

# ICTs in the Fight Against HIV/AIDS in Ethiopia: Analysis of Current State and Needs Assessment

ECA-UNDP Ethiopia Country Office  
SPPD Project HIV/AIDS and Development

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SPPD Project HIV/AIDS and Development

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The project is funded through UNDP's Support Services for Policy and Programme Development (SPPD). Funding through SPPD resources will allow UNDP to assist the Ethiopian Government in the identification of gaps that need to be covered to successfully combat the HIV/AIDS epidemic in the country. This initiative will thereby provide for the Government a menu of options to choose from and a basis for the development of UNDP's "HIV/AIDS and Development Programme", and lay the grounds for its implementation. UNDP's HIV/AIDS and Development Programme to be developed will support the Government and the Civil Society of Ethiopia in the planning and implementation of Ethiopia's Multi-Sectoral Response to HIV and AIDS in Ethiopia.

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# Summary

Information and Communications Technology (ICT) offers potentially powerful tools to improve the fight against HIV/AIDS. ICT provides opportunities for innovative solutions, raising the visibility of issues and enabling the potential for limitless knowledge development and information sharing across all boundaries. The rationale of this study is to assess the ICT needs of stakeholders in addressing the challenge of HIV/AIDS in Ethiopia.

The Economic Commission for Africa (ECA) and United Nations Development Programme (UNDP) commissioned this survey as part of their ongoing programme to support the use of ICT in the fight against HIV/AIDS in Ethiopia. The information gathered would be used by ECA/UNDP and its partners to assess interventions that may be useful for HIV/AIDS programmes and activities in the country. The research process was placed under the direction of the Support Services for Policy and Programme Development (SPPD) unit at ECA. Throughout the duration of the project, the consultant drew on the expertise of a range of stakeholders including members of academic institutions, educators from HIV/AIDS stakeholders, members of nongovernmental organizations (NGOs), donor and UN agencies operating in the field, and other relevant organizations.

The main objective of the study was to assess the ICT needs and to examine the current state of HIV/AIDS stakeholders and to investigate the nature and extent of ICT provision in the fight against HIV/AIDS. The study tries to form a picture of the HIV/AIDS stakeholders' ICT environment.

Equally important was to identify factors that could be regarded as hindering the use of ICTs in the fight against HIV/AIDS. All these issues were used to provide insights for key considerations in the use of ICTs and to help in identifying key areas for strategic interventions towards achieving these objectives.

This survey report looks at the role of ICT in addressing the challenges of HIV/AIDS in Ethiopia. The report provides an overview of HIV/AIDS, the way ICTs are being used to address the pandemic and some preliminary information on the views of HIV/AIDS stakeholders in the country.

The survey emphasised the necessity, above all else, to focus on the information needs and existing communication channels when considering the use of ICT in the fight against HIV/AIDS.

When compiling the information, three areas emerged as focal points showing effective contribution of ICT in the fight against HIV/AIDS. These areas were:

**Creation and Dissemination Information:** The process of creation and dissemination of information is the most critical element in educating the public and specific target groups towards understanding this pandemic, and the preventive measures and behavioral changes that can save lives. This approach is reliant on more common broadcast technologies, such as radio, television and video, and other ICTs, such as CD-ROMs and printed material.

**Application:** Application of ICT is used to improve access to information, education and communication for HIV/AIDS workers. ICTs mostly used by HIV/AIDS workers range from CD-ROMs, the Internet, to distance learning technologies.

**Research:** HIV/AIDS data and research are critical components in the long-term management strategy for HIV/AIDS. ICTs offer a significant opportunity in developing this evidence-based decision making capability.

Looking at the needs of HIV/AIDS stakeholders, recognizing preventive information as critical in the fight against HIV/AIDS, a number of respondents commented that they felt broadcast technologies were underutilized in disseminating preventative messages in the country.

Education for HIV/AIDS sector is about information and knowledge and how to apply them to their varied tasks. For HIV/AIDS workers, the need for greater education and learning opportunities was not restricted to any one category. Instead their need can be grouped into the following areas:

- Access to journals, texts, databases, etc.
- Access to basic training material
- Access to communication technology that enhanced the sharing of information
- Access to information with relevant local content and language

While many identified that meeting these needs meant access to technologies such as the Internet and distance learning, which have cost and infrastructure issues associated with them, the use of ICT as a cost-effective way to get journals, guidelines, education and training materials with limited infrastructure was highlighted.

Several respondents noted the ongoing challenges to obtain accurate data on HIV/AIDS; the lack of HIV/AIDS systems limits the ability to conduct effective activities in country. Without such capacity there is no ability to truly assess the efficacy of intervention projects in an evidence-based fashion.

ICT are essential support tools for HIV/AIDS and associated activities. And while it was not advocated that large complex networks be developed, access to information, applications to analyze data and tools to effectively disseminate information are needed elements to build on existing infrastructure to strengthen this capability. Information is the common denominator supporting these foci. With effective communications channels, integrated in the community, appropriate ICT can make a contribution in supporting the fight against HIV/AIDS.

# CHAPTER 1: INTRODUCTION

Information and Communication Technologies (ICTs) offer an important opportunity to increase the efficiency of knowledge sharing and dissemination across the globe. If the full potential of ICTs is properly harnessed, it will make a significant impact in the fight against HIV/AIDS in Ethiopia.

To promote ICTs in support of the fight against HIV/AIDS, a survey was conducted to broadly capture HIV/AIDS stakeholders' views on the use, and potential use, of ICTs in the fight against the disease. Much of the solutions to today's problems are heavily centered on technology. This survey set out to get a sense of what HIV/AIDS stakeholders felt were the issues in relation to the promotion of ICTs. The results will help to broaden and validate our understanding of the role ICTs can play, and the challenges faced in this sector of development.

The Economic Commission for Africa (ECA) and the United Nations Development Program (UNDP) Ethiopia country office identified the need for comprehensive ICT systems, and the development of appropriate and sustainable capacity in the HIV/AIDS activities. This commitment was made with a clear recognition that a huge variation in access to ICTs in Ethiopia exists. It was also recognized that the use of ICTs in HIV/AIDS activities lacks clear direction and is highly fragmented. Although these problems were recognized, the ability to address them was severely hampered by a lack of informed and critical research in this area.

## 1. Terms of reference

Stemming the spread of HIV/AIDS is one of the Millennium Development Goals (MDGs) adopted by the international community during the Millennium Summit. Households affected by HIV/AIDS bear a substantial burden of illness and death and this impacts on the entire economy by reducing the productive capacities of the human resources of various countries. In addition to the international initiatives, several Non-Governmental Organizations (NGOs) have started to provide care, support and treatment services to those affected and infected by the pandemic.

Ethiopia has formulated a policy on HIV/AIDS and is currently encouraging NGOs and civil society organizations (CSOs) to become actively involved in the fight against the disease. One of the intervention areas where most NGOs are working is awareness raising and/or behaviour change. However, the efforts of NGOs

and CSOs are limited by a number of constraints such as inadequate resources and materials, poor access to clients, low management and technical capacity, and so on. Information technology (IT) can assist NGOs to overcome or effectively manage some of these constraints in order to intervene much more effectively to serve their target populations. However, very little is known about the IT needs of NGOs and CSOs in Ethiopia. Neither is much known about areas where IT intervention would add the most value.

Within the context of the SPPD project (HIV/AIDS and Development) that the ECA and the UNDP Ethiopia Country Office are jointly executing, ECA and UNDP-Ethiopia recruited an IT consultant to assess the IT needs of NGOs and CSOs operating in the areas of HIV/AIDS in Ethiopia. The expert will undertake an in-depth review of and identify important intervention areas for IT of NGOs and CSOs working on HIV/AIDS in Ethiopia.

Working with the Health Economics Unit in the Social Policy and Poverty Team of the Economic and social Policy Division (ESPD) of ECA and under the general supervision of the Chief of the Division, the consultant will:

- Undertake a rigorous review of the IT capacities of NGOs working on HIV/AIDS;
- Assess their IT needs, taking account of their intervention areas and IT capacities; and
- Discuss the preliminary findings with consultant recruited for reviewing the institutional capacity assessment of NGOs;
- Propose prioritized areas of interventions for IT

## 1.1 Aims of this research project

This research project began in January 2003. The main objective of the study was to assess the ICT needs of HIV/AIDS stakeholders and to investigate the nature and extent of ICT provision in the fight against HIV/AIDS. More specifically, mapping what ICT resources are presently being used by the HIV/AIDS stakeholders, the manner in which they are being used and the organizational arrangements used to facilitate their use.

In addition, it aimed to identify factors that could be regarded as enabling or restricting the use of ICTs by HIV/AIDS stakeholders. The performance of the current system and issues important to stakeholders were also noted. This information can be used to provide insight into policy considerations around the creation of equity, facilitating quality in the use of ICTs and identifying key areas for strategic interventions.

## 1.2 Participants in the research

Funding to undertake the research was received from UNDP and the research process was placed under the direction of the SPPD unit at ECA. In undertaking the survey, SPPD also entered into collaborative relations with the other donor and governmental institutions. Collaboration was sought to provide information about the role of NGOs, the UN and donor agencies, in supporting ICT development in HIV/AIDS activities.

The consultant had the opportunity to engage in rigorous discussion on the study process and methods with experienced ICT and HIV/AIDS professionals and with the core members of the team who were drawn from SPPD and UNDP.

This report thus reflects the collaborative efforts of a number of people who came together to undertake what proved to be an extremely exciting but daunting task. Although all the unique contributions may appear invisible, the report is a measure of the process of collaboration and engagement, which all contributors to the process tried to sustain to the best of their abilities.

## 1.3 Report structure

The report is organized to provide an introductory overview of ICT and its relation to HIV/AIDS. Chapter 1 provides a background to the study. It outlines the use of ICTs in the fight against HIV/AIDS, and looks at factors that shape HIV/AIDS prevention and control efforts in Ethiopia. Chapter 2 provides a more detailed overview of the methodological processes followed for all aspects of the study while Chapter 3 provides a detailed description of the survey findings.

Chapter 4 deals with the findings of the survey of HIV/AIDS stakeholders. A more substantial analysis of the survey findings, along with recommendations for a way forward, is addressed in this chapter. This chapter also serves to conceptualize the survey results and to synthesize key findings in a way where areas for strategic intervention are noted.

As stated earlier, this survey marks the substantial attempt to map ICT use in the fight against HIV/AIDS in Ethiopia. As such, it is primarily an exploratory study which, based on questionnaires and interviews, only provides a picture of the terrain as it existed when the study was carried out. While it is recognized that this subject area is in constant flux, with new and innovative developments taking place everyday, the survey provides valuable insights into some of the key issues, both positive and negative, which characterize the development of ICTs among Ethiopian HIV/AIDS stakeholders, present and future.

## 1.4 Definitions and abbreviations

ICTs are the convergence of microelectronics, computers and telecommunications. These devices make it possible for data, including text, video and audio signals, to be transmitted anywhere in the world where these digital signals can be received. ICTs thus incorporate a range of technologies used to support communication and information. ICTs include both networks and applications. Networks are fixed, wireless and satellite telecommunications. Well-known applications are the Internet, database management systems and multimedia tools.

Hamelink (1997) provides a useful and clear definition of ICTs, indicating that ICTs are those technologies that enable the handling of information and facilitate different forms of communication. These include capturing technologies (camcorders), storage technologies (CD-ROMs), processing technologies (application software), communication technologies (local area networks), and display technologies (computer monitors). ICT encompasses a wide range and complexity of technology including, telephone (copper wire, fiber optic, wireless), radio, television, Internet, email, videoconferencing, multimedia (videocassette, CD-ROMs), and electronic networks.

For the purpose of this report, ICT can be defined as any information and communication technology involved in enabling the capture, processing, storage, transmission and communication of information through electronic means.

## 1.5 Information and Communication Technologies in Ethiopia

Many of the fundamental conditions that have enabled developed countries to exploit ICT are non-existent in Ethiopia. Stable and growing economies with considerable capital resources are required to make the significant infrastructure investment required. Political support, a service-oriented culture, and a strong educational system are also key requisites. These are some of the major challenges being faced in Ethiopia today.

Information technology is still not fully formed in the country. A digital divide is emerging between agencies and institutions that can install and operate ICT systems, especially those with high fixed and operational costs, and institutions that cannot afford them. Yet business, government and key services in HIV/AIDS, health and education recognize that they must be, to some degree, part of the ICT revolution. This is needed in order to keep informed, reach broader audiences with more effective services and promote overall objectives.

ICTs, and in particular the Internet, have fundamentally changed the developed world. Some of the changes include more open and responsive government, access to huge amounts of information, and the ability to share information, network and

communicate virtually. But for Ethiopia, where the most basic needs are still not met, how ICTs fit and their role as a tool to achieving primary development objectives is still in question.

The Internet and its associated technologies are being heralded as the latest and possibly greatest tool in collecting, building and disseminating information and knowledge.

Vital services such as HIV/AIDS prevention/treatment/care, especially in rural and isolated communities, face challenges of attracting and keeping HIV/AIDS workers. ICT can support this through opening communication channels, enhancing the ability to exchange information, continue education and remain connected to the larger community. ICTs do not in themselves guarantee benefits to people. In the rush to implement ICTs and promote their potential, the focus must be on people as the ultimate recipients of any benefit. The processes and organizations that support them can be optimized by ICTs, but ICTs must remain servants to the true needs of the target audience. Needs must drive the solutions and this is particularly true in the fight against HIV/AIDS.

## 1.6 The HIV/AIDS Pandemic in Ethiopia

Ethiopia's HIV/AIDS epidemic is classified as "generalized" and continues to impact every sector of society. According to the Ministry of Health (MOH), approximately 3.2 million Ethiopians are living with HIV/AIDS, though the Joint United Nations Programme on HIV/AIDS (UNAIDS) had estimated a total of 2.1 million at the end of 2001, with an adult prevalence of 6.4 percent. The U.S. Census Bureau estimates that life expectancy in Ethiopia will decline to about 42 years due to AIDS by 2010; without AIDS, life expectancy would be 55 years.

According to the MOH, sexual contact and perinatal transmission are the predominant modes of HIV transmission. Currently, 87 percent of all HIV/AIDS infections result from heterosexual transmission. As of October 1997, men comprised about 61 percent of reported AIDS cases. HIV prevalence among pregnant women in Addis Ababa increased from 5 percent in 1989 to 18 percent in 1997.

As of 2001, about 200,000 children under age 15 were living with HIV/AIDS. Reversing years of progress in child survival, AIDS increased Ethiopia's infant mortality rate by 7 percent from 1995 to 2000. According to the MOH, as of December 2001, an estimated 1 million Ethiopian children have been orphaned due to HIV/AIDS.

Most HIV infections in Ethiopia occur among young people in their teens and 20s, and young women are particularly vulnerable. The number of HIV-positive women in the 15 to 19 year old age group is much higher than the number of HIV-positive men in the same age group. This is due to earlier initiation of sexual activity by women and the fact that their older partners often have more than one sexual partner.

As the global community begins to comprehend and acknowledge the immense impact of HIV/AIDS, there is an increasing urgency to respond in a way that will reverse the devastation and destruction caused by the disease. However, the resources required to strengthen prevention and treatment programmes far surpass the current annual spending of \$US1.2 - 2 billion in all developing countries. UNAIDS estimates that between \$7 - 10 billion is required annually to effectively address the epidemic in low- and middle-income countries. These estimates do not include the cost of improving and expanding health and education infrastructure in these countries, which is essential in responding to HIV/AIDS, or the cost of other socio-economic interventions.

Yet the HIV/AIDS status in Ethiopia continues to remain a major problem. HIV/AIDS has added a tremendous burden to the public, and with it opportunistic infections such as TB are again taking hold and spreading.

With no vector and no other host, the spread of HIV is due entirely to human behavior. HIV/AIDS affects all strata of society. However, the poor, the uneducated and the economically disadvantaged are at the highest risk. Ethiopia is one of the most affected countries, with a higher prevalence in women than men. This is the result of less education, economic restrictions and cultural issues that place them, especially younger women, at a disadvantage. Young men, by virtue of limited education and limited economic prospects, are also vulnerable as they engage in riskier behavior.

There is no cure or vaccine for HIV, but it is preventable. A core element in the set of preventive interventions is changing behavior through communication. HIV/AIDS education is a core to identifying and communicating appropriate messages. Others include access to condoms, diagnosis and treatment for sexually transmitted diseases (STDs), and safe blood and prevention of mother-to-child transmission (PMTCT). All of these preventive measures need to be developed and brought to the national scale and sustained over time. The environment to achieve this requires a number of pre-conditions including government policy support, socio-economic support, and addressing of gender and cultural factors that contribute to risky behaviour. ICT can play a significant role in supporting activities that combat HIV/AIDS.

Promotion of preventive messages in relation to HIV/AIDS is proving to be the most effective course of action against this scourge. HIV/AIDS workers, church and community leaders and governments are realizing that information is a critical aspect to changing human behaviour that can save lives and will be essential in managing the spread of HIV/AIDS.

Long-term sustainability of any HIV/AIDS intervention is dependent on the viability of the HIV/AIDS system and its ability to respond to the needs of the population across the continuum of care. This requires long-term and sustained support by

donor organizations and recipient governments. It requires a business or financial model for self-sustainment within the country's realistic capabilities. It also requires technology to support the information and decision-making processes.

## CHAPTER 2: RESEARCH METHODOLOGY

### 2.1 Methodology

The research method used for this report was based on a survey issued by email, mail and interviews with approximately 55 HIV/AIDS stakeholders in the country. Only 36 responses were received and used for this report. The group of respondents consisted of representatives from local and international NGOs, donor and UN agencies, and governmental institutions involved in HIV/AIDS activities. Some additional information concerning the use of ICTs in the fight against HIV/AIDS in Ethiopia was collected through limited Internet and literature searches. As required, additional follow-up was conducted through telephone discussions.

### 2.2. The research process

A combination of quantitative and qualitative research methods was used in the study.

A postal survey was sent to a sample of Ethiopian HIV/AIDS stakeholders throughout the country. The sample of organizations was derived from a matrix prepared by the Ethiopian HIV/AIDS Prevention and Control Office (HAPCO) in 2002. Fifteen governmental institutions throughout the country (11 regional HIV/AIDS prevention and control offices), 15 local NGOs, 20 international NGOs and 5 UN and donor agencies were included in the survey.

HIV/AIDS stakeholders were requested to send back the questionnaire that was appropriate to their present status. The information obtained was expanded on through interviews with key stakeholders and site visits in Addis Ababa. Somali and Southern Regional HIV/AIDS Prevention and Control offices and the Positively Living Women Association in Awassa (Tilla) were also visited by the consultant. Once all the data had been collected, a detailed analysis was made for the research findings. The list of sample stakeholders and respondents are available in Appendix A.

The key findings of the research were synthesized into this final report.

Four distinct environments condition the provision and use of ICTs by Ethiopian HIV/AIDS stakeholders. These environments are governmental institutions, local and international NGOs, UN and donor agencies. Although the State plays a prominent role in shaping policy and jump starting provision of ICTs in HIV/AIDS, the main focus of this investigation is to map the HIV/AIDS partners' environment

by collecting baseline data on the resources available and assessing the needs of the stakeholders and how these resources are being used in the fight against HIV/AIDS. The study also identifies the constraints that hamper the promotion and use of ICTs by Ethiopian HIV/AIDS stakeholders.

## 2.3 Data collection

The research design envisaged that data would be obtained through quantitative and qualitative methods. The design required that the quantitative data would be obtained through the submission of a postal questionnaire to HIV/AIDS stakeholders throughout the country. Qualitative data was obtained through interviews, observations by the consultant during visits to the stakeholders.

## 2.4 Developing a questionnaire

The questionnaire was developed with the support of the teams from ECA and UNDP. It was tested on two IT experts and three HIV/AIDS workers from government institutions and NGOs in Addis Ababa. The most important conceptual lesson learnt was that the key focus of the questionnaire had to be on the collection of base-line data about actual conditions of ICT in HIV/AIDS stakeholders. The group advised the questionnaire to concentrate on the needs assessment and stock-taking survey of ICTs in HIV/AIDS stakeholders in the country.

## 2.5 Constructing a representative sample

On the advice of a professional statistician, there were discussions on deploying a smaller sample without foregoing an adequate representation of the overall HIV/AIDS stakeholders in the sample. The sample was made depending on their degree of HIV/AIDS activities and their profile in the sector that contained 15 local NGOs, 20 international NGOs, 5 donor and UN agencies, and 15 federal and regional government institutions involved in the fight against HIV/AIDS.

The 55 HIV/AIDS stakeholders that returned completed questionnaires constituted a response rate of 65 percent compared to the target population of 400 HIV/AIDS Stakeholders, it represents only nine percent of HIV/AIDS stakeholders nationally.

## 2.6. The interview process

Somali and Southern Regional HIV/AIDS Prevention and Control Offices and Tilla, all federal institutions, donor and UN agencies and all of the respondents of local and international NGOs were visited. Interviews were conducted with the managers or project officers or ICT coordinators in the institute.

## 2.7. Data analysis

The data collected through the questionnaires and interviews was captured and coded so that an initial overview of frequencies and general trends in responses could be ascertained. Cross-tabulations involving the coded data were then performed. The level involved the selection of grouping variables and consistently using these to identify patterns and deviations for each of the items being tested.

## 2.8. Conclusion

It is important to recognize that a study of this nature is not a comprehensive national audit of ICT in all HIV/AIDS stakeholders and the impact of ICTs in this area. The study is, therefore, not intended to provide detailed audits of all ICT resources and their use. Rather, this study is a mapping exercise designed to inform the development of intervention strategies through an analysis of data received from the sample of HIV/AIDS stakeholders.

However, since this is a comprehensive attempt to analyze the adoption and diffusion of ICTs by Ethiopian HIV/AIDS stakeholders, there may be a number of factors, which have either been overlooked or explored inadequately, for more in depth interventions. These factors could have a national, regional or even local orientation.

## CHAPTER 3: SURVEY FINDINGS

### 3.1 Response Analyses

This survey sought to broadly capture input from HIV/AIDS stakeholders on the subject of ICT use in the fight against HIV/AIDS. Much of the discussion to date has been heavily centred on technology and a technology-driven approach to issues. This study set out to get a sense from HIV/AIDS demand-driven perspective of the issues in relation to ICTs. This perspective will help broaden and validate our understanding of the role ICTs can play and the challenges faced in the sector. The survey carried out an audit of ICT resources available to HIV/AIDS intervention agencies, sought commentary on ICTs in relation to core infrastructure elements and provided specific feedback on potential uses of ICTs in HIV/AIDS prevention.

Input was sought from a wide and diverse range of sources. It was recognized that the subject of ICTs and HIV/AIDS is vast and no single survey could do justice to the subject. However, there is a lack of general input from HIV/AIDS-related organizations on the subject of ICTs and this broad approach could serve to collect and present some of those opinions.

**Table 1: Distribution of responses among the four categories of stakeholders surveyed.**

Source	Total Number of the Sample	Number of Responses
Local NGOs	15	9
International NGOs	20	14
Donor and UN agencies	5	4
Government institutions	15	9
Total	55	36

A significant amount of data was collected through the survey. Once all the data was captured, a first level of analysis was done to explore the responses of HIV/AIDS stakeholders to the different questions asked in the questionnaires. The frequency of responses was recorded and compared to significant grouping variables such as Local NGOs, International NGOs, donor and UN agencies, and governmental organizations in the country. This was done to investigate whether these variables impacted on the pattern of responses. Below is an overview of the key findings from this level of analysis.

It is divided into five sections and provides a detailed overview of the findings from the questionnaires received from stakeholders. Each section deals with a specific aspect of ICT provision in the stakeholders by providing an overview of general trends that can be gauged through basic cross tabulations of the data. The sections are:

- An audit of ICT resources
- Training on the use of ICT
- Effective use of ICT for HIV/AIDS
- Funding and maintenance of ICT
- HIV/AIDS and ICT Infrastructure Analysis

This section provides an overview of the questions contained in the questionnaire, including a discussion of the most pertinent findings. Each section ends with a short summary of the main findings in each case. With this background in mind, the summary, which follows, presents the central findings from the questionnaire designed for HIV/AIDS stakeholders.

## 3.2 Audit of ICT resources

### Hardware

The study estimates that 94 percent (34 out of roughly 36) of HIV/AIDS stakeholders in Ethiopia have one or more computers. A breakdown of these HIV/AIDS stakeholders shows that they can be segmented into four clusters with a distinct range of resource endowments and capacities. That is, local and international, NGO's, government institutions and donor and UN agencies.

Most stakeholders in the sample (36.11%) have between 11 to 29 computers, and a substantial proportion (25%) have 30 or more computers. 33.33% of stakeholders have 10 or less computers and 5.5 percent of them are without computers.

**Table 2: Distribution of Computers in the Stakeholders**

Type of Stakeholder	Stakeholders with 10 or less Computers	Stakeholders With 11 - 29 computers	Stakeholders with 30 and more computers	Stakeholders Without Computers
Local NGOs	5	2	0	2
International NGOs	1	8	5	0
Donor and UN Agencies	0	1	3	0
Government Institutions	6	2	1	0
<b>Total</b>	<b>12</b>	<b>13</b>	<b>9</b>	<b>2</b>

Out of the 942 computers, 40 of them are available in local NGOs, 543 in international NGOs, 265 are in donor and UN agencies and 94 are available in government institutions.

**Table 3: Total Number of Computers in the Sample Stakeholders**

Type of stakeholder	Number of Stakeholders	Desktop Computers	Laptop	Other	Total
Local NGOs Local NGO's	7	37	3		40
International NGOs	14	404	138	1	543
UN and Donor Agencies	4	203	62		265
Government Institutions	9	73	21 21		94 94
<b>Total</b>	<b>34</b>	<b>717</b>	<b>224</b>	<b>1</b>	<b>942</b>

International NGOs and donor and UN agencies have, on average, higher numbers of computers than local NGOs and government institutions. The average number of computers in use in international NGOs and donor and UN agencies (80.3) is significantly higher than average for all stakeholders and is nearly seventy percent higher than the average number of computers in government and local NGOs (10.4). However, any measure of the average number of computers across all stakeholders needs to be read with caution as the survey data also shows large discrepan-

cies between stakeholders. For example, while the overall average number of computers may be 90% for NGOs and donors, some stakeholders have 60 computers while others have only one.

Seventy five percent of HIV/AIDS stakeholders are under equipped with laptop computers, compared to less than 25% under equipped in desktop computers.

## Specification of computers

The processing power and subsequent capability to process multimedia content is a useful factor in determining the suitability of computers used by HIV/AIDS stakeholders. The largest grouping is those computers based on Intel Pentium III & IV processors which make up nearly 85 percent of current stock. One percent of computers have processors less powerful than Pentium I. Pentium I & II processors are found in 14 percent computers.

**Table 4: Distribution of Type of Computer in Use by Stakeholders**

Type of computer	Local NGOs	International NGOs	UN and donor agencies	Government Institutions	Total
486 and older	2	8	-	-	10
Pentium I & II	30	80	4	17	131
Pentium III & IV	8	455	261	77	801
<b>Total</b>	<b>40</b>	<b>543</b>	<b>265</b>	<b>94</b>	<b>942</b>

The majority of desktop computers run a version of Windows 95, 98, Windows NT/2000 which is 95 percent of the total stock, Windows XP runs on four percent of desktops while Windows 3.x units continue to be made redundant with fewer than five remaining – one percent of the total stocked in the local NGOs and government institutions.

Out of the 942 computers (desktop and laptop), 820 computers (87%) have cd-drives, 788 (83.65) have network cards, 669 (71%) have multimedia facilities.

## Laptop computers

There are over 224 Windows-based laptops in HIV/AIDS stakeholders. Even with rapid growth, a third of HIV/AIDS stakeholders have extensive requirements for laptops.

Twenty-eight (77.77%) HIV/AIDS stakeholders record ownership of at least one laptop. It is expected that 8 HIV/AIDS stakeholders (22%) do not have a laptop at all. There is now an average of 6.2 laptops per institution.

Of the laptops in use, 90 percent are Windows-based, 50 percent are for administrative use - compared with 12 percent of desktop computers. There is still a high demand for laptops, with a third of HIV/AIDS stakeholders having extensive requirements – compared to 25 percent for desktop computers.

## Peripherals

To make the most of desktop and laptop computers there are a number of key peripherals aimed at assisting HIV/AIDS activities. Approximately two thirds of respondents indicated that their office had peripherals to support computer technology. 31 stakeholders have fax machines and TVs, 9 radios, 8 Slide and Tape Projectors, 18 VCR, 6 CD players, 19 CDRs, 24 overhead projectors, and 4 video-conference facilities as the major peripherals.

Colour printers have been available for many years but only 10 HIV/AIDS stakeholders have at least one color printer, of which frequent use is made. Printers are the most widely used peripherals. Out of the 206 printers, 95 percent are LaserJet.

Scanners are also widely owned, by 18 HIV/AIDS stakeholders. While digital photo cameras are relatively new to the market HIV/AIDS stakeholders have made much use of their potential, 16 HIV/AIDS stakeholders owning at least one camera.

HIV/AIDS stakeholders also increasingly use digital camcorders, although, at present, 20 HIV/AIDS stakeholders record ownership. Interactive whiteboards are also a new technology which is becoming more popular, with nearly 8 HIV/AIDS stakeholders already recording ownership.

**Table 5: Distribution of Peripherals in HIV/AIDS Stakeholders**

Type of stakeholder	LNGOs	INGOs	UN and Donor agencies	Government Institutions	Total
Fax Machine	6	14	4	7	31
Colour Printer	1	3	4	2	10
Printer	15	60	101	30	206
TV	6	14	4	7	31
Radio	5	4	-	-	9
Slide and Tape Projector	2	4	2	-	8
Digital Still Camera	2	5	4	5	16
VCR	3	8	4	3	18
Scanner	1	9	6	2	18
CD player	4	1	1	-	6
Digital Camera	1	9	4	6	20
CDR	1	13	4	1	19
Interactive whiteboards	2	2	4	-	8
Digital Projectors	1	3	4	3	11
Overhead Projectors	3	13	4	4	24
Videoconference facilities	-	-	4	-	4

## Internet access and connectivity

The Internet is beginning to be used as a resource and communication tool. Internet access and connectivity requires the availability of appropriate hardware and software. A major constraint that tends to limit Internet use is the cost of connecting, transmitting information, images and data. More than 88% of stakeholders sampled have access to the Internet. This profile, however, masks some rather large differences when other factors are taken into consideration. All NGOs, donor and UN agencies have access to the Internet while 66 percent of local NGOs and 88 percent of gov-

ernment institutions have access. Similarly, stakeholders in Addis Ababa are better connected than their counterparts in the region. One reason for this may be the high telephone costs associated with accessing the Internet by using direct telephone lines and the absence of Internet facilities in the region.

**Table 6: Distribution of Internet Access**

Type of Stakeholder	Number of Stakeholder	Number of Stakeholders with Internet	Number of Stakeholders Without Internet
Local NGO's	9	6	3
INGOs	14	14	-
UN and Donor agencies	4	4	-
Government Institutions	9	8	1
Total	36	32	4

Internet use is becoming more common in a wide spectrum of HIV/AIDS stakeholders across all the regions. Over 88 percent of HIV/AIDS stakeholders in the regions that have computers have access to the Internet. The most surprising scrutiny from the study is that the government monopolizes the whole telecommunication system, but the government institutions do not have better access to the Internet and other facilities than the INGOs, donor and UN agencies. Unlike the government institutions, donor and UN agencies and some of the INGOs have the opportunity to import and use the best ICT technologies.

Fifty percent of HIV/AIDS stakeholders are well equipped with network infrastructure, with a further 50 percent under equipped. Internet communication links show a similar pattern to networking infrastructure and show the connection between the two services.

All UN and donor agencies have a computer network. Local NGOs and government institutions recorded large proportions of stakeholders without computer networks.

Despite some extreme variations, donor and UN agencies and INGOs have, on average, a better ICT infrastructure than local NGOs and government institutions.

According to the results presented, 30 percent of stakeholders have a file server, mainframe, WAN, LAN and Intranet. This tends to be the case irrespective of the type of stakeholder or region in which the stakeholder is located. Some deviations from the rule being that the local NGOs and government institutions in a relatively large sample do not have a file server.

The same qualification applies to the regional stakeholders, where 100 percent indicated that they do not have a file server.

E-mail facilities are beginning to be used more extensively in many HIV/AIDS stakeholders as a management and administrative resource. Comparatively higher proportions of staff have personal e-mail addresses compared to either management, administration or supporting staff. Just over half of the stakeholders that participated in the survey have e-mail addresses for some of their staff. In international NGOs and donor and UN agencies, 95 percent of staff have their own e-mail addresses. However, a majority of stakeholders in the local NGOs and government institutions do not have personal e-mail addresses for their staff.

In terms of reliability and performance of Internet services, 80 percent of the stakeholders are dissatisfied, five percent are content with the services and only five percent of the stakeholders are satisfied.

Almost all local and international NGOs, and Government institutions showed an interest in installing faster Internet connection in the future. UN and donor agencies have no such plan at all.

With regard to Internet use, 99 percent was for e-mail, 10 percent for networking, 80 percent for database searches, 15 percent for record keeping, 40 percent for job searches, 70 percent for file sharing, 20 percent for Listservs, three percent for on line conferencing, 54 for percent courseware/software access, 60 percent for Storage of data and work files, 95 percent as a source material for office activities, 30 percent for maintaining a webpage and two percent for online purchasing and staff training.

## **Networks and communication**

The advent of networks in general and the Internet in particular provides phenomenal opportunities for communication and data exchange among and within stakeholders. This section examines the use of networks among firms, the use of and access to the Internet, as well as the exchange of documents in an electronic fashion.

Computers are being networked at a similar growth rate as computer expansion, indicating that most new computers are added to some form of network configuration. 60 percent of HIV/AIDS stakeholders with computers had network configurations for at least a group of computers.

There are 605 networked computers, 202 of them are in UN and donor agencies and 377 of them are in international NGOs and 20 computers in government institutions on a Windows-based network.

Even with this rapid growth 19 percent of HIV/AIDS stakeholders still indicate extensive requirements for new networks while a third have no additional requirements.

The most common network form is based on a Windows environment, including NT4, Win2000 and peer-to-peer connections. The number of HIV/AIDS stakeholders with Unix-based networks continues to be limited to a few large establishments.

## Network usage and wireless networking

Networked environments provide a range of benefits from shared printing services to document exchange. Most networked HIV/AIDS stakeholders make use of these traditional networking benefits, however, Internet connectivity is becoming increasingly important, with 44 percent of all HIV/AIDS stakeholders already making significant use. This compares with 55 percent for printing and 26 percent for document exchange.

Significant use of email lags behind Internet connectivity with 14 percent of networked HIV/AIDS stakeholders making no use of this capability – a similar number to those not utilizing their networks to share HIV/AIDS information.

As networks become a key part of ICT facilities, wireless networking functionality is gaining interest, with 35 percent considering implementation to allow the mobility of networked laptops, ease network installation and reduce networking costs.

30 percent of HIV/AIDS stakeholders are interested in the ability to use laptops in multiple locations without the need to provide fixed network points. A fifth of HIV/AIDS stakeholders see this option as a way of reducing networking costs. These facilities are only available in UN and donor agencies, and international NGOs have limited facilities.

Nearly 22 HIV/AIDS stakeholders used dial-up services as their primary connection, with 5 using leased line (DDN) and 4 stakeholders using Very Small Aperture Terminal (VSAT) satellite connection in the country.

**Table 7: Means of Gaining Access to the Internet**

Type of Stakeholder	Dial up	Leased Line	Satellite (VSAT)	Total
Local NGOs	5	-	-	6
International NGOs	9	5	-	14
UN and donor agencies	-	-	4	4
Government Institutions	8	-	-	8
Total	22	5	4	32

Increasingly, attention is turning to the number of Internet access points within the institutions and the amount of bandwidth available for multi-user access. Currently, HIV/AIDS stakeholders mostly rely on dial-up as their networked access route to the Internet. This provides limited bandwidth for accessing interactive websites with significant streaming.

## Internet access

Every stakeholder with Internet connection now has at least one staff member with Internet access in the office. HIV/AIDS workers use the Internet for a range of information sourcing – most widely for obtaining content for HIV/AIDS activities. Access to the Internet for all staff is provided for nearly 95 percent of HIV/AIDS stakeholders in donor and UN agencies, 90 percent in international NGOs. Local NGOs and government institutions provide Internet access for 20 percent of their staff, 80 percent of them provide no access.

**Table 8: Factors Limiting Internet Access in HIV/AIDS Stakeholders**

	Local NGOs	International NGOs	Donor and UN agencies	Government institutions	Total
Internet cost	9	14	-	9	32
Inadequate computer	9	10	-	6	25
Speed of the connection is slow	9	12	-	9	30
No telephone connection	2	-	-	3	5
Absence of facilities	5	3	-	4	12

Over 95 percent of UN and donor agencies offer HIV/AIDS workers good access to Internet compared to 20 percent providing access of local NGOs and Government institutions to their staff. Good Internet access is provided to HIV/AIDS workers by nearly 90 percent of international NGOs.

Stakeholders were asked to specifically consider the area of Internet use and to identify the factors that prevented them from making more effective use of this facility. By far the most frequently identified factor is the cost of Internet access – 88 percent of the respondents identified the cost factor. Another 83 percent noted the Internet connection speed, 69 percent identified an inadequate number of computers in their offices, 33 percent identified lack of capacity and facilities for Internet access. Other items such as the problem of telephone connection was noted by 13 percent of the respondents.

## Software packages and usage

In terms of software, the vast majority of HIV/AIDS stakeholders are well-resourced in office applications with 56 percent being well resourced, while seven percent are under resourced.

Stakeholders were asked to indicate which software programs they use and how often they use them. As is evident from the data, word processing software, spreadsheets and software for administrative purposes are used by more than two thirds of all stakeholders with computers. It is worth pointing out that there may be some overlap between these three categories as administrative software probably includes both word processing and spreadsheet packages. More than half of the stakeholders (10 out of 34) use electronic information resources such as encyclopedias on CD-ROMs, while presentation and database software are also used by a significant number of stakeholders.

The results showed that most stakeholders use the software they possess to greater or lesser extents. 88% and 94% of stakeholders frequently used word processing and administration software programs respectively. Other software programs which stakeholders use frequently are spreadsheets (80%) and programming languages (10%). Only a small proportion of software is not being used at all. Software that is technically easier to use shows only minor under utilization, whereas software that lends itself to more complex technical applications tends to be under utilized by between 10–35% of stakeholders.

Microsoft is the dominant brand of operating systems used in the sector since it sold almost 99% of all operating systems installed.

UN and donor agencies appear to have better facilities and more up-to-date computers and software than local NGOs and government institutions. International NGO's are walking a middle path between the two.

Most of the software which stakeholders possess are being used. However, there are some software programs installed by stakeholders that are not used at all. These tend to involve software that performs advanced and complex technical applications.

### 3.3. Levels of skill and access to training

It is vital to note that positive attitudes to ICTs arise not only through exposure to the equipment but also through access to training. Correlating staffs attitudes with the degree of access that professionals have had to training in the use of ICTs reveals a significant relationship. A majority of HIV/AIDS stakeholders identified a lack of available staff trained to use computers as the biggest hindering condition to the effective use of computers. However, only five percent of them prioritized expenditure on this item in their ICT budget.

HIV/AIDS stakeholders offering computer training are more likely to have the resources and capacities for a relatively better ICT infrastructure in the institutions. Twenty percent of HIV/AIDS stakeholders offered computer training for their staff within and outside the institution.

The competency of staff in the use of ICTs in the sector continues to rise, with 60 percent believed to be competent. ICT is being effectively used across a wide range of core subjects with 50% of HIV/AIDS stakeholders indicating effective use in ICT. Staff training continues, with 84% receiving ICT training individually or at the institutional level.

Most training is required in the use of specialist software such as graphics and web authoring, with 43% indicating extensive requirements for the majority of their staff. A similar percentage requires training on how to use ICTs in the sector.

### 3.4. Effective use of ICTs in HIV/AIDS Stakeholders

#### **ICTs and human resources**

Effective use of ICTs requires the establishment of an ICT capability and infrastructure. An established infrastructure means that basic ICT resources are in place. It also means that staff who are equipped with the skills, knowledge and confidence to creatively insert ICTs into the fight against the pandemic are present.

Positive attitudes toward ICTs among HIV/AIDS stakeholders appear to have been enhanced through the access that staff have to relevant training. HIV/AIDS stakeholders where staff had a relatively high level of access to training opportunities expressed positive attitudes to the use of ICTs. The opposite prevailed for HIV/AIDS stakeholders that had limited access to training opportunities. The survey data also shows that HIV/AIDS stakeholders with greater access are those that possess a high level of resources. HIV/AIDS stakeholders with low access to training have a strong correlation to low resource levels. Thus, while access to training clearly affects the attitudes of staff towards ICT usage, training is itself an issue affected by resource levels.

Four hundred computers are used to deliver the HIV/AIDS services, with a further 542 used for administrative and other purposes. HIV/AIDS stakeholders are most likely to place computers within a computer room, especially in government institutions and local NGOs. Only 11% of HIV/AIDS stakeholders have no computers based in a computer room. Less than 2% of HIV/AIDS stakeholders indicate that they have no computers in their offices.

It is also pertinent to note that while the nature and extent of ICT use is substantially influenced by access to adequate resources, there are some HIV/AIDS stakeholders that are able to overcome resource barriers and move towards effective ICT usage.

In the questionnaire, respondents were first asked to mark the factors that prevent them from using computers in HIV/AIDS activities. The factors most often marked were insufficient funds, 75%, an insufficient number of computers, 77.77%, lack of computer literacy among staff, 63%, and lack of training on how to integrate computers into specific interventions areas, 58%. The most challenging problem of all stakeholders to ICT in the sector is power. 41% of the stakeholders noted that the lack of appropriate space is another factor hindering ICT use.

Analysis of the data revealed that the factors listed as preventing stakeholders from using computers is sharply influenced by the number of computers the stakeholder possesses. It can be observed that stakeholders with 10 or fewer computers are faced with a greater intensity of inhibiting factors. The most prominent of these is insufficient funds and lack of computers in their respective offices.

**Table 9: Factors Hindering the Maximum Use of Computers in HIV/AIDS Stakeholders**

	Local NGOs	International NGOs	Donors and UN agencies	Government Institutions	Total
Lack of computer skills by the staff	8	5	1	9	23
Lack of computer professional	6	7	2	6	21
Insufficient funds	9	11	-	7	27
Lack of suitable space	3	5	2	5	15
Lack of computers	9	12	-	7	28
Power	9	10	4	9	32

Over half of HIV/AIDS stakeholders provide HIV/AIDS workers with good access to computers for HIV/AIDS purposes. Fewer than 11 HIV/AIDS stakeholders indicate that they provide little access; 7 of them have adequate access of computers to their staff for HIV/AIDS purpose. International NGOs, donor and UN agencies provide good access for their staff. Government institutions and local NGO staff have little access.

Eleven respondents confirmed that they provide zero access, 15 of them have little access, 4 of them have adequate access and 8 of them have good access to their respective partners for HIV/AIDS purposes.

Half of the stakeholders have little access, 2 of them have adequate access and only 5 of them have good access to their HIV/AIDS partners. Local NGOs and government institutions have no access levels for outside users, while donor and UN agen-

cies offer little access of provision of computers for external users for HIV/AIDS purposes. The AIDS Resource Center (ARC) is the only stakeholder with absolute freedom of access to Internet and other ICT facilities.

However, when a perceived lack of computer literacy among the staff was measured as a factor against the number of computers per stakeholder, the responses were inverted. It appears to be comparatively, but not absolutely more observable that for stakeholders with 3 or more computers, a lack of computer literacy among the staff is seen as more of an obstacle.

The use of computers in the stakeholders tends to feature more strongly in the programme areas but less in management and administrative areas. This was affirmed when stakeholders were asked to identify areas in which staff make the most use of computers.

The use of computers in the day-to-day practice and problem-solving exercises tends to be lower with local NGOs and government institutions. In international NGOs, UN, and donor agencies, computers tend to be used for a greater variety of purposes in the different aspects or interventions of HIV/AIDS programmes, although the presentation of assignments and problem-solving exercises are the major uses.

## **Computer use after hours**

A majority of staff at 59% of HIV/AIDS stakeholders make use of computers after hours. After hours computer use is being done to a slightly greater extent at donor and UN agencies, and International NGOs.

## **Effectiveness and age of computers**

Of all the computers it is estimated that more than 85% are considered effective. However, this figure will continue to decline as expectations of what constitutes an 'effective computer' changes over time.

The effectiveness of computers is closely related to age. It is estimated that 15% computers are five years old or more. These computers are likely to be Pentium I and II computers with limited multimedia potential. Although growth in computer purchases has been historically high, a fifth of HIV/AIDS stakeholders indicate extensive requirements for new computers with only 9% indicating no requirements for any new computers.

## **Technical support and maintenance**

32% of HIV/AIDS stakeholders have dedicated on site IT technicians (fewer than half are full time). 47% of HIV/AIDS stakeholders have a managed formal and informal services agreement with private professional business service and 10% of stakeholders have support from other stakeholders.

The level of ICT support in the institutions is important if the expansion of technology is to be used to best effect. A third of HIV/AIDS stakeholders have at least one on site dedicated IT technician, though only 13% have this facility as a full-time staff member. Managed service agreements are maintained by 10%.

## **ICT applications in Ethiopia**

In terms of the potential of ICT applications to provide technical support for HIV/AIDS stakeholders, the respondents requested to mention the kind of ICT application they have in their respective institutions. It is evident from this survey that only ARC has comprehensive ICT application that provides HIV/AIDS information for stakeholders. Web-based information, production of research based and culturally appropriate HIV/AIDS materials, well-designed databases, local area network, HIV/AIDS news and media and discussion groups are major activities of the centre. The detailed activities and projects of the AIDS Resource Center are available in Appendix D. Most stakeholders noted that they used the already designed applications in their day-to-day activities in the fight against the pandemic.

## **Stakeholders future plan**

When asked to provide their thoughts on the needs of ICT in the fight against HIV/AIDS for the next 3 – 5 years the tone could be summarized as a need for greater commitment nationally to addressing the problem backed by the necessary financial, governance and delivery capability of ICTs in HIV/AIDS activities.

The future requires that we learn from these and move forward for improved peace in their institution. 99% of stakeholders never had any ICT plans in the coming years irrespective of their interest to buy computers and printers.

ARC is the only stakeholder that has ICT project plans in the coming five years to develop additional databases and websites and networking of regional HIV/AIDS prevention and control offices to the ARC system (Appendix D).

90% of the stakeholders noted that they have a computer replacement plan to purchase new computers, upgrading of existing computers, purchasing of new software, staff training, maintenance of computers and for purchasing the necessary hardware and software to get the stakeholders connected to the Internet/e-mail. So far none of them have provided any budget details for their plan. Local NGOs and government institutions noted that they plan to get funding from donors.

### 3.5. Financing ICTs

Defined ICT budgets are used by 91% of HIV/AIDS stakeholders in international NGOs, UN and donor agencies. 10% of Local NGOs and government institutions have a budget allotted for ICT activities. Half the HIV/AIDS stakeholders are obtaining the majority of funding from this source. Most of the stakeholders are not interested in mentioning their ICT budget.

75% of HIV/AIDS stakeholder's purchasing decisions are primarily taken by the management/administration and ICT co-coordinators, with half of HIV/AIDS stakeholders at least partly sharing responsibility with the administrative and supporting unit.

The majority of funds come from a defined ICT budget or from allocated external grants. 16% of HIV/AIDS stakeholders receive funds from donors, however, this does not form an extensive part of spend-for-all but a few HIV/AIDS stakeholders. Donations are a more widely used source of funding, with 67% of HIV/AIDS stakeholders using funds, of which 10% make extensive use of funding ICTs from their annual budget.

On average, HIV/AIDS stakeholders spend \$US5,000 a year funding ICTs, with 54% being spent on hardware and a further 20% spent on software and content. Telecom and Internet Service Provider (ISP) charges take up 90% of the budget – a higher proportion than for training and purchasing hardware and software.

The majority of HIV/AIDS stakeholders (73%) had a specific budget for computers. The computer budgets of HIV/AIDS stakeholders tend to be devoted to the purchase of computers, software and the maintenance of computers. The revenue sources through which items on the computer budget are derived are mainly from allocations on HIV/AIDS stakeholder core budgets and funding activities and also through financial donations from different sources.

### 3.6. Resource sharing

Almost all stakeholders showed their interest in participating in networking and sharing of resources with other HIV/AIDS stakeholders in the country.

ARC is currently the only stockholder that creates and makes available electronic information resources on HIV/AIDS on database, Web, CD-ROM and in other electronic formats for other stakeholders in the country.

Information sharing tools exercised in the stakeholders are e-mail, mailing lists (50%), electronic discussion groups and forums (10%) videoconferencing and telconferencing (8%).

Donor and UN agencies and international NGOs are all set to contribute for other stakeholders to provide access to computers and other facilities, expert advice,

funding, technical support, training, material and data and human resources and to allow the local NGOs and government institutions to use their facilities/equipment.

In addition, donors and UN agencies and some of the international NGOs are interested in contributing to the development of documentation standards, imaging, new media, software and hardware selection, technical standards, training, website and databases in the country for HIV/AIDS activities.

All local NGOs and government institutions are also noted to receive access to computers and other facilities, expert advice/expertise, funding, technical support, training, human resources and training on use of the facilities/equipment in the sector.

### 3.7. HIV/AIDS and ICT infrastructure

To effectively address HIV/AIDS programme objectives through ICTs, there is a requirement for some basic elements to be in place. These elements capture aspects that need to be understood and managed in order to build an effective and sustainable environment conducive to enhanced use of ICTs. This resulting HIV/AIDS ICT infrastructure represents an integration of technology, capacity and process with supporting policy and standards in a manner that strengthens the collection, sharing, useful application and communication amongst stakeholders. For this survey, basic elements have been ICT capacity, ICT policy, HIV/AIDS information, technology and standards.

Respondents were asked to provide their views on the needs and issues/challenges to the acceptance and expansion of ICTs in the fight against HIV/AIDS in terms of these elements.

#### **ICT Capacity**

Building basic infrastructure (e.g. electricity and telecommunications) capacity was noted as a perennial problem. Respondents felt that while the information needs are there, the communications technology is still not affordable and has not reached remote places sufficiently, while for many other areas it remains unstable.

The transformation of information into knowledge was seen as a significant challenge tied to better understanding of information needs. Respondents noted that understanding the relevance of information requires ongoing training of recipients and users of information.

It was stated that most HIV/AIDS workers have a fairly basic educational level. From the comments received, it can be concluded that, at present, increased training and ICT tools for HIV/AIDS workers may offer better benefits than focusing on increasing general public access capacity, given the significant illiteracy rate and low

education level in the country. General public exposure to ICTs may be more effective through mass broadcasting tools such as radio, television and video, whereas HIV/AIDS workers may benefit from more interactive ICTs, e.g. PC/CD-ROM, Internet, telemedicine and so on.

Building acceptance of ICTs, regardless of the sophistication, in an environment with limited education is an ongoing issue that respondents noted. There is still a great need to inform and educate decision-makers of potential benefits of ICTs.

Building human capacity in ICT through training is pivotal. Building greater knowledge and know-how with respect to technology and information systems is required. Capacity to operate and maintain ICTs was noted as a major concern that can only be overcome through ongoing training.

Reflecting on the human dimension of issues in Ethiopia, comments noted that presently and probably always, ICTs cannot replace small groups or one-on-one intervention and interaction with marginalized risk groups for HIV/AIDS. This is a powerful statement balancing the role ICT can have in building capacity versus the need to integrate it in a manner that reflects human interactions and behavior.

## Conclusions

Fundamental infrastructure for stable electricity is a major ongoing issue in Ethiopia. Alternatives to traditional power generation need to be considered. Basic telecommunications is an ongoing issue, as it remains a key building block for greater access of ICT.

Acceptance of ICT and its benefits is still a major issue in the sector that can limit the development of capacity. Equipment, hardware, software, and consumables are all needed but must be deployed judiciously, with clear intent to maximize the benefit of these limited resources.

Human capacity through training needs to be done for technology resources to be able to operate, maintain and exploit ICTs. This same training effort needs to be applied to users to build their capacity to access, understand and apply information in support of their tasks.

Better understanding of information needs and specific problems for target groups will help focus the needed capacity building in both human resources and the material resources required.

## ICT policy

Some respondents indicated that developing policy to promote ICTs should be a task for later. Right now the focus needs to be on the capacity to deliver basic HIV/AIDS services and to build basic HIV/AIDS system infrastructure. ICT can be used to support this. Until there is some sustainable ability to access, maintain and oper-

ate ICT, and have this cost effective, it will be difficult to describe anything but an imperfect view of ICT, especially within governmental HIV/AIDS facilities.

Even where there does exist policy to promote ICT, the weak infrastructure, high costs, low economic situation and brain-drain make its promotion and implementation a challenge. Almost all respondents commented that ICT needs to be promoted at multiple levels and by integrated into the education system and business environment to build better acceptance and understanding of how such tools can relate to other matters, especially the importance of ICT in changing the human behavior.

## **Conclusions**

Very little, if any, policy is directed to promoting ICT. There is still a significant lack of understanding of the applications and benefits of ICT and greater effort needs to be directed to raising awareness and demonstrating value to decision-makers.

For many HIV/AIDS workers, the immediate needs of direct HIV/AIDS delivery issues are a higher priority than promoting ICTs.

ICT needs to be promoted at multiple levels and through greater integration into the educational system and business sector. Basic project management is needed, especially as it relates to local involvement, and performance and outcome measurements upon which factual analysis, learning and decisions can be based.

## **HIV/AIDS Information**

The most common aspects noted by respondents in addressing information were in relation to information content and quality of HIV/AIDS information.

It was noted that regardless of the medium, but especially when we consider the Internet, the majority of information available is in English. This is a challenge for many HIV/AIDS workers especially in cases where they need to access more detailed medical/scientific information for the educational purposes of the community.

For the general public, most of whom do not speak English, the problem is even greater as most English information becomes meaningless. Local languages, local content and local culture needs to be built into information sources.

Comments from the AIDS Resource Center (ARC) emphasized the challenge to gaining local content. In Ethiopia, those with the expertise and the experience to create appropriate content are grossly underpaid in their main occupations and are overwhelmed with their excessive commitments. With a population of 65 million, more than 70 languages spoken, a high rate illiteracy, and 85% of the population living in rural areas; local content messages are the basic prerequisite undertaking to educate the community in the fight against the pandemic.

One aspect to provision of more accessible information is translation. In a similar vein as authorship of local content, skilled translators are very difficult to find and keep hold of. Further, as noted in the response from the ARC, at times translation of information from English to the indigenous languages distorts the actual content of the information provided.

Quality assurance and credibility of information, in translation or especially from sources such as the Internet, is a critical concern. There is so much information from so many sources that users need some understanding and assurance of the quality of what they are accessing. This is an important element in building trust and continued usage of information sources.

Often there can be too much information and insufficient time or ability to sift through the information and extract what is useful. Some filtering and assurance of quality and reliability of information from key sources would help both HIV/AIDS workers and the general public.

Low educational levels and cultural factors must be respected for ICT to be integrated, accepted and contribute in a positive approach. Information and its presentation must be simplified and packaged appropriately to be understood by the local community.

Several respondents strongly identified a need to further identify and understand the information needs of target audiences. Several respondents made comments on specific information needs in relation to HIV/AIDS:

- Local HIV/AIDS information (relevant guidelines, procedures and databases) are needed;and
- HIV/AIDS statistical information is still a guarded resource in the country

## Conclusions

The dominance of materials printed in English, especially on the Internet, presents a challenge in comprehension and application for HIV/AIDS workers. This is even more so an issue for the general public whose literacy and basic educational levels are low.

Achieving relevant local content is a function of competent sources of information and the cost to produce content. Both are significant issues. Similarly, translation faces much of the same issues of competence and cost. Furthermore, it was noted that this is an often-underestimated aspect of project planning and implementation.

Reliability and quality assurance of information, particularly from the Internet, was noted. It was stressed that selecting appropriate ICT to access and disseminate information is important. The most advanced ICT is often not as beneficial as more familiar ICT, especially when coupled with cultural and behavioral norms.

## Technology

In Ethiopia parts of the world access and issues of connectivity are still the major problems. Reliability of service providers is a matter of concern. The dilemma cast is whether to focus on making ICT more affordable and the technology more suitable to the country needs or to focus on more immediate delivery of services with existing limited technology.

Urban areas are generally more fortunate than rural, but even here technology solutions are introduced that cannot be maintained due to lack of trained personnel and other resources.

A comment from ARC suggested the only way to advance technology in Ethiopia is to advance technology across the board. We need to build more local capacity. Initial costs are high to bring in technology and support costs are typically unbearable for the country that brings in technology.

The government dedication becomes a major issue when it comes to addressing the large-scale inadequacies of supply of infrastructure, technology, maintaining technology and its long-term sustainability. Governments and donors must be committed to making technology affordable and accessible to the vast majority of the public in order for it to be accepted and become part of the daily routine.

Poor connectivity due to poor or inconsistent telecom infrastructure can be overcome by other ICT, e.g. CD-ROMs or wireless, in some areas. Generally speaking, as noted by respondents, while overcoming one set of problems, there is generally another group of challenges to be addressed.

The major problem on issues of connectivity and appropriate choices of ICT in Ethiopia is the lack of ability to maintain the technology. Maintenance is a huge issue. Lack of training and funds for parts and repair leaves sustainable technology vulnerable. Numerous respondents commented that long-term technical support to operate and maintain equipment provided by donors is likely to be necessary for many years to come. In light of these comments, ICT choices must be a robust technology that requires a low-skill level from the point of view of access, use and maintenance, and low-cost from the maintenance perspective.

In terms of specific technologies, the stakeholders requested to mention the most useful ICT resources in the fight against HIV/AIDS. The responses to some major ICTs can be summarized as follows:

**Broadcast technologies:** These refer generally to radio and television. Respondents emphasized the huge advantage these technologies have in respect to coverage and acceptance by the population at large. These are by far the most widely accessible ICT. Numerous respondents noted their concern that these tools were not being maximally used, and specifically identified them as critically underused tools in combating HIV/AIDS in Ethiopia. But using these technologies is unthinkable in

Ethiopia due to access and cost. Distributions of these technologies in the rural areas are also uncase.

**Internet:** Clearly the Internet offers an enormous capability to access and share information. The issues of cost for both equipment and access to the full capabilities of the Internet puts it out of reach of most stakeholders. For those few that can access the Internet on a regular basis there are still issues in relation to understanding the potential of this technology and how to best capitalize on it.

**Video and discussion lists:** Video offers the advantage of greater control of the content and is not restricted by issues such as broadcast schedules and editorial control. This technology has proven very effective in educational activities and in positively changing behaviors and supporting HIV/AIDS prevention and control practices.

**Email:** This was seen as one of the greatest benefits of connectivity technologies. Regardless of the mechanism, email provides a means to maintain communication and contact with peers.

**Distance learning technologies:** This type of technology was identified as extremely useful and cost effective. The principle issues centered on acquisition and maintenance costs, supporting infrastructure and the ability to operationally maintain such technologies.

**Telecentres:** While not so much a technology but an approach to linking and providing versatile access, telecentres were identified as an approach to disbursing access to ICTs in an effective manner.

**Phone and fax:** These basic tools are still a mainstay for ICTs essential to Ethiopia. Respondent comments were mainly centered on the already well-established issues of infrastructure, stability, cost and accessibility.

**CD-ROMs:** This technology was noted by a large number of respondents as one of the most significant and sustainable breakthroughs in information and knowledge sharing and education and training. CD-ROMs offer enormous information carrying potential, are reliable and can be updated either remotely or through mail. The technology to run them is minimal and generally available to many.

## Conclusions

Connectivity and affordable access to technology by the majority is problematic. ICT must be appropriate to the problem and the environment they are to be used in. Human and environmental factors must be considered.

The absence of design/adaptation of technology for Ethiopia heightens the risk of technology driving solutions versus need. The latest ICT is not always the best solution.

Training and maintenance costs and logistics are enormous problems in keeping technology operational.

While there are many available technologies, respondents seemed to indicate that broadcast technologies were still the most appropriate in dealing with the broader public. These included radio, television, and video with CD-ROM, video and phone/fax being other noted ICTs of import.

## **Standards**

Standards and their consistent use on a large scale are almost non-existent in Ethiopia in relation to any aspect of ICT. The absence of standards leads to an overabundance of technologies and variants of versions such that compatibility is a major problem. There needs to be some effort made to promote standardization to ensure compatibility of technologies and sharing of information. There are many programmes collecting valuable HIV/AIDS information, but because of absence of information standards, it is not possible to combine, communicate or compare findings.

All respondents acknowledged the benefits that some degree of standards development would bring, especially for Ethiopian languages.

The overall sense was that there are more immediate challenges that need to be addressed, but eventually this will become an issue.

## **Conclusions**

ICT standards development and implementation processes are virtually non-existent in Ethiopia though their value is recognized to some degree.

While international standards may offer a basis for moving forward, there are concerns that these standards may lead to as yet undefined problems for Ethiopia.

## CHAPTER 4: CONCLUSIONS AND RECOMMENDATIONS

### 4.1. Conclusions

Education in general, preventive education more specifically, and behavioral changes have been found to be most effective in tackling the issue of ICT use in the fight against HIV/AIDS. ICT offers effective tools to support all the underlying aspects that will contribute to the fight against the spread of HIV/AIDS.

ICTs represent a paradigm shift with respect to the transfer and management of information. It is clear from the survey that ICTs are now an integral part of day-to-day activities within the sector.

Most of the stakeholders have adopted the Internet and are now using e-mails and the World Wide Web on a daily basis. The remaining stakeholders will inevitably adopt this new technology in the coming years if not months. Many stakeholders even have a presence on the Web; those who do not, intend to do so in the near future. However, even though most HIV/AIDS stakeholders have adopted IT, because it provides a quick and efficient means of exchanging information digitally, some stakeholders still exchange information manually. It is a matter of time before the various players get accustomed to this new mode of communication. The government institutions and Local NGOs were a little slower in adopting ICT than international NGOs and UN and donor agencies.

Using ICTs is always involves significant investments. A majority of government and NGOs reported that they do not have enough resources to increase their investment in ICT.

The advent of ICTs has been both beneficial and detrimental. According to the respondents, ICTs have raised productivity in most processes. The main benefits achieved by the use of ICTs is an increase in the quality of documents, an increase in the speed of work, better financial control, better communication, simpler and faster access to common data as well as a decrease in the number of mistakes in documentation. Furthermore, the continual demand for upgrading hardware and software, the high investment costs and the greater know-how required from the staff are perceived as important obstacles to the greater use of ICTs.

HIV/AIDS is a public problem and for Ethiopia a problem that cuts across all aspects of development and human nature. While no one sector can be singled out as the primary solution contributor, there can be no doubt that communication of

relevant and timely information is a critical component underlying efforts in fighting HIV/AIDS. Communication is a key element to preventive and post-infection treatment of this epidemic. ICT in its many manifestations can be a major facilitator of communication and information sharing in this battle.

The survey showed that there are a number of ways in which ICTs are used in HIV/AIDS activities. Among some HIV/AIDS stakeholders, ICTs are relatively absent from HIV/AIDS prevention activities, but are integrated to a fairly large extent as an administrative and management tool. It is interesting to note that some HIV/AIDS stakeholders, particularly in local NGOs and Government institutions where there are few ICT resources, tend to use computers to improve the computer literacy and skills of staff rather than applying them in the programme. The only available computers at some of the HIV/AIDS institutions may be located within a computer lab or the table of the Secretary, dedicated to secretarial purposes. There also appears to be a distinct category of ICT use among some HIV/AIDS stakeholders, where computers are used to give their staff up-to-date HIV/AIDS information.

All ICTs have a place in supporting HIV/AIDS activities and programmes that surround services across the continuum. However, faced with the realities surrounding HIV/AIDS in Ethiopia, appropriate choices of technology must vary case by case. There is no single approach to addressing the issues and no single ICT solution set.

In relation to HIV/AIDS and ICT, the most dynamic and targeted conclusions affirmed from the participants are:

- Consideration on information and communication channels must be the principal perspective in the discussion of HIV/AIDS and ICTs.
- Content is a fundamental element in all aspects of information. Local content, language and presentation are critical success factors. The ability to access and use this information is a further success factor. In this respect, ICTs must be matched to the needs of the recipients.
- Capacity building is key to the relevance, acceptance and ongoing operation of ICTs. Understanding the needs and how things function locally gives scope to the effective choice of ICTs. Long-term sustainability and support are required to build capacity.
- ICT projects should contribute to strengthening the HIV/AIDS system with long-term sustainability in order to support addressing the pandemic.
- Collaboration of all stakeholders is essential to get in sparkling effects.
- Research is still required to focus on target groups and more clearly define their information needs in terms of content and communication methods.

One of the biggest impediments to ICT and its expanded use and acceptance in the fight against HIV/AIDS is the human factor. Some of the key observations in the survey were:

- Lack involvement in the process of defining the problem and the solution. Absence of ownership of either the ideas or the process can make it a tough sell and even tougher to follow through.
- Acceptance of new ideas, processes, versus familiar, entrenched habits are challenging.
- Ability to integrate ICTs into daily practice in the routine to minimize human disruption.
- Absence of a digital information culture makes it difficult to get acceptance, trust and comprehension of the benefits of ICTs.
- Low level of literacy leads to unique communication challenges and contributes to the absence of an information culture.

The survey noted that from the perspective of fighting HIV/AIDS, the cost of technology versus other HIV/AIDS priorities might overshadow technology's potential long-term benefits and savings.

Stakeholder access to the Internet was limited. Many implementing partners had computers but did not have operational budgets for an Internet connection. In some institutions, use of the Internet was restricted because of inadequate operational budgets for ISP and telephone charges.

Survey respondents provided expanded comments in relation to HIV/AIDS specifically. They noted the need for more open discussion and policies reflective of the reality of the pandemic as being crucial to stop the spread and increase the incidence of HIV/AIDS. ICTs such as radio, television, email and the Internet can help to open the communication and discussion and give visibility to promote transformation of human behavior.

Combating HIV/AIDS needs a multifaceted approach. From policy to provision of adequate services, there needs to be an integration of ICT services across the country. By simply addressing HIV/AIDS care provision, statistics gathering, laboratory testing, and mass communication, systems will be developed in isolation and will risk being useless in just a few years. By creating a coordinated approach to ICT, an infrastructure can evolve that will allow for a much more comprehensive and coordinated solution to the current problem. As systems tend to be integrated, having a coordinated ICT plan would enable the inclusion of all aspects of ICT appropriately.

The survey identified three key areas of focus where ICT could play a positive role:

- Dissemination of preventive HIV/AIDS information is the most critical element in educating the public and specific target groups towards understanding this disease and the preventive measures and behavioral changes that can save lives. Community-level application of ICT to support informational activities is proving the most effective approach. This approach is reliant on Internet, radio, television, video, and more readily accessible technologies such as CD-ROMs and printed material integrated within community organizations.

- Application of ICTs to improving access to information, education and communication tools for HIV/AIDS workers, particularly those in community and rural settings, holds one of the highest benefits of applying ICT, such as CD-ROMs, Internet, and distance learning technologies.
- Enhanced evidence-based activities, including research on HIV/AIDS are critical components in the long-term management strategy for HIV/AIDS, and other diseases, and offers significant opportunities for exploiting all types of ICTs.

Information is the common thread. It is key in understanding and addressing HIV/AIDS and almost the only universal resource that we have available. Many respondents felt preventive HIV/AIDS information was continually underrated. People need to be empowered to better understand and manage their HIV/AIDS risks. They need to understand the best defense to HIV/AIDS. The knowledge of the problem and the behavioral changes will help to protect them.

Information, to a large extent, is available and is easily attainable. Certainly the information to educate and inform the general population and select target groups readily exists. Issues of a cultural and linguistic nature are present, but these can be managed. ICT in many forms can be the supporting delivery platform to assist people, organizations, communities and nations to understand and communicate the messages that can alter thinking and behavior, and directly save lives.

Mass communication is a key component to better management of HIV/AIDS. But, again, the most common tools are proving to be the most effective. Survey respondents noted the need to build on and utilize more community radio, television, videos, CD-ROMs and printed material.

The central argument put forward in the report is the need for the development of a comprehensive approach and strategy of incorporating ICTs into the HIV/AIDS fight. This presupposes a realistic assessment of the possibilities for interventions at all levels as well as the recognition of the limitations that will initially be encountered to mobilize resources in a coordinated manner.

HIV/AIDS care and support is still a critical problem, especially in rural areas. Respondents emphasized the need to keep this in mind in any considerations of ICT application to problem solving. Respondents clearly recognized the role that information sharing could play in building HIV/AIDS workers knowledge, peer support and trust with patients. It could be concluded that HIV/AIDS workers see improved HIV/AIDS care and support services as the priority and there remains a challenge to demonstrate direct benefits of ICT.

Any application of ICT must be well planned in order to be accepted and sustainable. Historical challenges such as electricity, telecommunications, training, access, relevant content will remain as significant obstacles in the country.

The need for greater education and learning opportunities for HIV/AIDS workers was not restricted to any category of worker or to any particular field of interest. The focus of need was common, requiring access to journals, texts and databases, greater local content and language information, basic training materials, for HIV/AIDS workers and capability for better peer communication. The ICT to address these needs was focused on the Internet, PCs and CD-ROMs, distance learning and videos.

For the general public, the focus of education was dissemination of preventive information for HIV/AIDS. While access to technology was an issue, the major concern was appropriate messages (local content, culturally and linguistically appropriate) presented in a manner most effective in reaching and re-enforcing messages to target groups.

HIV/AIDS research has significant benefits and positive impacts in managing HIV/AIDS. It was recognized that there is little or no coordinated approach to developing this capability in Ethiopia. It was further recognized that this would require a significant government commitment and resource commitment to achieve an effective system. ICT can have a major role in this aspect of HIV/AIDS.

HIV/AIDS information was identified as a current and continuing priority. Preventive information, especially related to HIV/AIDS, is recognized as one of the key and possibly most potent weapons against HIV/AIDS. ICT in all its manifestations can support this communication. However, in many areas, broadcast technologies, such as radio and television, are the tools of choice as opposed to other ICTs with more limited impact, such as Internet.

Non-technological issues of governance, stakeholder involvement and government commitment to open and effective policy development in both HIV/AIDS and ICTs are more fundamental issues than the promotion of ICTs. Basic managerial and organizational issues challenge management of ICTs, to an extent that ICT plays a very minor role at this time.

Policy that stimulate greater promotion of ICT remains almost totally absent in Ethiopia and will require a significant increase in awareness to become an issue of any priority.

Research and Development (R&D) is recognized as an integral part of the HIV/AIDS system that needs significant investment and an area in which ICT is an essential element. At present, however, the weak HIV/AIDS infrastructure, competing needs for limited resources, lack of competent trained professionals and the cost associated with R&D, create a situation where R&D remains a lower priority.

The widespread access to email and Internet services in terms of infrastructure is hampered by the limited availability of electricity and basic telecommunications infrastructure. Another limitation that particularly hampers the use of ICTs for HIV/AIDS stakeholders is the cost for hardware and connecting charges.

In addition to the lack of infrastructure and human resources, one of the challenges regarding the use of Internet is the lack of awareness and commitment among the highest-level political leaders. As pointed out by the stakeholders, the introduction and spread of the Internet is political rather than technical in Ethiopia.

## 4.2. Recommendations

The cost in resource development and training, ICT acquisition, operation and maintenance are currently beyond the capacity of Ethiopia.

The country needs a strategic approach to direct and prioritize the national agenda to fight HIV/AIDS. However, this approach needs to be operationalized by focusing on the strategies appropriate for all stakeholders so that there is an alignment between distributive strategies and those aimed at enhancing the quality of practice. The following provides a broad overview of the central strategies proposed for leveraging effective start-up and equitable distribution of resources and building ICT capability in the fight against HIV/AIDS in the country.

- As minimum levels of resources remain critical to developing ICT capability, attention to infrastructure development among HIV/AIDS stakeholders must be regarded as central to ICT start-up. Given the existing resource disparities between stakeholders and the reliance on parental contributions for non-personnel expenditure, it is imperative that resource mobilization for ICTs, especially from the donor and UN agencies, is appropriately targeted. From the findings of the study, it is argued that resources necessary for ICT start-up should be directed towards those stakeholders.
- HIV/AIDS stakeholders should be encouraged to promote the development of ICT capability in less funded stakeholders in the country. This could be achieved through a range of strategies including the sharing of resources, the offering of professional support, the transference of skills and facilitating linkages with existing service providers. Donors, UN agencies and NGOs ought to be encouraged to develop appropriate partnerships with other local NGOs and government institutions. It is imperative that each stakeholder and interest group seizes the initiative to develop immediate and strategic partnerships that can sustain ICT capability.
- The lack of sufficiently trained staff remains a barrier for the effective use of ICTs. This is evident throughout the profile of stakeholders, from those that can be regarded as privileged to those that are the most significantly disadvantaged. While this is clearly a long-term responsibility of the government, there is also a need for stakeholders to be encouraged to include staff training as a central budget item. The process of building human resource capacity also involves the development of national guidelines and

criteria for the training of HIV/AIDS professionals in this area and to support in the application of ICTs.

- The governments' role must be informed and guided by the stakeholders who are directly involved in the day-to-day implementation of ICT policy in the country. Stakeholders active in this area in the country are the partners that should be centrally involved in the planning and implementation process. At every level this requires effective consultation and consensus about the strategic process that should be followed to mobilize available resources so that they are directed at the creation of equity and the enhancement of quality.

For HIV/AIDS, planning to promote and capitalize on ICT should focus on three areas:

- Creation and dissemination of preventive HIV/AIDS information in community-based projects for educating the public and specific target groups, and making use of more common ICTs such as radio, television, video, CD-ROMs and printed materials;
- Application of ICT to improving access to information, education and communication for HIV/AIDS workers, in particular at the community level; and
- Enhancing the HIV/AIDS research capacity of Ethiopia, promoting evidence-based decisions.

ICT projects should build onto existing systems and infrastructure wherever feasible to capitalize on existing investment, contribute to building the bigger system picture and re-enforce local capacity development.

ICT Projects should focus on community-based and community-led initiatives, making use of local capacity and the local context. Investment in human and technical resources should be made where community commitment exists.

Stakeholders develop and offer a continuum of ICT training programmes, from basic to advanced courses for their staff and partners.

In order to effectively support the HIV/AIDS programmes in the country:

- All stakeholders, including libraries and community education centers, should be connected to the wide area network (WAN) and local area network (LAN);
- Provide desktop computers and necessary facilities for those sites when necessary;
- Enable data and email to be transmitted between all those sites;
- Provide access to the Internet via a gateway connected to the core network; and
- Provide multimedia facilities for stakeholders in the country.

Donors should consolidate activities in the area of basic ICT access and institutional capacity building before taking up ambitious plans for knowledge sharing. Strategic injection of capital for improving basic connectivity and ICT use and provision of operational funds for a limited duration could make a significant difference.

The potential benefits of information sharing, notwithstanding the primary focus of networking, should be at national level, including all the stakeholders in the country in order to ensure usefulness and applicability to local interventions.

To a great extent, the staff of the stakeholders lack the skills required to filter through the vast information available on the Internet and identify information relevant to them. Thus there will be a need to facilitate filtering of information, testing of solutions offered to their specific problems and their adaptation, until the stakeholders themselves acquire the skills needed to access this information.

The government of Ethiopia pursues telecommunications reform, aiming at market liberalization and addresses the confined factors, such as bandwidth limitation, availability of computers, reliability and cost of electricity and telecommunication services. Explore low-cost technologies, e.g. wireless communication devices, to broaden ICT access in rural areas will also the role of the government to play

In promoting ICT in support of the fight against HIV/AIDS, staff, field workers and client communities, use of the local language should be emphasized and supported. Some of the ideas suggested by informants for future applications include:

- Links to online publications, journals, resource databases, alternative medicine and therapy;
- More educational materials should be published on the web and engines to help find it. It would be useful to have evidence-based summaries available electronically.
- Greater support for moderated discussion groups to ensure their effectiveness and relevance; greater need for exchange of views through discussion groups to support advocacy initiatives.
- Funding for ICT projects that rely on drama, music, pictures and training at the level of villages and small towns that have no or limited access to electricity and telephone lines and other ICT infrastructure.
- Support for training in use, incremental support for better connections, with special reference to community groups and rural communities; funds that allow groups that may have computers but not enough memory, or have a very slow connection, to make the small leaps would be useful.
- Training and increased use of ICT by stakeholders; regular training to maintenance and upgrading skills, technical support
- International agencies can better use electronic discussions to expand access to conferences, and to consult with people working in LINGOs and community groups.

- Improved use of ICTs in surveillance systems; these technologies would facilitate the process of gathering, consolidating and utilizing data and information
- Support for increased local content for educating the public and semiliterate villagers; content in local languages; support for networks.

It is suggested to use focused applications of ICTs and appropriate policies that empower intermediary groups such as community institutions, health care providers, and those working with the poor and vulnerable groups, can make good use of ICTs to improve the lives of people living with HIV/AIDS. Therefore, these new technology options need to be explored and exploited in appropriate ways. A practical approach suggests that while ICTs may not be the most critical single element to the challenges related to HIV/AIDS, these technologies can make useful contributions within an appropriate framework.

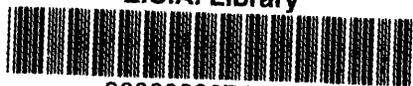
It is crucial to note that the government institutions and local NGOs do not have enough ICT capacities in order to fight against the HIV/AIDS. The reasons for this might be the governments low commitment to the ICT sector and little attention to allocate enough resources. It is key-scraping time that the government should give priority in building the infrastructure so that the HIV/AIDS stakeholders should benefit from the information superhighway.

More research should be done to more precisely define ICT needs for targeted groups in relation to HIV/AIDS. This should be accompanied by an analysis of the most effective communication channels for these targeted audiences.

The AIDS Resource Center (ARC) is a pilot model of ICT projects on HIV/AIDS in Ethiopia. The ARC is directly connected to the National HIV/AIDS Prevention and Control Office (HAPCO). The ARC should be encouraged and supported to reconfigure to a network-of-networks throughout the country. Within this new configuration, ARC would comprise a national, and regional networks within the country. All HIV/AIDS stakeholders would form these networks and take the advantage of sharing information. Establishing the replica of the AIDS Resource Center in the regions is the paramount contributions to the donors and government institutions in order to support the efforts of the stakeholders in the fight against the pandemic.

Hopefully, the results of the survey will prove helpful and reinforce the fact that the country's HIV/AIDS system has come a long way but still has a long way to go.

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