6%) agreed that it is an important determining factor while only 28.4% differed. Financial resource was viewed as a critical determining factor for ICT adoption by most (54.6%) respondents while 45.4% felt otherwise. The responses in respect of each variable are contained in Table 4.15.

Table 4.15: Organizational factors that influence ICT adoption (n=183)

Factor	Response	
	Yes	No
Size of facility	84(45.9%)	99(54.1%)
Quality of ICT systems	139(76.0%)	44(24.0%)
Information intensity	135(74.2%)	48(25.8%)
ICT specialization/alignment	109(59.6%)	74(40.4%)
Management support	131(71.6%)	52(28.4%)
Technological Resources	131(71.6%)	52(28.4%)
Financial resources	100(54.6%)	83(45.4%)

4.6.2 Relationship between health workers ICT adoption status and Organizational factors

For the purpose of this study, seven factors that influence ICT adoption in workplace were purposively selected. They included size of facility, the quality of ICT systems, information intensity, ICT specialization, management support, financial resources,

voluntariness and technology resources. The following section gives details of the relationship between the factors and adoption levels. The analysis of these results is contained in Table 4.16.

4.6.2.1 Size of facility

As illustrated, the results indicated that a larger proportion (56%) of those who had adopted was observed among health workers who were of the opinion that the size of the facility was determining factor of ICT adoption. Chi-square test ($\chi^2 = 2.484$; $df = 1$; $p = 0.015$) indicated that there is significant relationship between health workers opinion of this factor and ICT adoption. When public and private CCCs were compared, results of Chi-square test ($\chi^2 = 3.507$; $df = 1$; $p = 0.061$) indicated that there is no significant relationship between respondents view of this aspect and type of CCC.

In regard to the theme of size of facility and ICT adoption, it was generally agreed during FGDs that regardless of the size of an institution, the critical factor in the adoption decision of ICT is the extent of experience and knowledge of that particular type of technology as perceived by the facility .One of the HIV and AIDS patients explained:

“To me adoption of ICT in CCCs does not depend on whether it is in a health centre or a hospital. What is important is that when I go for services, the doctors have the ICT skills to offer services and also they have the equipment. I also need my telephone to communicate with my doctors.”

4.6.2.2 Quality of ICT systems

Result points out that an equal proportion (43.2%) of those who had adopted ICT was recorded among health workers who had the opinion that quality of ICT systems was an influencing factor in ICT adoption. Chi-square test ($\chi^2 = 0.000$; $df = 1$; $p = 0.018$) showed that there is a significant relationship between the health workers opinion on quality of ICT systems and ICT adoption. In regard to public and private CCCCs, results of Chi-square test ($\chi^2 = 2.276$; $df = 1$; $p = 0.131$) showed that there is no significant relationship between respondents view of the particular aspect and type of CCC.

In the discussions it came out clearly that most respondents agreed that the quality of ICT systems in CCCs was vital in order for both service providers and patients to adopt existing and emerging technology. They observed that ICT systems that were always functional would ensure efficient and effective services. One male participant said:

“We need computers that don’t breakdown always in order to access our records timely, The CCCs should also install backup systems such as generators to ensure continuity in case of power failure.”

4.6.2.3 Information intensity

As illustrated, findings of the study point out that a large proportion (55.5%) of those who had adopted was observed among health workers who were of the view that information intensity is a determining factor. Chi-square test ($\chi^2=10.759$; $df=1$; $p=$

0.001) indicated that there is significant relationship between health workers view of information intensity and ICT adoption with CCCs having higher information intensity more likely to adopt ICT. When public and private CCCs were compared, results of Chi-square test ($\chi^2= 8.802$; $df = 1$; $p = 0.003$) revealed that there is significant relationship between respondents view of this aspect and type of CCC with more respondents from public CCCs concurring.

It was generally agreed by most participants that the capacity to obtain required information, either electronically or by other means is essential. Information, appropriateness and acceptability of the information were all found to be vital for ICT adoption in CCCs. One participant quipped:

“For CCCs to effectively adopt and use ICT, both health providers and patients need adequate information that is appropriate, acceptable, timely, and generally user acceptable.”

4.6.2.4 ICT specialization

As pointed out, findings of the study showed that a larger proportion (60.5%) of those who had adopted ICT was observed among health workers who agreed that ICT specialization was a contributing factor for ICT adoption. Chi-square test ($\chi^2=1.520$; $df=1$; $p = 0.218$) indicated that there is no significant relationship between health workers view on this factor and adoption. When public and private CCCs were compared, results of Chi-square test ($\chi^2= 50.926$; $df = 1$; $p = 0.000$) indicated

that there is significant relationship between respondents view of this aspect and type of CCC with more respondents from public facilities concurring.

Most respondents in the Focus group discussions indicated that neither the health workers nor the patients needed to be ICT specialists in order to adopt ICT in CCCs services .They argued that the health workers were medical specialists and needed basic ICT skills in order to provide the necessary services. They were also of the opinion that the patients were just after seeking services and therefore needed minimum ICT skills in order to adopt ICT such as how to use short text messages to communicate with their health workers. One female patient observed:

“Both the health worker and the patients are not ICT specialists .The health worker is trained on medical issues. And only needs basic ICT skills in order to use the existing technology to offer services. As patients, we need only basic skills such as using short text messages in order to communicate with our doctors.”

4.6.2.5 Management Support

As the results illustrate, a larger proportion (50.4%) of those who had adopted was observed among health workers who agreed that management support is a determining factor of individual’s ability to adopt ICT. Results of Chi-square test ($\chi^2 = 0.713$; $df = 1$; $p = 0.018$) indicated that health workers opinion of management support as a determining factor for ICT adoption had a significant relationship with ICT adoption. When public and private CCCs were compared, results of Chi-square test ($\chi^2=7.632$; $df = 1$; $p = 0.006$) showed that there is significant relationship

between respondents view of this factor and type of CCC with more respondents from private facilities concurring.

There was consensus by majority of HIV and AIDS patients that management support can catalyze and accelerate ICT adoption. This theme focused on the importance of the degree to which top management of CCCs understands the importance of the ICT systems function. It was generally agreed that management support cultivates favorable attitudes and fosters technology acceptance and utilization. In one of the FGDs, one participant observed:

“The management of the CCCs should always support health workers by way of providing equipment and skills for that they can in turn help us adopt and use ICT in our daily services. For example if my records are electronically saved I will always access them even if I lost my clinic card.”

4.6.2.6 Technological resources

Results point out that most of the respondents (44.3%) who had adopted ICT were observed among health workers who were of the opinion that technological resources do determine ICT adoption. Results of Chi square test ($\chi^2= 0.396$; $df= 1$; $p = 0.020$) showed that there is significant relationship between health workers opinion on technological resources and ICT adoption. When public and private CCCs were compared, results of Chi-square test ($\chi^2= 5.644$; $df = 1$; $p = 0.018$) revealed that there is significant relationship between respondents view of this factor and type of CCC with more respondents from private CCCs concurring.

The theme of technological resources and its impact on ICT adoption was exhaustively discussed during the FGDs. It emerged that a majority of respondents agreed that physical, managerial and patients ICT technologies were important for ICT adoption and subsequent adoption and use. It was agreed that equipment such as computers, telephones, tele-videos and projectors were absolutely necessary for health workers and managers in CCCs. The patients also needed basic ICT skills in order to adopt and use ICT. One female patient said:

“If there are no computers we cannot use ICT. If the doctors don't have telephones and the patients lack them too, then how do we communicate? These equipments could be there but if both doctors and patients don't know how to use them, then it is useless.”

4.6.2.7 Financial resources.

The results indicate that a larger proportion (56%) of those who adopted ICT was recorded among health workers who agreed that financial resources were a determining factor for ICT adoption. Chi-square test results ($\chi^2 = 0.062$; $df = 1$; $p = 0.003$) indicated that there is a significant relationship between health workers opinion on this particular factor and ICT adoption. In regard to public and private CCCs, results of Chi-square test ($\chi^2 = 23.095$; $df = 1$; $p = 0.000$) revealed that there is significant relationship between respondents view of this factor and type of CCC with more respondents from private CCCs concurring.

Financial capability of both the CCCs and patients to purchase and consequently adopt and use ICT equipment emerged as central theme. In the discussions it was agreed by most HIV and AIDS patients that an organizations and individual financial resources were crucial for ICT adoption. One participant did remark:

“Computers, telephones and most ICT equipment are expensive gadgets. CCCS need money to purchase these equipments. As patients we need money to purchase telephone, and even if we go to cyber cafes we need money to pay for services.”

Table 4.16: Relationship between adoption status and organizational factors (N = 183)

Factor variable	Adoption Status				Chi – square tests		
	Mal adoption		Adoption		χ^2	Df	P
	Frequency	Percent	Frequency	Percent			
Size of Facility							
Yes	37	44	47	56	2.484	1	0.015
No	67	68.7	32	32.3			
Systems Quality							
Yes	79	56.8	60	43.2	0.000	1	0.018
No	25	56.8	19	43.2			
Information Intensity							
Yes	60	44.5	75	55.5	10.759	1	0.001
No	44	91.6	4	8.4			
ICT Specialization							
Yes	43	39.5	43	60.5	1.520	1	0.218
No	61	82.5	13	17.6			
Management support							
Yes	65	49.6	66	50.4	0.713	1	0.018
No	39	75	13	25			
Technological Resources							
Yes	73	56	58	44	0.396	1	0.020
No	31	60	21	40			
Financial Resources							
Yes	44	44	56	56	0.062	1	0.003
No	60	72.3	23	27.7			

4.6.3 Relationship between health workers ICT adoption status and Technological factors

For the purpose of this study, five aspects of technology were purposively selected to find out if they influence health workers ICT adoption. They included complexities, compatibility, affordability, information security and image of the facility. Table 4.17 shows the analysis of the responses. In relation to complexity of ICT facilitates, 29% of all respondents said that it was a very strong determining factor in enhancing ICT adoption by health workers, 24% said it was a very weak factor, 21.3% were neutral, 15.3% said it was a weak factor while only 10.4% felt it was a strong factor .

When asked about their opinion on the compatibility of ICT facilities as a factor in determining its adoption, 27.3% said it was a very strong factor, 24% felt it was a very weak one, 19.7% were neutral and only 7.7% said it was a strong one. The results indicates that most respondents (29%) felt affordability of ICT facilities was a very strong factor in determining their ICT adoption, 24% said it was a very weak one, 21.3% were neutral, 15.3% said it was a weak factor while only 10.4% were of the opinion that it is a strong determinant.

Regarding the security of information, most respondents (28.4%) were of the view that it is a very strong determinant, 25.1% said it was weak, 21.9 % felt it is a very weak determinant, 14.8% said it was a strong determinant while 9.8% were neutral. The results indicated that most respondents (37.7%) believed that improvement of the image of facility is a very strong determinant of ICT adoption, 25.1% felt it was a weak technological factor, 21.9% said it was a very weak factor, 9.8% felt it was a

strong one while only 5.5% were neutral. Further analysis of each variable is contained in table 4.18.

Table 4.17: Technological Factors influencing ICT adoption by health workers (N = 183)

Factor	Response				
	Very Strong	Strong	Neutral	Weak	Very Weak
Complexities	53(29%)	19(10.4%)	39(21.3%)	28(15.3%)	44(24%)
Compatibility	50(27.3%)	14(7.7%)	36(19.7%)	39(21.3%)	44(24%)
Affordability	53(29%)	19(10.4%)	39(21.3%)	28(15.3%)	44(24%)
Information	52(28.4%)	27(14.8%)	18(9.8%)	46(25.1%)	40(21.9%)
Image of facility	69(37.7%)	18(9.8%)	10(5.5%)	46(25.1%)	40(21.9%)

4.6.3.1 ICT Complexities

Results outlined points out that the largest proportion (62.2%) of those who had adopted was recorded among health workers who were of the view that ICT Complexities was a very strong influencing factor for ICT adoption. Chi-square test results ($\chi^2 = 13.870$; $df = 4$; $P = 0.008$) indicates that there is a significant relationship between health workers opinion of complexities as an influencing factor and adoption levels. When public and private CCCs were compared, results of Chi-square test ($\chi^2 = 46.637$; $df = 4$; $p = 0.000$) indicated that there was significant relationship between respondents view of this aspect and type of CCC with more respondents from private CCCs concurring.

During the discussions on this theme, most respondents actually agreed that ease of use and user friendliness of the ICT was an important factor in ICT adoption in

CCCs. Sophisticated technology and in-house technological support were not required. One HIV and AIDS patients explained:

“We need simple machines, simple telephones and only basic software to enables use ICT in order to access services from our CCCs.”

4.6.3.2 ICT Compatibility

The results presented point out that the highest proportion (60%) of those who had adopted was observed among health workers who said that compatibility of ICT was a very strong influencing factor of ICT adoption. Chi-square test results ($\chi^2=10.248$; $df = 4$; $P = 0.036$) indicated that there is a significant relationship between health workers opinion on this particular aspect and ICT adoption. In regard to public and private CCCs, results of Chi-square test ($\chi^2= 48.713$; $df = 4$; $p = 0.000$) revealed that there is significant relationship between respondents view of this factor and type of CCC with more respondents from public facilities concurring.

This theme focused on whether the existing ICT technology in CCCs and the one owned by the patients was aligned to the needs of both parties which was basically to offer HIV and AIDS services sought by patients in CCCs. Most respondents were of the view that while a wide range of facilities was needed, compatibility with the existing ICT systems was necessary for utilization of the communication systems. One participant vividly explained:

“Whether it is the computer or the telephone that I am using to communicate with my service providers in the CCCs, they must serve the purpose intended. If I want to

ask the doctor through a telephone call whether drugs are available, then they should be able to deliver that message.”

4.6.3.3 ICT Affordability

The results indicate that the largest proportion (62.2%) of those who adopted was observed among health workers who had agreed that affordability of ICT was a very strong factor in influencing ICT adoption. Results of Chi-square test ($\chi^2 = 19.997$; $df = 4$; $p=0.001$) indicated that there is significant relationship between health workers opinion on this aspect and ICT adoption. When public and private CCCs were compared, results of Chi-square test ($\chi^2 = 51.150$; $df = 4$; $p = 0.000$) showed that there is significant relationship between respondents view of this factor and type of CCC with more respondents from private CCCs concurring.

During the discussions on the theme of ICT affordability, it came out very strongly that only patients with facilities that could afford ICT in terms of physical equipment and necessary technological skills to use it that can actually adopt and utilize it. Focused group discussions held with participants from private and public facilities clearly pointed out that both their service providers and the patients could afford ICT and therefore had adopted and were actually using it. One participant from a private facility said:

“In my case, I have a computer home and I do also have a phone. I regularly use them to communicate with my doctors whenever I need or require drugs.”

On the contrary, findings from FGDs held with participants from public facilities indicated that their service providers lacked technology equipment such as computers. The patients from these facilities also could not afford computers and telephones at home. One female Participant explained:

“I cannot afford a computer neither a mobile telephone. I therefore cannot use them.”

4.6.3.4 Information security

As pointed out, the study revealed that the largest proportion (67.3%) of those who had adopted ICT was recorded among health workers who were of the view that security of information was a very strong factor in ICT adoption. Chi-square test results ($\chi^2 = 5.056$; $df = 4$; $p = 0.022$) showed that there is a significant relationship between opinion on this aspect and ICT adoption. In regard to public and private CCCs, results of Chi-square test ($\chi^2 = 54.742$; $df = 4$; $p = 0.000$) revealed that there is significant relationship between respondents view of this factor and type of CCC with more participants from public facilities concurring.

The confidentiality of information between patients and health providers are considered a major ethical issue that must always be observed. During the FGDs sessions most respondents argued that they can only adopt and use ICT if it guarantees that the information they share with the doctors and other service providers will remain confidential. One female patient observed that:

“I want to say here and now that I can only use SMS, e-mail or even telephone calls to discuss my health needs and requirements with my doctors if I am guaranteed that this information will not leak to the public and unauthorized persons.”

4.6.3.5 Image of facility

Results show that the study revealed that the largest proportion (63.7%) of those who had adopted was observed among health workers who very strongly agreed that improvement of the image of facility was an important influencing factor. Chi-square test results ($\chi^2=11.383$; $df = 4$; $p = 0.023$) indicated that there is significant relationship between health workers opinion of this factor and ICT adoption. When public and private CCCs were compared, results of Chi-square test ($\chi^2 = 68.498$; $df = 4$; $p = 0.000$) revealed that there is significant relationship between respondents view of this factor and type of CCC with more respondents from private CCCs concurring.

During FGDs, It came out clearly that most participants agreed that adoption of ICT by both service providers and patients would improve the image of the facilities. This way it would attract more clients since ICT improves efficiency and effectiveness of the services offered in the CCCs. One participant said:

“I have been impressed by the level of ICT usage in the services offered by my facility. It saves me time and money since I use my computers by way of e-mail and use of telephone to communicate with my doctors instead of physical visits. I have since been able to introduce several other clients to this facility.”

Table 4.18: Relationship between adoption status and technological factors (N = 183)

Factor variable	Adoption status				Chi – square tests		
	Mal adoption		Adoption		χ^2	Df	P
	Frequency	Percent	Frequency	Percent			
ICT Complexities							
Very Strong	20	37.8	33	62.2	13.870	4	0.008
Strong	9	47.4	10	52.6			
Neutral	25	64.1	14	35.9			
Weak	22	78.6	6	21.4			
Very Weak	28	63.6	16	36.4			
ICT Compatibility							
Very Strong	20	40	30	60	10.248	4	0.036
Strong	7	50	7	50			
Neutral	26	72.2	10	27.8			
Weak	27	69.2	12	21.8			
Very Weak	24	54.5	20	45.5			
ICT Affordability							
Very Strong	20	37.8	33	62.2	19.997	4	0.001
Strong	9	43.8	10	56.2			
Neutral	28	71.8	11	28.2			
Weak	23	82.2	5	32.1			
Very Weak	24	54.5	20	45.5			
Information Security							
Very Strong	17	32.7	35	67.3	5.056	4	0.022
Strong	14	51.9	13	48.1			
Neutral	11	61.1	7	38.9			
Weak	32	76	14	24			
Very Weak	30	75	10	25			
Image of Facility							
Very Strong	25	36.3	44	63.7	11.383	4	0.023
Strong	11	61.1	7	38.9			
Neutral	6	60	4	40			
Weak	42	91.3	4	8.7			
Very Weak	20	50	20	50			

4.6.4 Relationship between health workers ICT adoption status and external environment factors

The respondents were asked whether various external environmental factors influenced their ICT adoption. In regard to competitive pressure most respondents (65.6%) concurred that it is an important determined of ICT adoption while only 34.4% didn't agree. Many of the respondents (68.9%) said that GOK interventions were a determinant to ICT adoption while only 31.1% disagreed. Similarly, results showed that majority of respondents (51.8%) believe that ICT infrastructure is an important determinant while about 48.2% said it was not.

Results indicate that 59.4% of the respondents agreed that national values and culture was an important external determinant of ICT adoption while only 40.6% said that it was not. Results also indicate that many respondents 56.3% agreed that patients pressure was an important external factor in determine whether or not they adopted ICT while 43.7% were of the contrary opinion. The results are presented in table 4.19. Further analysis of the results is contained in table 4.20.

Table 4.19: External environment factors influencing health workers ICT adoption (n=183)

Factor	Response	
	Yes	No
Competitive pressure	120(65.6%)	63(34.4%)
GOK policies	126(68.9%)	57(31.1%)
Infrastructure	93(51.8%)	90(48.2%)
National Values	110(59.4%)	73(40.6%)
Patients Pressure	103(56.3%)	80(43.7%)

4.6.4.1 Competitive pressure

The results indicate that a larger proportion (60.8%) of those who adopted ICT was recorded among health workers who agreed that competitive pressure is a determining factor for ICT adoption. Results of Chi-square test ($\chi^2 = 0.062$; $df = 1$; $p = 0.003$) indicated that there is significant relationship between health workers opinion on this particular factor and ICT adoption with more respondents from private CCCs concurring. When public and private CCCs were compared, results of Chi-square test ($\chi^2 = 13.357$; $df = 1$; $p = 0.000$) showed that there is significant relationship between respondents view of this factor and type of CCC with more respondents from public CCCs concurring.

Competitive pressure among facilities was cited by most participants as a factor that determined CCCs to adopt ICT. In today's world where technology has been embraced in the provision of services, only the organizations with the best equipment and ones with best ICT practices will attract clients. One participant observed:

“I believe my service provider offers the best services. There are state of the art technological equipment and can access information from anywhere in the world. My doctors use this technology to seek opinions from counterparts from everywhere.”

4.6.4.2 Government policies

As the results point out that larger proportion of (61.2%) of those who adopted ICT was observed among health workers who agreed that government policies was an

influencing factor in ICT adoption. Results of Chi-square test ($\chi^2 = 3.21$; $df = 1$; $p = 0.082$) showed that there is no significant relationship between this aspect and adoption levels. In regard to public and private CCCs, results of Chi-square test ($\chi^2 = 17.143$; $df = 1$; $p = 0.000$) revealed that there is significant relationship between respondents view of this factor and type of CCC with more respondents from private CCCs concurring.

It was generally agreed that while the government of Kenya has a general policy on ICT, there are no specific policies to guide CCCs in adopting and use of ICT. Most participants agreed that to a large extent, the failure of government to put in place clear guidelines on use of ICT in CCCs has impacted negatively on adoption and use of ICT in CCCs. One participant sanctitly said:

“Our government has not put in place any policies and rules on how to equip facilities with ICT. It has not helped much in purchasing equipment and training the healthcare workers and public in general. They need to do more.”

4.6.4.3 National values and culture

Results indicate that most (44.5%) respondents who had adopted were observed among health workers who agreed that national values and culture on ICT influenced ICT adoption. Chi-square test results ($\chi^2 = 0.389$; $df = 1$; $p = 0.533$) showed that there is no significant relationship between health workers opinion on this particular aspect and ICT adoption. However, when public and private CCCs were compared, results of Chi-square test ($\chi^2 = 9.299$; $df = 1$; $p = 0.002$) indicated that there is

significant relationship between respondents view of this aspect and type of CCC with more participants from public CCCs concurring.

During FGDs most respondents were of the opinion that for ICT to be fully adopted and utilized in CCCs there is need to have a national culture and values on ICT. This would inculcate the necessary impetus in health workers and individuals to embrace adopt and utilize ICT in their daily services. They cited developed countries like USA where e-health is functional as some of the countries where people have national ICT values and culture specific to them. One of the patients said;

“Our government and by extension our facilities are supposed to have national values and ICT culture specific to them and our needs. They should learn from countries like USA and India.”

4.6.4.4 ICT Infrastructure

Results point out that a larger proportion (57%) of these who had adopted ICT was recorded among health workers who agreed that ICT infrastructure was a contributory factor in ICT adoption. Chi-square test results ($\chi^2 = 0.046$; $df = 1$; $p = 0.0830$) showed that there is no significant relationship between this aspect and adoption levels. In regard to public and private CCCs, results of Chi-square test ($\chi^2 = 19.661$; $df = 1$; $p = 0.000$) indicated that there is significant relationship between respondents view of this factor and type of CCC with more respondents from private facilities concurring.

4.6.4.5 Patients pressure

As shown, results indicate that most respondents (54.4%) who had adopted ICT was observed among health workers who agreed that patients pressure was influencing factor in ICT adoption. Results of Chi-square test ($\chi^2 = 12.046$; $df = 1$; $p = 0.001$) showed that there is significant relationship between health workers opinion on this particular aspect and ICT adoption. When public and private CCCs were compared, results of Chi-square test ($\chi^2 = 13.345$; $df = 1$; $p = 0.000$) revealed that there is significant relationship between respondents view of this aspect and type of CCC with more respondents from private CCCs concurring.

During the discussions, it emerged that pressure from patients seeking better, efficient and effective services can actually determine the rate and actual usage of ICT. Most participants agreed that they request service providers to use ICT to offer them service especially the use of mobile telephone. One participant explained:

“I am usually very busy. I requested my doctors to allow me to communicate with them using my mobile telephone and e-mails whenever I needed advise. This has made my life easier.”

Table 4.20: Relationship between adoption status and external environmental factors (N=183)

Factor variable	Adoption status				Chi – square tests		
	Mal adoption		Adoption		χ^2	Df	P
	Frequency	Percent	Frequency	Percent			
Competitive Pressure							
Yes	47	39.2	73	60.8	0.062	1	0.003
No	57	90.5	6	9.5			
GOK policies							
Yes	49	38.8	77	61.2	3.21	1	0.082
No	55	96.6	2	3.5			
Infrastructure							
Yes	40	43	50	57	0.046	1	0.083
No	64	68.9	29	31.1			
National Values							
Yes	61	55.5	49	55.5	0.389	1	0.533
No	43	59	30	41			
Patients Pressure							
Yes	47	45.6	56	54.5	12.04	1	0.001
No	57	71.4	23	28.6			

4.7 Predictors of ICT adoption status of health workers in HIV and AIDS Comprehensive Care Centers

The study aimed at establishing the predictors of adoption levels of health workers' in CCCs. Using Multinomial Logistic Regression and likelihood ratio tests, all the variables that were found to be significantly related to health workers ICT adoption levels were analyzed further in order to determine the real predictors. This section presents these results.

4.7.1 Perception predictors

Using multiple regressions, further analysis of the health workers perceptions that significantly related to adoption status was done to determine whether they were predictors of adoption or not. The results of this are presented in Table 4.21. As is shown, the significant perceptions of ICT drivers that were found to be predictors of health workers adoption status were those of access ($p=0.032$), personalization ($p=0.022$) and security ($p=0.029$).

Table 4.21: ICT drivers' perception predictors of health workers adoption
Likelihood ratio tests

Perception Variables	-2 log Likelihood of reduced model	Chi-Square	Df	Significance
Intercept	150.606	.000	0	.
Access	18.633	8.975	4	.032
Personalization	19.208	13.969	4	.022
Security	19.403	69.988	4	.029
Flexibility	19.224	69.988	4	.137
Site aesthetics	19.217	6.777	4	.148

4.7.2 Individual predictors

The individual variables that were significantly related to the adoption status were analyzed further to establish whether they were predictors of ICT adoption. The results of this analysis are shown in Table 4.22. As it is indicated, none of the individual factors were found to be significant predictors of ICT adoption among health workers.

**Table 4.22: Individual variable predictors of ICT adoption
Likelihood ratio tests**

Perception Variables	-2 log Likelihood of reduced model	Chi-Square	Df	Significance
Intercept	28.165	.000	0	.
Age	9.891	.549	1	.459
Training	9.103	.001	1	.974

4.7.3 Organizational predictors

Further regression analysis was done to determine the organizational variables that predicted ICT adoption. Results are analyzed in Table 4.23. As it is indicated, the significant organizational factors which are predictors of health workers ICT adoption levels were the quality of ICT systems ($p = 0.000$), information intensity ($p = 0.001$), financial resources ($p = 0.030$), technological resources ($p = 0.030$) and management support ($p = 0.039$).

**Table 4.23: Organizational predictors of ICT adoption status
Likelihood ratio tests**

Organizational variables	-2 Log Likelihood of reduced Model	Chi-square	Df	Significance
Intercept	133.464	.000	0	.
Systems quality	9.600	.000	1	.000
Information intensity	19.058	19.422	4	.001
Financial resources	9.771	.395	1	.030
Technological resources	9.771	.395	1	.030
Size of facility	9.869	2.495	1	.114
Management support	9.710	.710	1	.039

4.7.4 Technological predictors

Further regression analysis was carried out to establish technological factors predictors of health workers ICT adoption status. The results are illustrated in Table 4.24. As shown, the significant factors that were predictors of health workers ICT adoption status were found to be complexities ($p=0.005$), Compatibility ($p=0.035$), affordability ($p=0.000$), information intensity ($p=0.000$) and image of facility ($p=0.000$).

Table 4.24: Technological predictors of health workers ICT adoption status

Likelihood ratio tests				
Technological variables	-2 Log Likelihood of reduced Model	Chi-square	Df	Significance
Intercept	26.932	.000	0	.
Complexities	16.606	14.968	4	.005
Compatibility	19.566	10.373	4	.035
Affordability	19.132	20.454	4	.000
Information	19.132	20.454	4	.000
Image of facility	9.158	33.933	1	.000

4.7.5 External environmental predictors

Further regression analysis was carried out to establish external environmental predictors of health workers ICT adoption status. The findings are as shown in Table 4.25. As shown, the significant external environment factors that were predictors of health workers ICT adoption status were found to be competitive pressure ($p=0.000$) and patients pressure ($p=0.037$).

Table 4.25: External environment predictors of ICT adoption status**Likelihood ratio tests**

External variables	-2 Log likelihood of reduced Model	Chi-square	Df	Significance
Intercept	9.158	.000	0	.
Competitive pressure	9.158	33.933	1	.000
Patients pressure	9.902	.006	1	.037

CHAPTER FIVE: DISCUSSION

5.1 Demographic characteristics of the respondents

The study results indicated that majority of respondents were working in private HIV and AIDS CCCs compared to those in public CCCs. The results reflect the general staffing trends in specialized medical clinics in Kenya where private health facilities are better staffed than public facilities. The private CCCs also comprise two thirds of all CCCs in Nairobi County (GOK 2012).

The study findings revealed that majority of the respondents were in age bracket of 23-40 years while those aged above 50 years were least. In regard to public and private CCCs, results indicated that there is no significant relationship between age of respondents and type of CCCs. The findings concur with findings recorded by Kavanaugh *et al.* (2006) while investigating demographic variables for healthcare professionals in USA. This can be attributed to the fact that most of the health workers complete their specialized studies at this age and get employed while most retire or leave service after 50 years. This is also explained by the fact that health facilities adhere to labor laws that prohibit discrimination in employment based on age.

The findings show that most of the health workers in HIV and AIDS Comprehensive Care Centers were females compared to males. This pattern reflects the general trend in healthcare settings where most of the workers are female. The findings concur with those of (Muathe, 2010) while studying factors influencing ICT adoption among health workers in SMEs in Nairobi, Kenya where he observed that most of

the health workers were females compared to males. The pattern is similar to what was observed by Kordic (2013) while studying influence of social economic and demographic environment of health care providers in Croatia. When public and private CCCs were compared, results showed that there is no significant relationship between gender of the health workers and type of CCCs. This can be attributed to the government policy on employment that requires employers not to discriminate against either gender.

The results of this study indicated that most of the health workers in the HIV and AIDS CCCs were actually married. This could be attributed to the fact that most people marry between the age of 20-40 years when they finish school and get employed. It could also be due to the fact that health workers are salaried and therefore can afford to raise families. This finding supports those recorded by Kordic (2013) while studying influence of socio-economic and demographic environment on private health care providers in Croatia. When public and private CCCs were compared, results revealed that there is no significant relationship between respondents marital status and type of CCCs. This can be explained by the fact that employers are not bound by any laws to consider health workers marital status when recruiting.

Findings of the study showed that most of the respondents had a diploma certificate with a similar proportion attaining a Bachelors degree while those who had a high school certificate were least. This may be due to the fact that most of the courses that health workers study are at Diploma and Bachelor's degrees levels. The findings

concur with those of Black *et al.* (2007) while studying factors influencing digital divide in Rural Australia. In regard to public and private CCCs, results showed that there is no significant relationship between respondents level of education and type of CCCs.

The results indicated that most respondents were in the economic bracket of above poverty line. This was informed by the fact that health workers are salaried and may be engaged in other income generating economic activities. Findings reported in this study agree well with those recorded earlier by Balbao- Osorio *et al.* (2013) while investigating ICT for jobs and growth in a hyper connected world. They found that majority (70%) were economically strong. When public and private CCCs were compared, results indicated that there is no significant relationship between health workers economic levels and type of CCCs. Both public and private CCCs recorded huge majorities of health workers who were in 'above poverty' economic bracket. This could be explained by recent government efforts to increase its health workers emoluments which are now almost at par with those working in private facilities.

The findings revealed that nurses comprised majority of the health workers in HIV and AIDS CCCs. This could be attributed to the fact that most of the services offered in these Centers are mainly nursing services. This observation is in support of findings recorded by Garrosa *et al.* (2008) while studying relationships between socio-demographic variables of health providers in Spain where Nurses were majority (59%). In regard to public and private CCCs, results showed that there was no significant relationship between respondents professional qualifications and type

of CCCs. This finding can be attributed to the fact that health institutions need and indeed recruit all cadres of health professionals whether they are public or private.

5.2 Health workers ICT adoption status

Electronic patients records refer to information and data of patients that is stored in digital form. It is normally easy to retrieve for reference. Results of the study indicated that most of the respondents had adopted electronic patients' records. This could be due to the availability and access to these records and reliable sources of power in most of the health facilities where the study was carried out. Indeed, the study results show that majority of respondents had access to electronic patients records. This finding agrees well with earlier report recorded by Siika *et al.* (2005) who found that over 83% of health facilities have now adopted electronic patients' records in selected Sub Saharan countries.

A mobile phone makes and receives phone calls by connecting to cellular networks and one can move anywhere with it while fixed phones are immobile. Majority of the health workers had adopted use of mobile and fixed telephones in transacting services in the HIV and AIDS CCCs. This was possibly because of the availability of fixed telephones in all facilities. This is further supported by study findings which revealed that most of those interviewed had access to fixed and mobile phones. This could be attributed to availability of affordable mobile telephones in the market. These results agree with those of Hosman *et al.* (2012) who found that about 68% of respondents had adopted telephony while investigating use of mobile phones for development in selected African countries.

Computers are general purpose devices that can be programmed to carry out a set of arithmetic or logical operations automatically. They comprise of both hardware and software. The findings revealed that most respondents had actually adopted use of both computer hardware and software. This finding is supported by the study results which show that most of respondents actually had access to computers. This could be explained by recent government interventions in subsidizing and zero rating of value added tax on computer hardware and software. This made it possible for facilities to afford the facilities. The findings are in agreement with those of Fassil *et al.* (2012) while investigating the role of ICT in universal health coverage where he found that in over 74% of the countries where governments subsidize purchase of computers; there is more ICT coverage and adoption.

Email is a method of exchanging digital messages from an author to one or more recipients. It operates across the internet or other computer net works. According to the results majority of the respondents had not adopted use of email facility in offering services in HIV and AIDS CCCs. This was probably due to the fact that most of the respondents couldn't access the facility making it not possible for health workers and patients to communicate through e-mails. This finding is in support of earlier report recorded by Ndeti (2011) while studying HIV and AIDS communication in Secondary schools in Kenya, Eldoret. He found that over 58% of the respondents had no access to email facilities and therefore had not adopted this form of ICT.

The internet is a global system of interconnected computer networks. It carries an extensive range of information resources and services. Findings of the study indicated that most of health workers had not adopted use of internet. This could be attributed to lack of access to this form of ICT by most of respondents. Similar studies carried out by Seguay *et al.* (2006) in Kenya on data from programme for the prevention of mother to child transmission for HIV surveillance found that majority of health workers had not adopted internet. These results are supported by the findings of this study.

Social media is the interaction among people in which they create, share or exchange information and ideas in virtual communities and ideas. It is a relatively new ICT and is popular with young generations. Results of this study indicated that majority of the respondents had not adopted use of social media. This could be explained by the fact that majority did not have access to this form of ICT. This could also be attributed to fear of confidential information of patients being accessed by unauthorized persons since this mode of communication is prone to hackings. This finding concur with that of Bull *et al.*(2011) who discovered that most health workers had not adopted social media while conducting a case study on ethics of HIV prevention on Face book in USA.

Electronic media are media that use electronics or electromechanical energy for the end user to access the content. They include video recordings, multimedia presentations, slide presentations, radio and televisions. The findings of the study showed that most had actually adopted electronic media. This was due to the

availability and access of this kind of ICT by most of respondents. This mode of communication is particularly important in passing information on treatment and available programs such as VCT and PMTC. This finding is in support of research carried out on this field by Michael *et al.* (2013) on current strategies for improving access and adherence to antiretroviral therapies in limited settings in Kenya, Zambia, China, South Africa, Mozambique, Nigeria and Pakistan. It discovered that over 70% of health workers had actually adopted electronic media.

In contrast to electronic media, print media is static and disseminates printed matter. It gathers and publishes news in form of newspapers and magazines. A majority the sampled health workers had adopted use of print media. This could be explained by the fact that print media is one of the oldest ICT and is readily available at affordable costs. Indeed study results indicate that majority had access to this form of ICT. It is especially valuable in passing information about emerging and new trends in HIV/AIDS Treatment regimes and new prevention intervention strategies. These results are in support of Studies done by Casla *et al.* (2013) on the role of ICT in HIV testing and care in Burkina Faso, Kenya, Malawi and Uganda which found that over 70% of health workers had adopted print media.

A satellite system incorporates satellite signals and appropriate hardware such as antennas and receivers, television, audio systems and computers through which the satellite content is utilized. The research findings showed that most respondents had not adopted satellite systems. The study findings actually indicated that a huge majority of respondents did not have access to this form of technology. This is

probably because this form of ICT is relatively new and is very expensive to install. This could also be explained by the fact that its maintenance is high and health workers need specialized training to use it. These results agree well with studies conducted by UNESCO (2010) while investigating use of satellite systems in health care settings in Africa which established that over 90% of the sampled facilities had not adopted use of satellite systems

A website is a depository of information destined for public or private use. According to the findings of the study a huge majority of the health workers had not adopted websites. This could be explained by the unavailability and lack of access by most of health workers probably due to cost implications and lack of training on how to use this form of ICT. This finding is in support of similar studies conducted by Jerome *et al.* (2011) on transmission of information on HIV vaccines in Angola which established that about 80% of the selected HIV and AIDS CCCs, health workers had actually not adopted websites.

The study results revealed that overall; majority of the health workers in HIV and AIDS CCCs had not adopted ICT. The results can be attributed to the fact that overall, majority of the respondents had low accessibility of ICT. This finding is indeed in agreement with that of the (Qiang, Yamamichi, Hausman, & Altman, 2011) when investigating ICT applications for health sector in selected developing countries which found that over 60 % of those countries were lagging behind in ICT adoption in healthcare. When public and private CCCs were compared, results revealed that there is indeed significant relationship between type of CCC and

respondents status of ICT adoption. It is important to note that majority of the health workers who had adopted ICT was recorded in private facilities. The finding may be attributed to the fact that health workers private CCCs had high ICT accessibility while their counterparts in public CCCs had low ICT accessibility. This is probably because private health facilities are endowed with both financial and technological resources which are vital for acquisition and actual use of ICT.

5.3 Health workers perceptions of ICT drivers and contributors

The findings of the study indicated that majority of respondents who had adopted had a positive perception of ICT access an ICT driver. Results revealed that there is significant relationship between this aspect and respondents adoption status. This could have been informed by the fact that if one does not have access of basic equipment such as computers; it may not be possible to adopt and use ICT. In regard to public and private CCCs, results showed that there is significant relationship between respondents perception of this aspect and type of CCC. These results agree well with studies done by Anita *et al.*(2010) on research of designing a mobile phone based intervention to promote adherence to anti-retroviral therapy in South India which found that majority (58%) of health workers had a positive perception of ICT access.

Most of respondents who had adopted had a positive perception of efficiency as a driver of ICT adoption. Although Chi-square test revealed that there is no significant relationship between this aspect and respondents adoption status, this could have been prompted by the fact that any technology is valued by its efficiency and

effectiveness. When public and private CCCs were compared, results indicated that there is significant relationship between respondents perception of this aspect and type of CCC. Findings reported in this study agree well with studies done by Jessica *et al.* (2010) on real time and wireless monitoring strategies for entire HIV and AIDS therapy in Mbarara, Uganda which established that most health workers had a positive perception of ICT efficiency.

Findings of the study showed that majority of the health workers who had adopted had a positive perception of security or privacy as an ICT driver. Results indicated that there is significant relationship between this aspect and respondents adoption status. Information security and privacy is an important ethical consideration between health workers and patients. In regard to public and private CCCs, results showed that there is significant relationship between respondents perception of this aspect and type of CCC. These results are in support of findings recorded by United Kingdom advisory panel (UKAP, 2012) while carrying out risk assessment on infected health workers ICT adoption and coping mechanisms which found that over 63% of respondents had positive perception of ICT security.

The survey indicated that most of respondents who had adopted had a positive perception of assurance as an ICT driver. Although findings revealed that there is no significant relationship between this aspect and respondents adoption status, this could be due to the fact that both health workers and patients value assurance of any technology because they want to be assured of correct diagnosis and treatment. When public and private CCCs were compared, results revealed that there was

significant relationship between respondents perception of this aspect and type of CCC. Studies conducted by World Bank (2010) on ICT sector mobile applications for health sector which found that 65% of those interviewed had a positive perception of assurance as an ICT driver concur with the finding of this study.

Site aesthetics concept is about the physical layout of technologies. The results revealed that majority of respondents who had adopted had a positive perception about site aesthetics as an ICT driver. Results showed that there is significant relationship between this aspect and respondents adoption status. This may be explained by notion that physical layout for most technologies may determine the user's ability to adopt it or not. In regard to public and private CCCs, results indicated that there is significant relationship between respondents perception of this aspect and type of CCC. This finding supports results of similar studies carried out by Osei (2013) on how to develop a tool to measure coping mechanisms for infected HIV and AIDS health workers found that majority of those interviewed had a positive perception of ICT site aesthetics.

Reliability refers to ability of a technology to give similar results repeated overtime. Findings of this study showed that most of respondents who had adopted had a positive perception about this ICT driver. Although results indicated that there is no significant relationship between this aspect and respondents adoption status, this is explained by health workers belief in instruments that should give accurate and reliable results overtime. When public and private CCCs were compared, results showed that there was significant relationship between respondents perception of

this aspect and type of CCC. Results of this study agree well with those of studies conducted by USAID and Ghana Country Development Co-operation (2013) on District health information systems in Ghana which established that majority of those who took part in the survey had a positive perception.

Flexibility in ICT refers to ability of technology to serve the intended purpose according to the needs at a particular time. Results of the survey showed that majority of respondents who had adopted had a positive perception of flexibility as an ICT driver. Results indicated that there is significant relationship between this aspect and respondents ICT adoption. This could be attributed to the fact that the more flexible a particular technology is, the more likely and easier the users are likely to adopt it. However, when public and private CCCs were compared, results revealed that there is no significant relationship between respondents perception of this aspect and type of CCC. Similar findings were recorded by Maria *et al.* (2010) on their studies on mobile learning for HIV/AIDS healthcare worker training in resource limited-settings among doctors working in urban and peri-urban HIV/AIDS clinics in Peru which found that over 55% of the respondents had a positive perception of ICT flexibility.

Personalization of ICT is about users specifications on a certain technology. Most of the respondents who had adopted had a positive perception about this ICT driver. Results showed that there is significant relationship between this aspect and respondents adoption status. This could be explained by the fact that the use of ICT is individualized and the user's specifications are important in ICT adoption.

In regard to public and private CCCs, result showed that there is significant relationship between respondents perception of this aspect and type of CCC. These results agree well with those reported by Benjamin (2011) while investigating the ICT social-culture of librarianship through the identifications and experiences of library workers who were members of marginalized groups such as people living with HIV and AIDS which found that over a half of all participants had a positive perception of ICT personalization.

Overall, the study findings showed that most of the respondents had positive perception of ICT drivers. Results indicated that overall, there is significant relationship between respondents perceptions of ICT drivers and adoption status. This was possibly due to health workers willingness to learn ICT and anxiety towards new technologies. These results agree well with those reported by USAID (2012) while investigating health workers attitude towards application of ICT in HIV and AIDS prevention and treatment services which found that about 72% of those interviewed had positive perception of ICT.

When public and private CCCs were compared, results showed that there was significant relationship between respondents perception of ICT drivers and type of CCCs. An important finding noted is that the largest proportion of health workers who had a positive perception of ICT drivers was observed among health workers from private facilities. This could be attributed to management support and motivation in private facilities compared to public facilities. This finding is in support of results recorded by Muathe (2010) while studying health SMEs in Nairobi

which found that health workers in private SMEs perceive ICT drivers positively due to management support and motivation.

Optimism may refer to an individual's belief that using or adopting a certain technology will result to better outcomes than if not adopted. This study showed that majority of health workers who had adopted had a positive perception of optimism as a contributor to ICT adoption. Results revealed that there is significant relationship between this aspect and respondents adoption status. This could be attributed to the fact that most workers are always eager to learn and adopt new technologies especially in science oriented fields like medicine. However, when public and private CCCs were compared, results revealed that there was no significant relationship between respondents perception of this aspect and type of CCC. These results agree well with those recorded by Peterson *et al.* (2012) while studying ICT optimism and sexual risk behaviors among HIV positive African American men who have Sex with men in USA.

Innovation is about individual coming up with new ideas whenever faced with challenges in their working places. Most of health workers who had adopted had a positive perception about this contributor of ICT adoption.

Although results showed that there is no significant relationship between this aspect and respondents adoption status, this could be explained by the working environments of health workers where coming up with new ideas to tackle different situations are a common scenario. When public and private CCCs were compared,

results indicated that there is no significant relationship between respondents perception of this aspect and type of CCC. Data reported in this study is in concurrence with that of Parasuraman (2002) while studying ICT technology readiness among service providers which established that over a half of all respondents had apposite perception of ICT optimism.

Individuals may not adopt certain ICT technologies if they fear for the security and confidentiality of their information. In this study, the findings showed that most of health workers who had adopted had a positive perception about security as an ICT contributor. Although results showed that there is no significant relationship between this aspect and respondents adoption status, this could be explained by the fact that health workers seriously value confidentiality and security of information. However, results revealed that there is significant relationship between respondents perception of this aspect and type of CCC. This finding concur with results reported by UNAIDS (2012) while studying health workers readiness for e-health which found that majority had positive perception of ICT security. It maintains that security and privacy of ICT is imperative for actual adoption and usage.

The users of various technologies may feel uncomfortable while using various applications and infrastructure. This aspect has been viewed as an inhibitor by many ICT scholars. This study showed that most of respondents who had adopted had a negative perception of discomfort as an ICT contributor. Results also revealed that there is no significant relationship between this aspect and respondents adoption status. In regard to public and private CCCs, results also showed that there is no

significant relationship between respondents perception of this aspect and type of CCC. This finding is in congruent with that of USAID (2012) while studying use of ICT for HIV prevention for men who have sex with other men which revealed that majority of respondents had a negative perception of ICT discomfort.

In regard to overall health workers perception of ICT contributors the study revealed that the largest proportion of the respondents had a positive perception. Results revealed that there is significant relationship between respondents overall perception of ICT contributors and adoption status. This finding could be attributed to health workers optimism in regard to ICT. When public and private CCCs were compared, results showed that there is significant relationship between respondents perception of ICT contributors and type of CCCs. It is also important to note that majority of the respondents who had a positive perception in regard to this aspect was recorded among health workers in private facilities. This could be due to management support and motivation in private facilities compared to public ones. This finding concurs with that of Venkatesh *et al.* (2003) while investigating factors that influence ICT adoption among health workers in developing countries which reported that over two thirds of the respondents exhibited positive perceptions of ICT contributors. He maintains that user acceptance of ICT is dependent on health workers perceptions of ICT contributors.

We therefore fail to reject the hypothesis that the health workers perceptions of ICT contributors do not determine ICT adoption levels for the perceptions of innovation, insecurity and discomfort since they were not significantly related to adoption levels.

However, we reject the hypothesis in regard to ICT optimism since they were significantly related.

5.4 Factors determining ICT adoption

Majority of health workers who had adopted disagreed that gender was a determining factor on whether one adopted ICT or not. Results revealed that there is no significant relationship between this aspect and respondents adoption status. This could have been informed by the fact that value addition in quality of services offered by adopting ICT by all health workers was most crucial regardless of gender. When public and private CCCs were compared, results indicated that there is significant relationship between this aspect and type of CCC. These results agree well with those of studies carried out by Angela (2012) on contextual mediators influencing the effectiveness of Behavioral change intervention of health workers in HIV and AIDS treatment in Uganda.

It emerged that majority of respondents who had adopted disagreed that age of health workers determined ICT adoption. Results revealed that there is significant relationship between this aspect and respondents adoption status. Most probably, this opinion was informed by the fact that most health workers were of same age. In regard to public and private CCCs, result revealed that there is significant relationship between this aspect and type of CCC. These results concur by those of Amina *et al.* (2013) while conducting research on health communication in primary health care in Sweden where they discovered that age of health workers was not a major determinant of ICT adoption.

A majority of sampled health workers who had adopted were of the opinion that innovation actually determined their ability to adopt ICT. Innovation is about an individual ability to grasp and come up with new ideas to solve problems. Although results indicated that there is no significant relationship between this aspect and respondents adoption status, this could be due to the fact that innovation is critical in adoption of new technologies. When public and private CCCs were compared, results showed that there is no significant relationship between this aspect and type of CCC. These results concur with those of Julie *et al.* (2012) while investigating ICT in supporting disruptive innovation by nurse practitioners in emergency departments in Australia Metropolitan Public hospitals.

The findings point out that most of respondents who had adopted agreed that specialized ICT training was an important factor in determining adoption. ICT training is not integrated in health workers training. This could have informed this opinion. Chi-square test revealed that there is significant relationship between this aspect and respondents adoption status. When public and private CCCs were compared, results showed that there is significant relationship between this aspect and type of CCC. Studies done by Fassil *et al.* (2012) while investigating the role of ICT towards universal health coverage in Ethiopia concur with this finding.

The study found out that most respondents who had adopted agreed that the size of their CCCs determined their adoption of ICT. Results showed that there is significant relationship between this aspect and respondents adoption status. This could be explained by the fact that adoption and actual use of ICT is dependent on availability

of the ICT facilities and their ability to use it. When public and private CCCs were compared, results showed that there is no significant relationship between this aspect and type of CCC. Studies done by Julie (2010) while researching on Socio-technical approach to evaluating the impact of ICT on Clinical environment are in concurrence.

We therefore fail to reject the hypothesis that health workers individual factors of gender and innovation does not determine the level of ICT adoption for the health workers in CCC_s. We however reject the hypothesis that age and training of health workers do not determine health workers adoption levels since they were significantly related.

Information intensity is a concept referred to by academics in theorizing, by businessmen in decision making and by governments in reporting and regulating. Most respondents who had adopted were in agreement that information intensity was a determining factor in ICT adoption. The intensity of information increases the desire and need to adopt ICT in offering most of the services. When public and private CCCs were compared, results showed that there is significant relationship between this aspect and type of CCC. Findings of this survey are in support of studies carried out by Clifford *et al.* (2013) while studying HIV and AIDS stigma and ICT utilization which established that information intensity was a determining factor for ICT adoption.

Results indicated that most of respondents who had adopted were of the view that ICT specialization was an important factor in determining ICT adoption. Although results revealed that there is no significant relationship between this aspect and respondents adoption status, this was most likely due to the fact that ICT should be aligned to the services being offered. In regard to public and private CCCs, results indicated that there is significant relationship between this aspect and type of CCC. Investigations by Joseph *et al.* (2012) on quality management approach to implementing point of care technologies for HIV diagnosis and monitoring in Sub-Saharan Africa found similar results.

Majority of the health workers who had adopted agreed that the quality of ICT systems is a determining factor of adoption. Results revealed that there is significant relationship between this aspect and respondents adoption status. This was informed by the fact that the efficiency and reliability of any technology is actually determined by its quality. However, when public and private CCCs were compared, results indicated there is no significant relationship between this aspect and type of CCC. Similar results were recorded by Claud *et al.* (2013) while studying design and customization of telemedicine systems in USA.

Results showed that most of the health workers who had adopted agreed that the support of management is crucial in VCT adoption. Results showed that there is significant relationship between this aspect and respondents adoption status. In all ventures, the support of management is considered a very important factor since it must support the undertaking both finically and technology. In regard to public and

private CCCs, results indicated that there is significant relationship between this particular aspect and type of CCC. These results agree well with those of Studies done by Abu *et al.* (2012) on systematic review of Health care applications for smart phones in UK which established that management support accounted for much of success in ICT adoption.

Findings of the study showed that majority the respondents who had adopted agreed that technological resources were an important factor in determining ICT adoption by health workers. Results indicated there is significant relationship between this aspect and respondents adoption status. This was because without the actual facilities such as computers, adoption was most unlikely. When public and private CCCs were compared, results indicated that there is significant relationship between this aspect and type of CCC. Data recorded in this study is in support of studies done by Gari *et al.* (2008) while investigating medical information systems in Haiti.

The findings revealed that most of health workers who had adopted ICT were of the view that an ICT complexity was a very strong factor in determining their ICT adoption. Results indicated that there is significant relationship between this aspect and respondents adoption status. This was probably due to the fact that health workers orientation on technology does not involve the technological complex issues in ICT. When public and private CCCs were compared, results indicated that there is indeed significant relationship between respondents views and type of CCC. Data recorded in this study agrees well with findings by WHO (2005), on preparing a health care workforce for the 21st century.

It has been argued that people readily accept new technologies if they are aligned to their needs. Most respondents who had adopted said that ICT compatibility was a very strong determinant of ICT adoption. Results indicated that there is significant relationship between this aspect and respondents adoption status. This could have been informed by the reasoning that communication between health workers and patients was what is most important. In regard to public and private CCCs, results revealed that there is significant relationship between respondents view of this factor and type of CCC.

We therefore fail to reject the hypothesis that organizational factors of specialization do not determine the levels of ICT adoption by health workers, Conversely, we reject the hypothesis that organizational factors of quality of ICT systems, information intensity, financial resources, technological resources and size do not determine health workers adoption levels since they were significantly related.

In relation to affordability of ICT, majority of those who had adopted said that it was a very strong determinant of ICT adoption. Results showed that there is significant relationship between this aspect and respondents adoption status. The fact that it is the responsibility of the health institutions to procure ICT infrastructure may have influenced this decision. When public and private CCCs were compared, results revealed that there is significant relationship between respondents view of this factor

and type of CCC. Studies done by WHO (2013) while reporting on access to communication technology in HIV/AIDS treatment found similar results.

The findings revealed that most of the sampled health workers who had adopted said that information security was a very strong factor in determining whether or not they would adopt ICT. Results revealed that there is significant relationship between this aspect and respondents adoption status. Most patients require confidentiality of information about their conditions to be observed. Health workers on the other side require detailed information from patients in order to make correct diagnoses. This may have informed this decision since it is the health workers who mostly use the ICT. In regard to public and private CCCs, results revealed that there is significant relationship between this aspect and type of CCC. Similar studies by National AIDS Council of Zimbabwe (2011) while preparing the government strategic plan on HIV/AIDS concur.

The result showed that most of those who had adopted were of the opinion that image of facility was a very strong determinant of ICT adoption. Results showed that there is significant relationship between this aspect and respondents adoption status. This could have been due to belief that quality of services was the single most important objective of adopting ICT. When public and private CCCs were compared, results indicated that there is significant relationship between respondents view of this factor and type of CCC. Similar studies done by Wole *et al.* (2009) in Nigeria on ICT use by reproductive health workers concur with this finding.

In this case we reject the hypothesis that technological factors do not determine health workers ICT adoption levels, on the other hand we fail to reject the hypothesis that, ICT complexities, compatibility, affordability, security of information and image of facility do not determine ICT adoption levels since they were significantly related.

Investigations revealed that majority of the health workers who had adopted said that competitive pressure was a determinant of ICT adoption. Results revealed that there is significant relationship between this aspect and respondents adoption status. Adoption of ICT would definitely improve services of a facility and therefore give it competitive advantage over others. This would attract patients to the facility. When public and private CCCs were compared, results indicated that there is significant relationship between this aspect and type of CCC. Findings of this agree well with those recorded by UNESCO (2010) during its study of how to engage the private sector to upgrade the ICT infrastructure.

The survey revealed that majority of health workers who had adopted indicated that national values and culture is an important factor in determinant ICT adoption. Although Chi-square test showed that there is no significant relationship between this aspect and respondents adoption, this could have been informed by recent government initiatives to popularize ICT and its contribution to development. In regard to public and private CCCs, results indicated that there is significant relationship between this aspect and type of CCC. Results of this study agree with the report on studies done by Federal government of Nigeria (2009) while carrying

out studies for national HIV ICT policy indicated that majority of respondents agreed that national values and culture of people is a strong determinant of ICT adoption.

A majority of respondents who had adopted agreed that patients' pressure was a determinant of ICT adoption by health workers. Results revealed that there is significant relationship between this aspect and respondents adoption status. Patients have nowadays become aware of their rights to quality services and do demand for quality services. This probably informed this decision. When public and private CCCs were compared, results showed that there is significant relationship between this aspect and type of CCC. This finding agrees well with results of earlier studies conducted by GOK (2012) on the role of patients in adoption of ICT in health services.

We therefore fail to reject the hypothesis that external environmental factors of government Policies, national values and culture do not determine health workers ICT adoption. Conversely, we reject the hypothesis that external environment factors of competitive pressure and patient's pressure do not determine adoption since they were significantly related.

5.5 Predictors of ICT adoption status

In order to determine the real predictors of health workers ICT adoption status, all variables that were found to be significantly related to adoption status were subjected to Multinomial Logistic Regression analysis. Results of the study showed that most of those who had adopted ICT were recorded among health workers who had a

positive perception of access as a driver of ICT. Results of Multinomial Logistic Regression indicated that this aspect was indeed a strong predictor of health workers ICT adoption status. This can be explained by the fact that one has to have access to any technology in order to adopt and use it. This finding is in support of (Parasuraman, 2002) who found that all over the world, access of both ICT infrastructure and training are viewed by majority (60%) as precursors of ICT adoption and usage in any field, be it entrepreneurship, healthcare or Agriculture.

The results showed that most of the health workers who had adopted ICT were observed among those who perceived personalization as an ICT driver positively. Results showed that this aspect was a strong predictor of health workers ICT adoption status. This trend can be attributed to the importance attached to customization and personal specifications in usage and adoption of technologies. This finding is in support of observation made by Gagnon *et al.* (2003) while studying customization of ICT in health care in developing countries. They established that over 80% of users who perceive customization positively were more likely to adopt ICT.

The findings of the survey indicated that majority of those who had adopted ICT was observed among health workers who had a positive perception of security /privacy as an ICT driver. Results of Multinomial logistic Regression ($p = 0.029$) revealed that indeed this aspect was a very strong predictor of respondents ICT adoption status. This finding could mean that the health workers who perceived ICT security especially that of information were more likely to adopt ICT. Security of information

is a very significant ingredient of ICT acceptance especially by health workers. This observation agrees well with data recorded by the National Aids Control Council of Zimbabwe while investigating use of ICT in health facilities in the country. In some instances there has been total (100%) rejection of ICT where security of information has not been guaranteed (National Aids Control Council of Zimbabwe, 2011).

Results of the study showed that majority of those who had adopted ICT was recorded among health workers who were of the opinion that quality of ICT systems was an influencing factor of ICT adoption. Results indicated that this particular aspect was a very strong predictor of respondents ICT adoption status. This scenario could be due to beliefs that good quality technology will give effective and reliable services, hence encourage adoption as opposed to those of poor quality. Data recorded by Black *et al.* (2007) while studying digital divide in Australia is supported by this finding. They found that over 60% of health workers who had adopted ICT held that quality of ICT systems was a contributing factor.

A large proportion of those who had adopted ICT were observed among health workers who were of the view that information intensity was a determining factor in ICT adoption. Findings indicated that this aspect was a very strong predictor of health workers actual ICT adoption status. This meant that institutions and facilities whose information flows were highly intense were more likely to adopt ICT compared to those ones where information intensity was low. Similar studies conducted by World Bank (2011) on mobile applications for health care are in

agreement with this finding. Over two thirds of those who participated in the survey agreed that the rate of information flows helped them adopt ICT.

A larger proportion of those who had adopted ICT were recorded among health workers who agreed that management support is a determining factor of ICT adoption. Results showed that this organizational aspect was a strong predictor of the respondents ICT adoption status. This could mean that those facilities where management supports ICT adoption the health workers were more likely to adopt the new technologies compared to those where management support is not available. Data recorded by UNESCO (2012) while studying integration of ICT in curriculum of Medical Schools in selected developing countries is supported by this observation. A majority of the respondents who participated in the study maintained that management support is crucial in enabling health workers adopt and integrate ICT in healthcare services.

Most respondents of those who had adopted ICT observed among those who agreed that technological resources were a determining factor for them to adopt. Results revealed that this aspect is a strong predictor of the respondents actual ICT adoption status. It is generally argued that technological resources are a vital ingredient of ICT adoption. Studies done by Sorensen *et al.*(2008) on ICT system for HIV/AIDS and anti-retroviral therapy in South Africa found that most (71%) of respondents who had adopted ICT viewed technological resources as very important for one to adopt ICT. Findings reported in this study are in agreement with these results.

A larger proportion of those who had adopted ICT was recorded among health workers who agreed that financial resources were a determining factor in adoption. The results indicated that in deed that this aspect is a predictor of respondents ICT adoption status. This could mean that facilities with stable financial resources were more likely to adopt ICT compared to those who lacked financial resources. This finding collaborates that of Osei (2013) who observed that financial resources were the single most significant factor in developing tool of caring T.V. and other necessary ICT infrastructure to care for HIV and AIDS patients.

According to the findings of this study most of those who had adopted ICT was observed among health workers who said that ICT complexity was a very strong determinant of ICT adoption. Results revealed that this particular factor was a very strong predictor of health workers ICT adoption status. This observation could mean that health workers were more likely to adopt technologies that were relatively easy to learn and use compared to those that are supplicated and difficult to use. Findings reported in this study agrees well with observations made by Benjamin (2011) where he holds that ICT complexities were the leading contributory factors for rejection of ICT by marginalized groups such as HIV and AIDS patients.

Most of these health workers who had adopted ICT recorded among the ones who said that compatibility was a very strong factor in deterring ICT adoption. Results showed this factor was a strong predictor of respondents ICT adoption. This could have been informed by the health workers need and desire to have technologies that were compatible with the functions and clients who are basically their patients. This

finding is in support of Parasuraman (2002) who found that over a half of respondents were of the view that ICT compatibility is a predictor of adoption while investigating technology readiness by service providers in Asia. He holds that ICT technology must be compatible with the user's needs especially in health care systems.

Three quarters of those who had adopted ICT was recorded among health workers who agreed that affordability of ICT was a very strong determinant of ICT adoption. Results indicated that this factor was indeed a very strong predictor of the respondents ICT adoption status. This finding may be an indication that those health workers and facilities which could afford ICT facilities were more likely to adopt. In his evaluation of technological factors that influenced ICT adoption in SMEs in Nairobi, Muathre (2010) found that affordability of both ICT infrastructure and training was significant. His findings agree well with the observations made in this study.

The largest proportion of the health workers who had adopted ICT was recorded among the ones who stated that security of information was a very strong factor in ICT adoption. The results showed that this aspect was a very strong predictor of the respondents ICT adoption status. This finding could be due to importance attached to confidentiality of patient doctor information. Those who felt that by adopting ICT, the security of this information would not be compromised were more likely to use and adopt ICT in their services. This finding is in agreement with that of Jesica *et al.*

(2010) who found that for ICT to be accepted and actually used in the health care systems by health workers and patients, security of information must be guaranteed.

The findings of the study showed that the largest proportion of those who had adopted ICT was observed among health workers who felt that the image of facility was an important factor for ICT adoption. The results showed that this factor was a very strong predictor of respondents ICT adoption status. This pattern could be an indication that those who agreed that by adopting ICT, the services would be better and therefore improve the image of the facility were more likely to adopt ICT. This observation agrees well with that of Parasuraman (2002) who found that by incorporating ICT in service delivery by healthcare providers ultimately defines the quality of service and overall image in over 80% of the facilities involved. This contributes to client satisfaction.

The results indicated that majority of these who had adopted ICT was observed among health workers who agreed that competitive pressure is a determining factor for ICT adoption. Results showed that this factor was actually a very strong predictor of respondents ICT adoption status. The observation can be attributed to the fact that by adopting ICT services the quality of services would improve and more clients be attracted to the facility. This would provide competition to other facilities. Findings reported in this study agree well with earlier studies done by Muathe (2010) while investigating the role of ICT in competitive pressure in SMEs in healthcare. He found that by incorporating ICT in their services, over 90% of SMEs had a

competitive edge over the ones that did not. This attracted more clients and therefore better business return.

The findings of the study showed that most of the respondents who had adopted ICT were observed among health workers who actually agreed that patients pressure is a determinant of ICT adoption. Chi-square test of significance showed that this particular aspect was a strong predictor of respondents ICT adoption status. This was a noteworthy finding, given that in most service industries, the client's pressure ensures that the service provider offers the best services. In this case therefore, given that ICT improves efficiency and effectiveness of services, health workers were more likely to adopt ICT in CCCs with patients' pressure. This finding supports that of Waham *et al.* (2004) who found that clients' pressure is significant in ICT acceptance and adoption in their study of environmental factors that influence ICT adoption among healthcare workers

We therefore reject the hypothesis that ICT adoption predictors are not significantly associated with health workers ICT adoption status for the following variables since they were found to be significant predictors.

- i. Perception aspects of ICT access, personalization and security.
- ii. Organizational factors of systems quality, information intensity, financial resources, technological resources and management support.

- iii. Technological factors of ICT complexities, compatibility, affordability, information security and image of facility.

CHAPTER SIX: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

6.1 Introduction

This chapter presents summary of research findings, conclusions and recommendations.

6.2 Summary of the main findings

The study set out to describe the socio-demographic characteristics of health workers and patients in HIV and AIDS CCCs in Nairobi County. Generally, findings showed that majority (69%) of the respondents were females, most (45%) were in the age bracket 31-40 years, majority (49%) were actually married, the largest proportion (39%) had a diploma and a bachelors degree, a huge majority (81%) were economically above poverty line and most (20%) of respondents were professional Nurses and Clinical officers. In regard to public CCCs, majority (67%) were females, most (47%) were aged 31-40 years, majority (58% were actually married, most (60%) had a Bachelors degree, most (78%) were in 'above poverty line' economically and majority (22%) were Nurses. In private CCCs, results indicated that majority (71%) were females, most (41%) were aged 31-40 years, majority (52%) were single, most (67%) had a Diploma, most (78%) were in 'above poverty line' economically and majority (23%) were Medical Doctors.

One of the specific objectives was to determine health workers ICT adoption status.

The study findings showed that overall, 57% of health workers had mal adopted

while 43% had adopted ICT. The largest proportion (53%) of those who had adopted was observed in private facilities.

The study findings indicated that more than two thirds (77%) of all respondents had a positive perception of ICT drivers. The largest proportion (81%) was recorded among health workers in private facilities. It was observed that that respondents overall perceptions of ICT drivers is significantly related to adoption levels ($\chi^2 = 4.201$; $df = 1$; $p = 0.040$). Health workers who had positive perceptions tended to adopt compared to those who had negative perceptions. It also emerged that most (68%) of the respondents had a positive perception of ICT contributors. The largest proportion (81%) of respondents who had adopted was also observed among health workers in private facilities. Study findings ($\chi^2 = 2.752$; $df = 1$; $p = 0.027$) indicated that there is significant relationship between respondents perception of ICT contributors and adoption levels with health workers who had positive perception adopting compared to those who had negative perceptions.

The results further revealed that the individual factors which were significantly related to ICT adoption status were age ($\chi^2 = 0.550$; $df = 1$; $p = 0.002$) and ICT training ($\chi^2 = 3.098$; $df = 1$; $p = 0.038$). The organizational factors included size of facility ($\chi^2 = 2.484$; $df = 1$; $p = 0.015$), quality of ICT systems ($\chi^2 = 0.000$ $df = 1$; $p = 0.018$), information intensity ($\chi^2 = 10.759$; $df = 1$; $p = 0.001$), financial resources ($\chi^2 = 0.062$; $df = 1$; $p = 0.003$), technological resources ($\chi^2 = 10.396$; $df = 1$; $p = 0.020$) and management support ($\chi^2 = 0.713$; $df = 1$; $p = 0.018$). The findings showed that the technological factors that were significantly related to ICT adoption levels

were ICT complexities ($\chi^2 = 13.870$; $df = 4$; $p = 0.008$), ICT compatibility ($\chi^2 = 10.248$; $df = 4$; $p = 0.036$), ICT affordability ($\chi^2 = 19.997$; $df = 4$; $p = 0.001$), ICT information security ($\chi^2 = 5.056$; $df = 4$; $p = 0.022$) and the image of facility ($\chi^2 = 11.383$; $df = 4$; $p = 0.023$). In regard to external environmental factors, competitive pressure ($\chi^2 = 0.062$; $df = 1$; $p = 0.003$) and patients' pressure ($\chi^2 = 12.046$; $df = 4$; $p = 0.001$) were found to be significantly related to ICT adoption status.

In relation to factors that influence ICT adoption, significant predictors included ICT security ($p=0.029$), systems quality ($p=0.000$), information intensity ($p=0.001$), financial resources ($p=0.030$), technological resources ($p=0.030$), management support ($p=0.039$), ICT complexities ($p=0.005$), ICT compatibility ($p=0.035$), ICT affordability ($p=0.000$), information security ($p=0.000$), image of facility ($p=0.021$), competitive pressure ($p = 0.000$) and patients pressure ($p = 0.037$). In regard to health workers perceptions, the significant predictors of ICT adoption were found to be those of ICT access ($p=0.032$), ICT personalization ($p= 0.022$), ICT security ($p = 0.029$) and ICT optimism ($p=0.005$).

6.3 Implications of the findings

The findings of ICT adoption indicate that most of the health workers have not adopted ICT in their work place. The results also show that health workers in private facilities were ahead of public facilities in levels of ICT adoption. The role of adoption and application of ICT is to improve efficiency and effectiveness of services. The results therefore imply that delivery of services in HIV and AIDS

CCCs are not optimally efficient and effective as required. It also implies that services in private facilities are better than in public facilities.

The findings of this study show that most of the health workers had a positive perception of both the ICT drivers and contributors and therefore meaning that health workers were willing to adopt ICT. However, it was found that most health workers had not adopted ICT. This implies that the managements of the CCCs have not put in place strategies to tap and exploit this potential which will help to improve adoption levels.

The results of the study indicate that the factors that influence ICT adoption and are significantly related to ICT adoption among health workers in HIV and AIDS CCCs are:

- i. Individual factors of age and ICT training.
- ii. Organizational factors of size of facility, quality ICT systems, ICT information intensity, financial resources, technological resources and management support.
- iii. Technological factors of ICT complexities, ICT compatibility, ICT affordability, ICT information security and the image if the facility.
- iv. External environment factors of competitive pressure and patent pressure.

Adoption and actual of usage of ICT is likely to take place where Government policies and regulations are in support and favor of these factors since they are significantly related to adoption levels. The fact that most of the health workers had

not adopted ICT implies that there are inadequate policies and regulations in place regarding these factors to support ICT adoption and application.

Analysis of the study results revealed that the real predictors of health workers ICT adoption were ICT security, systems quality, information intensity, financial resources, technological resources, management support, ICT complexities, ICT compatibility, ICT affordability, information security and image of facility, competitive pressure and patients' pressure. In regard to health workers perceptions of ICT drivers and contributors, the predictors included ICT access, ICT personalization and ICT optimism. Studies elsewhere have shown that ICT adoption is more likely to take place where governments and management of organizations formulate and put up policies in support of these factors. The fact that most health workers had not adopted ICT implies that the management of CCCs has not laid enough strategies to support the real predictors of ICT adoption.

6.4 Conclusions

The study concludes that:

- i. Majority (69%) of health workers in HIV and AIDS CCCs were females, most (45%) were aged between 31- 40 years, majority (48%) were actually married, most (39%) were Diploma holders, most (81%) were in 'above poverty line' economically and majority (20%) of them were professional Nurses.

- ii. Only 43% of the health workers in HIV and AIDS CCCs have adopted ICT which is considered sub optimal and that more (53%) health workers in private facilities have adopted ICT compared to their counterparts in public facilities (33%).
- iii. Majority (77%) of health workers in HIV and AIDS CCCs has a positive perception of ICT drivers and that most (68%) of them have positive perceptions of ICT contributors. Results of FGDs showed that majority of HIV and AIDS patients had positive perceptions of ICT drivers and contributors.
- iv. The factors that influence ICT adoption and are significantly related to ICT adoption in HIV and AIDS CCCs are:
 - a. Individual factors comprising of gender and ICT training.
 - b. Organizational factors comprising quality of ICT systems, ICT information intensity, financial resources, technological resources and management support.
 - c. Technological factors comprising of ICT complexities, ICT compatibility, ICT information securities and image of facility.
 - d. External environmental factors comprising of competitive pressure and patient pressure.

The predictors of health workers ICT adoption status are factors of ICT security, systems quality, information intensity, financial resources, technological resources,

management support, ICT complexities, ICT affordability, ICT compatibility, information security, and image of facility, competitive pressure and patients' pressure. The significant perception predictors of ICT adoption are ICT access, ICT personalization, ICT security and ICT optimism.

6.5 Recommendations

In order to ensure optimum ICT adoption by health workers and patients in HIV and AIDS CCCs, the study recommends to the Ministry of Health both at National and County levels as well as other interested stakeholders such as NACC, NASCOP, WHO, UNAIDS and USAID that:

- i. In order to optimize ICT adoption levels of health workers and HIV and AIDS patients, managements of the CCCs should support the workers through continuous on job ICT training. They should also develop ICT strategic plans that will enable them have competitive edge in terms of business and which will improve the effectiveness and efficiency of the services offered to the patients.
- ii. The management of the CCCs should provide ICT infrastructure and motivational rewards which will help in exploiting the potential in positive perceptions of ICT by health workers and patients.
- iii. Both National and County Governments formulate policies and regulations that will favor the organizational, technological and external environment factors that were found to be significantly related with health workers ICT adoption.

- iv. Both National and County Governments enact ICT laws favorable to predictors of ICT adoption. This will enable the managements of CCCs acquire ICT infrastructure and provide capacity building and therefore make ICT available and accessible to health workers.

6.6 Further research

This study generally investigated Health workers and patients ICT adoption in HIV and AIDS CCCs. It is recommended that studies be done on ICT adoption and integration in management and treatment of Tuberculosis component in HIV and AIDS.

This study focused mainly on health workers since they were the primary respondents. HIV and AIDS patients were used only in FGDs in order to triangulate the opinions of the health workers. It is therefore recommended that further studies be done to investigate their ICT adoption levels.

Finally, findings of this study revealed that health workers in private CCCs have adopted ICT more than their counterparts in public. It is recommended that research be done with an objective of bridging the gap between private HIV and AIDS CCCs.

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APPENDIX 1: Questionnaire for Health Workers

Would you like to share the findings of this study?

a) Yes

b) No

General Instructions: The purpose of this questionnaire is to collect data on “*ICT Adoption Levels in HIV and AIDS Comprehensive Care Centers in Nairobi County, Kenya*”. The questionnaire consists of five sections. Make sure you respond to all the statements.

(Note: In this study the ICT facilities will be limited to: personal computers (both hardware and software) , LAN, fixed and mobile phones, email, internet, websites, satellite systems, video conferencing, social media (Facebook, twitter, LinkedIn and G+), radio, TV, print media, patients information database.

Respondent _____ Name _____ (optional)

Organization _____ name _____

Health Workers background information

Demographic information

1. Respondents gender? (1) Male [] (2) Female []

2. What is your age? (1) 18 – 22 [] (2) 21 - 30 [] (3) 31- 40 [] (4) 41-50 [] (5) Above 50 []

3. What is your marital status? (1) Single [] (2) Married [] (3) Widow [] (4) Widower []

Social-Economic information

4. What is your highest completed academic level? (1) High School Certificate []
 (2) Diploma [] (3) Bachelors [] (4) Masters [] (5) Ph.D. []

5. What is your designation? (1) Doctor [] (2) Clinical Officer [] (3) Nurse []
 (4) Records Officer [] (5) Lab. Technician [] (6) pharmacist [] (7) Counselor []
 (8) Others []

6. What economical level do you consider yourself in? (1) Below the poverty line []
 (2) Neutral [] (3) Above poverty line []

7. On a scale of 1-5 (1 being very negative and 5 very positive), indicate your level of agreement with the statement that “ones economic status influences his/her ICT adoption” (1) strongly Disagree [] (2) Disagree [] (3) Neutral [] (4) Agree [] (5) Strongly Agree []

(B) ICT adoption levels

8. Has your C.C.C adopted ICT? (1) Yes [] (2) No []

9. If yes, how many services are ICT enabled? (1) 1-3 departments [] (2) Above 3 departments []

10. Are you ICT compliant? (1) Yes [] (2) No []

11. If yes, do you use ICT to offer services your C.C.C.? (1) Yes [] (2) No []

12. State (A) if you have access or not to (B) if you have adopted or not the following forms of ICT.

NO	ITEM	RESPONSE			
		ACCESS		ADOPTION	
		YES	NO	YES	NO
1	Electronic patients records				
2	fixed and mobile phone sms and calls				
3	Computers – both hardware and software				
4	e-mail				
5	Internet				
6	Social media				
7	Electronic media				
8	Print media				
9	Satellite systems				
10	Websites				

(C)Health Workers perceptions on adoption of ICT in CCC services

13. Ask for the respondent's view and perception of the ten dimensions of ICT in regard to assisting them adopt ICT On a scale of 1 – 5 (1 being very negative and 5 being very positive)

Key: SD-strongly Disagree, D-disagree, N-Neutral, S T-Strongly Agree, A - Agree

NO	ITEM	Response				
		SA	A	N	D	SD
1.	Access					
2.	Ease of navigation					
3.	Efficiency					
4.	Personalization					
5.	Security/Privacy					
6.	Responsiveness					
7.	Assurance/Trust					
8.	Site Aesthetics					
9.	Reliability					
10.	Flexibility					

(D) ICT adoption perceptions on the four ICT drivers by Health Workers in CCCs

14. On a scale of 1 – 5 (1 being very negative and 5 being very positive) ask participants perceptions and the level of agreement to which the following drivers of ICT readiness have either contributed or inhibited their ICT adoption.

Key: SD-strongly Disagree, D-disagree, N-Neutral, S T-Strongly Agree, A- Agree

NO	ITEM	Response				
		SA	A	N	D	SD
	CONTRIBUTORS					
1.	Optimism					
2.	Innovation					
	INHIBITORS					
3.	Insecurity					
4.	Discomfort					

(E) Factors influencing ICT adoption in CCCs

E.1 (Individual Factors)

15. Do you think gender influences the level of ICT adoption? (1) Yes [] (2) No []

16. Do you think age influences the level of ICT adoption? (1) Yes [] (2) No []

17. Does one's marital status influence adoption of ICT? (1) Yes [] (2) No []

18. According to you, which age category of Health Workers is likely to adopt ICT fastest? (1) 18 – 22 [] (2) 23 - 30 [] (3) 31- 40 [] (4) 41-50 [] (5) Above 50 []

19. Indicate the services you offer in this facility which have adopted ICT (1) VCT [] (2) ART [] (3) PMCT [] (4) Psycho- Social Counseling [] (5) T.B. Treatment [] (6) patients records [] (7) Any other specify

20. For how long have you been serving in this C.C.C? (1) 1 – 5 yrs [] (2) 6 – 10 yrs [] (3) 11- 15 yrs [] (4) Above 15 yrs []

21. In your opinion, does the level of education influence ICT adoption by Health Workers in CCCs? (1) Yes [] (2) No []

22. Do you think the other Health Workers of your C.C.C. are innovative in terms of bringing new ideas and changes in the facility? (1) Yes [] (2) No []

23. If yes, do you think their innovation influences ICT adoption in this C.C.C? (1)Yes [] (2) No []

24. Are the Health Workers ICT literate? (1) Yes [] (2) No []

25. Do you think the Health Workers ICT knowledge influences your facility in adopting ICT?(1) Yes [] (2) No []

26. What are the ICT applications mainly used for? (1) Admissions [] (2) Administrative purposes [] (3) Offering services [] (4) Defaulter Tracking [] (5) Internal Communication [] (7) External Communication [].

E.2: Organizational Factors and ICT Adoption in C.C.Cs

27. Which category is your facility? (1) Public [] (2) Private [] (3) F.B.O []

28. Do you think the Level of the facility has influenced your decision to adopt ICT? (1) Yes [] (2) No []

29. If yes, which facility is likely to adopt ICT in C.C.C services (1) Health Center [] (2) Hospitals [] (3) Dispensary []

30. Do you have access to ICT facilities? (1) Yes [] (2) No []

31. If yes, which ones? (1) Telephone [] (2) Email [] (3) Internet (Social Media) []
 32. Are you happy with the quality of the ICT systems in the facility you attend? (1) Yes [] (2) No []

33. Do you think the quality of the systems influence your adoption of ICT? (1) Yes [] (2) No []

34. What is the rate of information intensity in your facility? (1) High [] (2) Low []

35. Do you think the intensity contributes to the level of ICT adoption by your facility? (1) Disagree [] (2) Agree []

36. Do you find your facilities ICT systems adequately specialized/aligned to current services offered? (1) Yes [] (2) No []

37. Do you think ICT specialization/alignment with the services being offered contributes to ICT adoption? (1) Yes [] (2) No []

38. Is the management of the institution supportive of innovations? (1) Yes [] (2) No []

39. If yes, does management support affect your willingness to adopt ICT? (1) Yes [] (2) No []

40. In your facility, do you use ICT facility voluntarily? (1) Yes [] (2) No []

41. Do you think voluntary use of ICT facilities contributes to adoption? (1) Yes [] (2) No [] Explain your answer

42. On a scale of 1 – 5 (1 being very negative and 5 being very positive) rate the level of agreement at which you think ICT specialization/alignment has contributed to ICT adoption?

43. Strongly Disagree [] (2) Disagree [] (3) Neutral [] (4) Agree [] (5) Strongly Agree []

44. On a scale of 1 – 5 (1 being low intensity and 5 being very intense) rate the level at which information intensity contributes to ICT adoption (1) Very little [] (2) Little [] (3) Moderate [] (4) Much [] (5) Very Much []

45. On a scale of 1-5 (1 being very negative and 5 very positive) rate the level at which use of ICT in the facility is voluntary (1) strongly Disagree [] (2) Disagree [] (3) Neutral [] (4) Agree [] (5) Strongly Agree []

46. On a scale of 1 – 5 (1 being very negative and 5 being very positive) indicate the level of your satisfaction with the quality of ICT systems (1) Very Unsatisfactory [] (2) Unsatisfactory [] (3) Neutral [] (4) Satisfactory [] (5) Very Satisfactory []

47. On a scale of 1-5 (1 being very negative and 5 very positive), rate the levels of agreement with the statement that 'adequate resources facilitate ICT adoption' (1) strongly Disagree [] (2) Disagree [] (3) Neutral [] (4) Agree [] (5) Strongly Agree []

48. Do you think the facility you work in has adequate resources like financial and technology for factors on new technology?

a) Financial Resources? (1) Yes [] (2) No []

b) Technological Resources? (1) Yes [] (2) No []

E.3: Technological Factors and ICT adoption in C.C.Cs

49. Do you think by adopting ICT your facility will have relative advantage over others? (1) Yes [] (2) No []

50. If yes, does relative advantage influence a facility's decision to adopt ICT? (1) Yes [] (2) No []

51. Tick the likely benefits if your CCC adopts ICT.

Improved services e.g. ART, Services []

Improved patient Satisfaction []

Improved information Storage and retrieval []

Improved service efficiency []

Improvement in communication []

Improvement of drugs and other supplies availability []

52. Rank the extent to which the following factors enhance the adoption of ICT in your facility (Rank 1 being weakest and 5 strongest)

Complexity of facilities

(1) Very Weak [] (2) Weak [] (3) Neutral [] (4) Strong [] (5) Very Strong []

Lack of compatibility of ICT facilities

(1) Very Weak [] (2) Weak [] (3) Neutral [] (4) Strong [] (5) Very Strong []

Affordability of ICT

(1) Very Weak [] (2) Weak [] (3) Neutral [] (4) Strong [] (5) Very Strong []

Information Security

(1) Very Weak [] (2) Weak [] (3) Neutral [] (4) Strong [] (5) Very Strong []

Lack of improvement in the image of the facility

Very Weak [] (2) Weak [] (3) Neutral [] (4) Strong [] (5) Very Strong []

E.4: External Environment

52. Rank the competition strengths of the facility you work in (Rank 1 – 5) (1) Very Weak [] (2) Weak [] (3) Neutral [] (4) Strong [] (5) Very Strong []

53. Do you think adoption of ICT can enable the facility deal with competitive pressure? (1) Yes [] (2) No []

54. In your Opinion does ICT adoption by other facilities influence your organization to adopt ICT? (1) Yes [] (2) No [] Explain your answer_____

55. In terms of ICT, how does your facility compare with others? (1) Lagging behind [] (2) At par with others [] (3) Any other _____

56. Given the scope and description of ICT as explained at the beginning of this questionnaire, do you think the government of Kenya has enacted enough laws and policies to influence ICT adoption in C.C.Cs? (1) Yes [] (2) No []

57. To what extent do you think government policies have affected ICT adoption in your C.C.Cs? (1) Not to a great extent [] (2) To a great extent []

58. Do you think the government has developed adequate national ICT infrastructure? (1) Yes [] (2) No []

59. If yes, do you find that infrastructure enough to support ICT adoption in C.C.Cs? (1) Yes [] (2) No []

60. Do you think there are any shared national values concerning ICT? (1) Yes [] (2) No []

61. If yes, do you think that they contribute to your ICT adoption? (1) Yes [] (2) No []

62. In your opinion indicate the rate (1 being very little and 5 very much) at which the national culture affects ICT adoption (1) Very Little [] (2) Little [] (3) Moderate [] (4) Much [] (5) Very Much []

63. The facility you work in has a lot of pressure from patients in need of services? (1) Yes [] (2) No []

64. Do you think the pressure from patients has influenced ICT adoption? (1) Yes [] (2) No []

65. What recommendations would you suggest for ICT adoption in CCCs?

APPENDIX 2: FOCUS GROUP GUIDE

FOCUS GROUP GUIDE FOR HIV AND AIDS PATIENTS

(A) INDIVIDUAL FACTORS (probes: individual factors that contribute and inhibit ICT adoption)

1. What is the meaning of ICT?
2. What is the association between ICT and services you seek from CCC?
3. Which individual challenges do you face in using ICT applications in seeking services from your CCC?
4. Which individual factors do you think are significant in adopting ICT in CCC services?
5. Has your CCC adopted ICT in the services it offers you?

B ORGANIZATIONAL FACTORS (probes: factors associated with organizations)

6. If it has, which ICT applications has it adopted?
7. What is the quality of ICT systems in your CCC?
8. Do you think the intensity of information in your CCC helps you adopt ICT?
9. How does the management innovation help you in adopting ICT?

C TECHNOLOGICAL FACTORS (probes: factors associated with technology)

10. How does voluntary use of ICT assist you in adopting ICT in your CCC?
11. Which resources do you think are critical in your CCC adopting ICT?
12. What are the factors that enhance ICT adoption in your CCC?
13. What are the likely benefits if your CCC adopts ICT?
14. Which factors do you think limit use of ICT in your CCC?

D EXTERNAL ENVIRONMENT FACTORS (probes: factors that are external)

15. How competitive is your CCC in terms of services offered?
16. How does competitive pressure assist your CCC in adopt
17. What is the role of the Government in facilitating CCCs adopts ICT and if any, what has it done?
18. What are the national values regarding adoption of ICT in CCCs?
19. What mechanisms can be put in place to promote adoption of ICT in CCCs?

APPENDIX 3: CONSENT FORM

INFORMATION AND COMMUNICATION TECHNOLOGY ADOPTION LEVELS IN HIV AND AIDS COMPREHENSIVE CARE CENTERS IN NAIROBI COUNTY, KENYA

Facility name.....

Good morning/afternoon.

I am Kenneth K. Rucha, student no. P97/22289/10, a student at Kenyatta University undertaking a postgraduate degree. I am conducting a survey on the above topic. I wish to request for permission from the in charge of this facility to interview both the Health Workers and the patients. I already have been granted permission by the Kenyatta University Ethics Review Committee and the Kenya National Council for Science and Technology. The information you will provide will help me to determine the current status of ICT adoption, establish factors influencing its application and come up with a frame work that could help adopt, integrate and apply it in HIV and AIDS Comprehensive Care Centers in Nairobi County, Kenya. I am humbly requesting both the Health Workers and patients to cooperate with me and provide the necessary information.

I realize that this is quite a detailed interview schedule .You might get tired midway. You may also find that some questions are offending and not acceptable as per your religious and cultural beliefs. However, you do not have to respond to every question but I would appreciate if you answer all the questions. You can withdraw from the interview at any time if you do not wish to continue.

I appreciate the time you are taking to provide me with the valuable feedback but please feel free to ask for clarification of any question that you may not understand well so that you can give an accurate answer.

The information you provide will help me recommend interventions geared towards improvement of adoption, integration and application of ICT in HIV and AIDS Comprehensive Care Centers in Nairobi County, the whole of Kenya and the world in general.. This will help the Health Workers quality services to patients and help reduce the burden of morbidity and mortality associated with HIV and AIDS.

The information you will provide will only be used for academic purposes, will be treated with privacy and confidentiality it deserves. None of the information will be disclosed to any authority and your identity as a respondent will not be revealed.

In case of any queries concerning this study you are free to contact the following three referees who are my supervisors.

DR. Ochieng Otieno. Telephone No. 0719506770.

DR. Michael Gicheru. Telephone No. 0722609765.

DR. Andre Yitambe. Telephone No. 0715720568.

You may also contact Kenyatta University Ethics Review Committee through the following Email: kurc.charman@ku.ac.ke

Please listen carefully to the questions and provide accurate answers.

If you accept please sign below or give an oral consent.

Sign.....

Date.....

Thank you for accepting to participate.

APPENDIX 4: Authority Letter from Kenyatta University Graduate School

APPENDIX 4

Authority Letter from Kenyatta University Graduate School



**KENYATTA UNIVERSITY
OFFICE OF THE DEAN, GRADUATE SCHOOL**

E-mail: kubps@yahoo.com
dean-graduate@ku.ac.ke
 Website: www.ku.ac.ke

P.O. Box 43844, 00100
 NAIROBI, KENYA
 Tel. 810901 Ext. 57530

Our Ref: P97/22289/10

Date: 10th September, 2012

The Permanent Secretary,
 Ministry of Higher Education,
 Science & Technology
 P.O. Box 30040,
 NAIROBI.

Dear Sir/Madam,


RE: RESEARCH AUTHORIZATION

I write to introduce **Mr. Rucha Kenneth Kibaara** who is a Postgraduate Student of this University. He is registered for a Ph.D degree programme in the Department of Health Service Management & Informatics in the School of Public Health.

Mr. Kibaara intends to conduct research for a thesis entitled, **"Information and Communication Technology Adoption Levels in HIV and AIDS Comprehensive Care Centres in Nairobi County, Kenya."**


Any assistance given to him will be highly appreciated.

Yours faithfully,


 MRS. LUCY N. MBAABU
 FOR: DEAN, GRADUATE SCHOOL

JMO/bkk

APPENDIX 5: Authority letter from Kenyatta University Ethics Review Committee



**KENYATTA UNIVERSITY
ETHICS REVIEW COMMITTEE**

Fax: 8711242/8711575
 Email: kuerc.chairman@ku.ac.ke
 kuerc.secretary@ku.ac.ke
 Website: www.ku.ac.ke

P. O. Box 43844
 Nairobi, 00100
 Tel: 8710901/12
 Tel: 8710901/12

Our Ref: KU/R/COMM/51/99 Date: November 8th, 2012

Rucha Kenneth Kibaara
 School of Public Health
 Kenyatta University
 P. O. Box 43844, Nairobi.

Dear. Mr. Kibaara,

APPLICATION NUMBER PKU/068/160 OF 2012 – ‘INFORMATION AND COMMUNICATION TECHNOLOGY ADOPTION LEVELS IN HIV AND AIDS COMPREHENSIVE CARE CENTRES IN NAIROBI COUNTY, KENYA’- *VERSION 2*

1. IDENTIFICATION OF PROTOCOL

The application before the committee is with a research topic, Information and Communication Technology Adoption Levels in HIV and AIDS Comprehensive Care Centres in Nairobi County, Kenya’ *version 2* dated 30th October 2012.

2. APPLICANT

Rucha Kenneth Kibaara
 School of Public Health
 Kenyatta University
 P. O. Box 43844, Nairobi.

3. SITE

Nairobi County – Kenya.

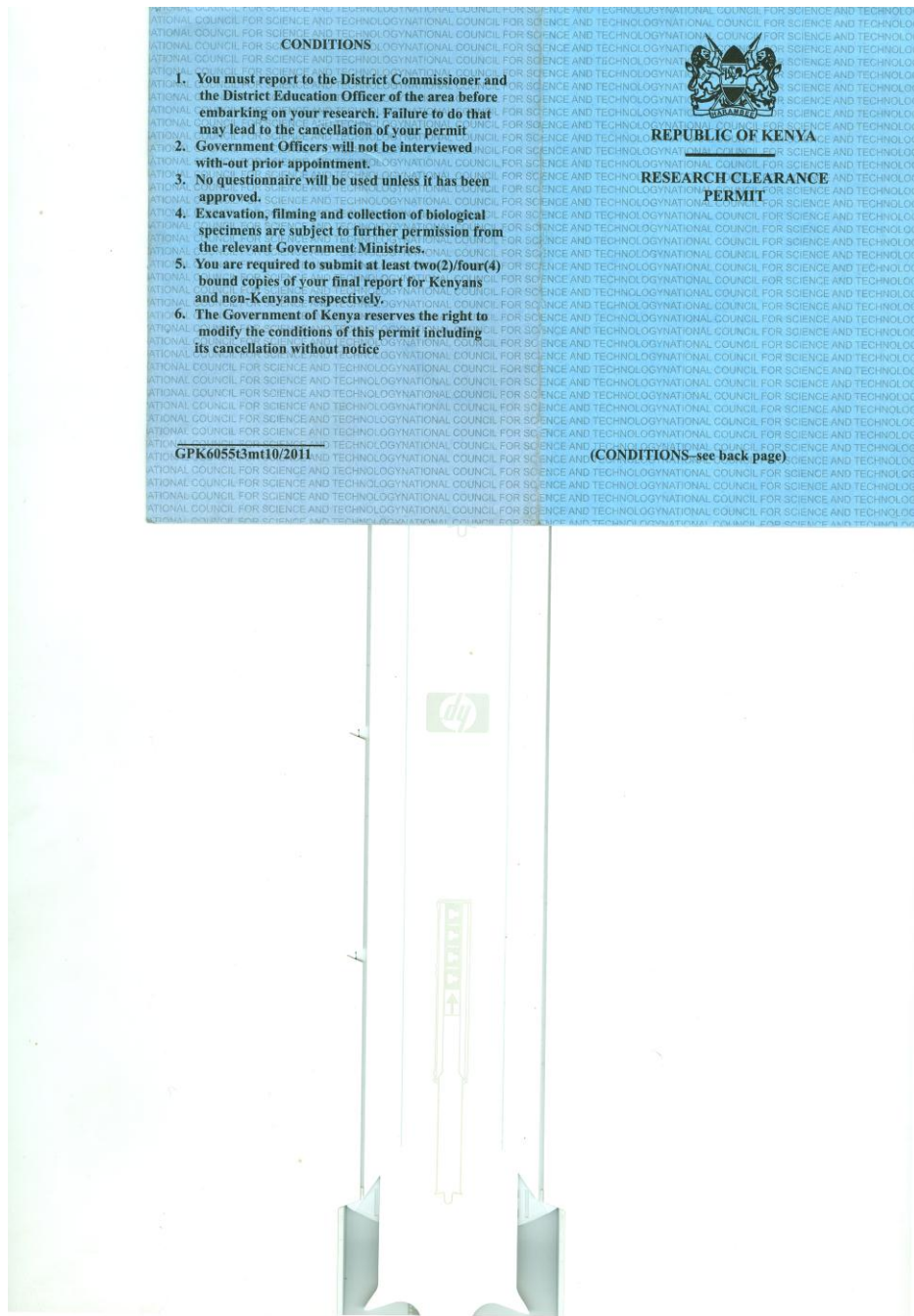
4. DECISION

The committee has considered the research protocol in accordance with the Kenyatta University Research Policy (section 7.2.1.3) and the Kenyatta University Ethics Review Committee Guidelines, and is of the view that against the following elements of review,


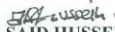
- (i) Scientific design and conduct of study,
- (ii) Recruitment of research participant,
- (iii) Care and protection of research participants,
- (iv) Protection of research participant’s confidentiality,
- (v) Informed consent process,
- (vi) Community considerations.

AND APPROVED that the research may proceed for a period of ONE year from 8th November, 2012

APPENDIX 6: Research permit from Council for Science and Technology



**APPENDIX 7: License from Council for Science and Technology to conduct
research**

<p>REPUBLIC OF KENYA</p> 	
<p>NATIONAL COUNCIL FOR SCIENCE AND TECHNOLOGY</p>	
<p>Telephone: 254-020-2213471, 2241349 254-020-310571, 2213123, 2219420 Fax: 254-020-318245, 318249 when replying please quote secretary@ncst.go.ke</p>	<p>P.O. Box 30623-00100 NAIROBI-KENYA Website: www.ncst.go.ke</p>
<p>Our Ref:</p> <p>NCST/RCD/13/012/68</p> <p>Rucha Kenneth Kibaara Kenyatta University P.O.Box 43844-00100 Nairobi.</p>	<p>Date:</p> <p>24th October 2012</p>
<p><u>RE: RESEARCH AUTHORIZATION</u></p>	
<p>Following your application for authority dated 27th September, 2012 to carry out research on "<i>Information and Communication Technology adoption levels in HIV and AIDS comprehensive care centres in Nairobi County, Kenya,</i>" I am pleased to inform you that you have been authorized to undertake research in Nairobi County for a period ending 30th April, 2013.</p>	
<p>You are advised to report to the Provincial Commissioner, Provincial Director of Education and the Provincial Director of Medical Services before embarking on the research project.</p>	
<p>On completion of the research, you are expected to submit two hard copies and one soft copy in pdf of the research report/thesis to our office.</p>	
<p> SAID HUSSEIN <u>FOR: SECRETARY/CEO</u></p>	
<p>Copy to:</p> <p>The Provincial Commissioner The Provincial Director of Education The Provincial Director of Medical Services Nairobi Province.</p>	
<p><small>"The National Council for Science and Technology is Committed to the Promotion of Science and Technology for National Development".</small></p>	

APPENDIX 8: Authority letter from Ministry of Health**MINISTRY OF PUBLIC HEALTH AND SANITATION
OFFICE OF THE DIRECTOR**

Telegrams: "MINIHEALTH", Nairobi
Telephone Nairobi 2717077
Email: psph@health.go.ke
When replying please quote

AFYA HOUSE
CATHEDRAL ROAD
P O Box 30016 00100
NAIROBI

MOPHS/ADM/2/1

29th November, 2012

Provincial Director Ministry of Public Health and Sanitation Nairobi County
Provincial Director Ministry of Medical Services Nairobi County

AUTHORIZATION TO CONDUCT STUDY RESEARCH

Thank you for your letter dated 27th November 2012.

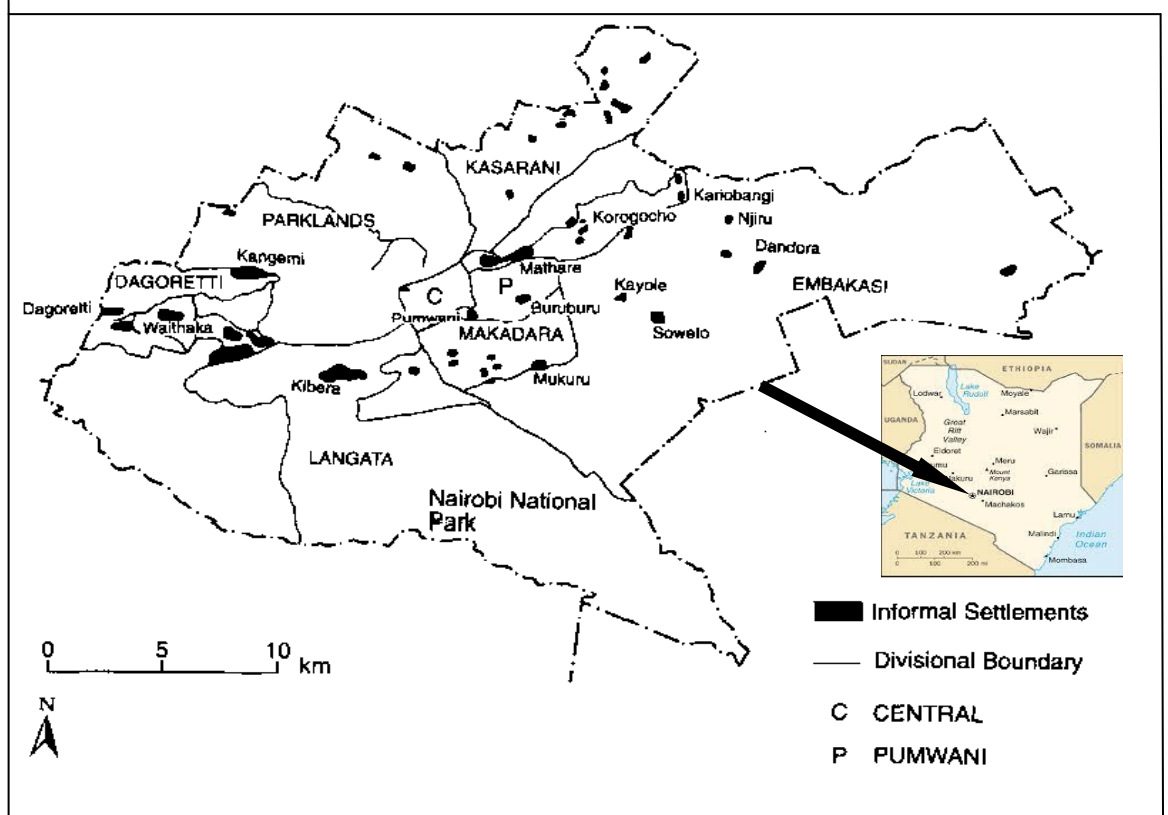
Your application to be authorized to collect data for the purposes of the study of PhD, from Public and Private HIV and AIDS Comprehensive Care Centres in Nairobi County, I am pleased to inform you that you that permission have been granted.

You are advised to comply with the guidelines directed to you as per the copies of authorization letters from National Council for Science and Technology and Kenyatta University Ethics Review Committee attached in your authority request letter. You can interview health workers but cannot collect any patient related information.

A handwritten signature in blue ink, appearing to read 'S18'.

Dr. S.K. Sharif, MBS, MBChB, M.Med, MSc
DIRECTOR PUBLIC HEALTH AND SANITATION

APPENDIX 9: Map of Nairobi County



Source: www.flickr.com/photos/albertknyaniinima/4729795674/