HEALTH COMMUNICATION

Insights

Information and Communication Technologies for the Developing World

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**Academy for Educational Development*

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Preface & Acknowledgments

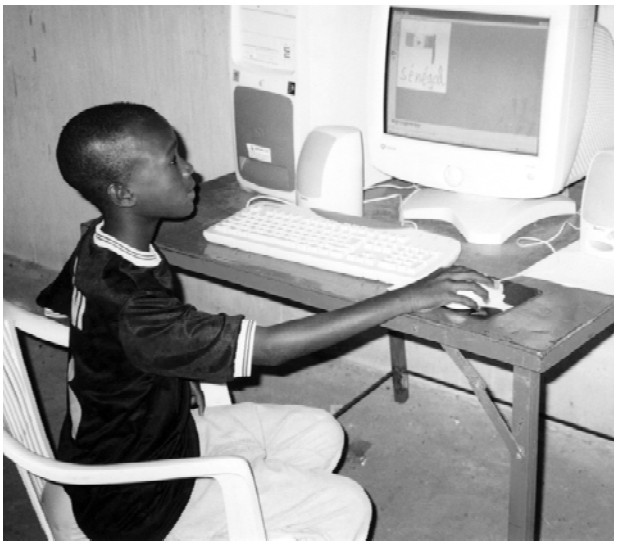
The Health Communication Partnership (HCP) is pleased to introduce *Health Communication Insights,* a new series that explores issues related to advances in strategic health communication. This premier issue focuses on the use of information and communication technologies (ICTs) by health communication programs in the developing world.

HCP is a global communication initiative led by Johns Hopkins Bloomberg School of Public Health's Center for Communication Programs (CCP) in partnership with the Academy for Educational Development, Save the Children, the International HIV/AIDS Alliance, and Tulane University's School of Public Health and Tropical Medicine. In addition to the five core partners, HCP works with leading southern-based health communication organizations as well as global programming partners from the corporate sector, international media, academic institutions, and faith-based organizations.

Supported by the U.S. Agency for International Development (USAID), HCP addresses family planning, maternal health, child survival, HIV/AIDS, and other infectious diseases such as malaria and tuberculosis.

This report was prepared as a white paper for HCP's Communication Sciences Resource Group. It was intended to help the project identify and adapt innovative uses of information technologies in developing and evaluating health communication programs. HCP would like to thank USAID for its continued support in advancing the field of health communication. Special thanks go to Peter Gottert, Neil McKee, Doug Storey, Jose Rimon, and others in HCP for reviewing various drafts and providing invaluable comments and insights. Finally, HCP is grateful to Andrew Maxfield, who was primarily responsible for conducting the research and preparing this important report.

Executive Summary



Thirty years ago, many believed radio and television would speed the transformation of developing countries and lead to the widespread adoption of "modern" attitudes and behaviors (Hornik 1988). In the last two decades, radios and televisions became more prevalent and truly effective mediums for health communication. Now, information and communication technologies (ICTs) represent the next significant wave of innovation.

The Internet is perhaps the most important ICT, but a variety of emerging technologies also fall into this category, including the "mobile Web," personal digital assistants or PDAs, and short message services (SMS or "text messaging"). As with radio and television, some are hailing these new technologies as a solution to the problems of development. The Internet, in particular, offers unique strengths as a medium for communication. It is cross-cutting, multifunctional, and enables the creation of social networks. The Internet is also a unique dissemination mechanism that separates content from physical location and allows for the reproduction of content at a declining or zero marginal cost (Digital Opportunity Initiative 2001).

ICTs are interactive technologies, however, that differ in important ways from broadcast technologies. If history teaches any lesson, the development community will need to find innovative ways of using the technologies, as well as endure some initial failure.

Growing evidence demonstrates that ICTs can make a significant contribution to public health under the right conditions. The Internet can facilitate interaction between health professionals and health consumers, manage the demand for services, and enable health organizations and government health agencies to update information far more quickly for surveillance, quality improvement or assurance, and policy purposes (SCIPICH 1999). From a health communication perspective, "e-health" applications—interactive websites providing tailored health information and other services to users—can be effective in helping people manage diseases, access health services, and obtain social support or provide assistance in changing behaviors. This is a new field, but evaluation of early e-health applications indicates they can have significant effects on behavior and health if they are well designed and well executed (Gustafson et al. 1999). The potential of e-health for prevention and care has led otherwise cost-conscious health organizations to make significant investments in the technology. Case in point: Kaiser Permanente, a large U.S.-based health maintenance organization, invested more than $2 billion in 2003 to provide Internet services to "empower" their health consumers in the United States.

Yet, e-health in the United States, Europe, and parts of Asia is vastly different from what is occurring in the developing world. The phrase "digital divide" arguably trivializes the "yawning chasm" that separates the North from the South in terms of access to these technologies (Sorensen 2001). But ICTs can likely help health communication programs achieve their objectives because the divide is not as simple as it may appear.

Internet access is growing dramatically in the developing world. Satellite Internet connectivity and other wireless technologies eliminate the need for telephones for dial-up access, thus Internet connectivity has expanded to secondary cities and is steadily moving "up-country." While access is generally estimated by the number of Internet subscriptions present in a country or among a population, in Africa and parts of Asia, Internet access grows not as a result of individuals or households purchasing computers and obtaining Internet subscriptions, but as a result of telecenters, cybercafes, community kiosks, and other "community access points" (CAPs).

This issue of *Health Communication Insights* details how ICTs are being used today, challenges and opportunities presented by ICTs, and potential ICT applications for health communication programs.

chapter 1

ICT Overview

- THE INTERNET
- WIRELESS TELEPHONY AND THE MOBILE INTERNET
- ICTs AND HEALTH

The Internet and wireless telephony, or cell phones, are emerging features in the communication and information environment in nearly every developing country.

THE INTERNET

In considering the Internet as a potential channel for health communication, program staff should be aware of how people connect to the Internet, barriers to the use of the Internet, and the effects of the Internet on communities. Access, barriers, and the potential for effects will vary widely between countries and determine which populations are able to use the technology.

The Internet is only now emerging as a potential channel, so there is very little data for assessing these factors in most countries. Analyzing its potential is also difficult because the Internet is composed of interconnected networks as well as all of the information and resources made available on those networks, all of which are evolving rapidly.

Connecting to the Internet

The means of connecting to the Internet in the South differ somewhat from what is commonly used in the North. The Internet in the North has been built on an established communication infrastructure—fixed line telephony and cable television that is not present, at least to the same extent, in most Southern regions.

In general, people in the South connect a computer or other device to the Internet one of the following three ways:

Dial-Up or Fixed Line. Dial-up Internet access consists of using a computer, a modem, and a fixed telephone line to access an Internet Service Provider (ISP). ISPs and dial-up access are available in many, if not most, capital cities and in many of the large urban areas in the Southern regions. However, dial-up access is limited by the lack of fixed telephone line penetration. With the advent of cell phones and wireless telephony, many countries have also slowed, if not ceased, investing in fixed-line telephone systems.

Satellite: Internet content can be downloaded to desktop computers, mobile devices, or local networks from satellites using a satellite dish or receiver. Satellite connections can be either one-way or two-way and narrowband or broadband. The WorldSpace Foundation in Africa transmits multimedia content obtained from the Internet to its geostationary satellite "AfriStar" from an earth station transmitter located in South Africa. People that have a WorldSpace receiver and are within AfriStar's coverage area can download that content to a computer. Notably, many ISPs in developing countries rely on satellite connectivity in order to provide dial-up access to their subscribers. While satellite connectivity provides Internet access to countries that lack a fiber optic link, this method of connecting to the Internet poses cost and quality problems for users. Satellite dishes capable of transmitting data are generally costly, with high monthly user fees. While downloading via satellite is generally fast, uploading information can be very slow. Many of the more affordable satellite devices, including the WorldSpace receivers, are one-way only.

Wireless Mobile: A large and increasingly varied number of mobile devices are now used to connect people wirelessly to the Internet. While wireless mobile access to the Internet is not yet common in developing countries, many mobile telephony networks that have been, or are being developed now in Africa (e.g., Mozambique and South Africa), Asia (e.g., India), and South America, will support mobile connectivity to the Internet. Wireless access, at present, typically consists of a desktop computer that is linked wirelessly to a microwave relay station and ultimately to a fixed line or fiber cable. Over time, however, users will likely shift to mobile devices such as cells phones or PDAs. In large urban areas such as Lagos, cell phones are already widely used and it is only a matter of time before Web-enabled mobile phones or wireless PDAs are introduced. Because mobile devices are much less expensive than computers, and combine voice and data, mobile devices may be adopted instead of a computer. Notably, mobile devices display Internet content differently, thus mobile Internet and the mobile Web are emerging almost in parallel to the more familiar Internet accessed using desktop computers. The mobile Internet may emerge as the predominant Internet in the developing world.

Barriers

While increasing attention is paid to the so-called "digital divide" (Eng et al. 1998; ITU 2002a), multiple digital divides exist depending on the frame of reference. A digital divide exists between Northern and Southern regions, within Southern regions (South Africa versus Ethiopia), between urban and rural, between high-income and low-income inhabitants in urban areas, between men and women in some countries, and between language groups. The barriers that create these divides can be classified into three types: country-level, community-level, and individual-level barriers.

Country-Barriers

Limited and unreliable telecommunications and energy infrastructures act as barriers in many countries. They can be overcome as technology evolves and policy and social norms shift. New technologies such as digital satellite, cell phones, and digital wireless are already supplanting the need for a telephone line or electrical outlet. Examples of country-level barriers that may limit health communication programs from using ICTs include the following:

- For the most part, governments see the Internet as an important part of economic development and Internet access as a door to global trade. Yet, many governments, particularly in the Middle East, see

much of the Internet content as an "agent of moral and political subversion" (Ghashghai & Lewis 2002). Countries such as Pakistan are looking to filter Internet content that passes through their exchanges. These filters may emerge as a barrier to providing health information over the Internet by screening out certain types of information about reproductive health and HIV/AIDS.

- The bandwidth available for national use of the Internet is often a limitation to access and is often beyond the control of developing country governments. While every country can now connect to the Internet, the access that countries and regions have to connect to the network of international fiber optic cables or Internet "trunks" helps determine the access level that users have. Bandwidth puts significant constraints on the use of graphic or video content.

Community-Level Barriers

Obtaining the hardware and services to connect to the Internet poses an additional set of barriers. Here, these barriers are considered community-level problems because the costs for the hardware and access are simply insurmountable for the vast majority of households in the developing world. Where access is being created, it is the entrepreneurs serving communities, government agencies, or NGOs that are purchasing computers and establishing Internet connectivity. Additional community barriers are as follows:

- The environment and facilities for using computers imposes a set of barriers on computer and Internet use. Most IT hardware is designed for a controlled environment; dust and heat, which are endemic in many developing countries, are especially hard on computers.
- Few opportunities exist for training in IT, resulting in a lack of IT technical specialists and few IT services outside of capital cities.
- A related, but often-overlooked, barrier is a lack of capacity to troubleshoot IT problems. A quick review of programs that have used ICTs indicates people can be successfully trained to use a computer and the Internet, often with surprising ease, but not to troubleshoot the problems that often occur.
- Internet Service Providers (ISPs) are unreliable and are generally far more costly than they are in the North. In 2001, the cost for 30 hours of Internet access was often more than a tenth or more of countries' per capita annual income (Table 1).
- The rate of innovation in IT hardware and software, or conversely obsolescence, is also a community-level barrier. Because of the costs, many developing country governments, local NGOs, or cybercafe entrepreneurs may have difficulty keeping pace with new hardware and software. This is important because increases in the speed and processing power of computers result in new generations of Internet applications. If these innovations are incorporated into health websites, many developing country users may not be able to access the latest, most up-to-date, and perhaps best health-related resources.

Individual-Level Barriers

If the community has an Internet connection and provides access, the location of the access point and the technical assistance available are important. Individual community members may have to pay for access, so cost may be a barrier. To use a computer, individuals also have to be literate and have a sufficient amount of technical knowledge to use both the computer and Internet software.

While access often refers to an Internet connection or being able to use a computer, the accessibility of the

applications and content people are using or searching for online are also important factors. Most of the Web will be inaccessible to people who are not fluent in English (this is changing) or because the content is either at a high level of literacy or culturally inaccessible. It may be helpful to remember that when learning to use the Internet, users need to face two learning curves: the one associated with using the technology and the other involved in learning to navigate the Internet and identify and utilize content.

- Language poses a significant barrier for a large proportion of the global population because the vast majority of Web content is in English, or other European languages to a lesser extent. This is changing as websites are being developed in Arabic, Kiswahili, Hindi, and other languages (e.g., Google recently added search capabilities in Kiswahili). But because the development of these websites lag behind Internet connectivity, it will be a number of years before people speaking other languages will be able to use the Internet.
- The literacy level of the Internet is a significant barrier. A study conducted in 2001 indicates that nearly all English and Spanish language health websites present material at a high school education level and most presented material at a college level of literacy (Berland et al. 2001).
- Beyond language literacy, experienced users rely on knowledge or "codes" to identify authoritative and credible sources (not always effectively) on the Web. This could include people's familiarity with the institutional or organizational sponsors of information, subtle culture-bound cues in the language used in websites, and other factors that distinguish commercial websites from non-profit sites, and expertise from opinion. These cues or codes may present an important barrier for users in the South because they lack the context for understanding them and have few local alternatives.

Growth of the Internet

Despite the barriers, Internet connectivity expanded dramatically in the last decade. Less than ten years ago, only a few countries in Africa had Internet access and this access was generally limited to governments, international NGOs, and a few elite users located in the capital city. Now public access points are in every capital; satellite, microwave, and wireless technologies are steadily pushing connectivity up-country; and cybercafes and other for-profit CAPs may help sustain Internet connectivity.

Growth in Connectivity

Internet connectivity is still extremely limited in most of the developing world (Table 1): fewer than 5 percent—and often less than 1 percent—of the countries' populations have an Internet subscription.

But the Internet was introduced much more recently in these countries than elsewhere. In fact, the growth of Internet connectivity is not only dramatic, but compares favorably to the growth of television in the few years after it was introduced. Between 1995 and 2001, the compound annual growth rate (CAGR) in Internet subscriptions ranged from 27 percent per year in Tajikistan to 425 percent in Vietnam (Table 1).

While differences exist between regions (e.g., Asia and Africa), differences are also seen within regions. In 2001, 70 Internet subscriptions were available for every 1,000 inhabitants in South Africa, compared to 1 per 1,000 in Ethiopia. Decisions about the use of the Internet in health programs should be made at the country level and not on a regional basis.

Whether Internet connectivity can continue to grow at the same rate is not as clear. The asymptote for Internet penetration appears to be lower than radio and television. While the initial growth curve of the Internet in the United States closely matched that of radio and television several decades ago (Bimber 2001), the penetration of radio and television began at about 80 percent while the

growth of Internet appears to have slowed at approximately 60 percent penetration. Developing countries have the same initial Internet growth, but the roll-off may occur much earlier and the ultimate asymptote may be much lower.

The ceiling on connectivity in developing countries will depend on the barriers present at the country, community, and individual level. At a certain point, organizations and the few households that can both afford a computer and have a way to connect to the Internet will do so. Some telecommunications analysts project that the growth rate in connectivity is likely to slow in many African countries over the next few years, if it has not already.

Table 1
Internet Connectivity & Access in the Developing World

	PCs per 1000 inhabit. '02	CAGR in Internet Sbscrps '95-'01 (%)	Internet Sbscrp. Per 1000 '02	Estimated direct access per 1000 (Sbscrp. x 3)	Estimated indirect access per 1000 (Direct x 2)	Cost per month for 30 hours of Internet access '01 (US$)
Africa						
Ethiopia	1	268	.4	1	2	95.22
Gambia	13	138	13	39	78	23.03
Ghana	3	196	2	6	12	36.851
Madagascar	2	134	2	6	12	72.85
Mozambique	4	97	1	3	6	--
Nigeria	6	112	2	6	12	45.31
South Africa	66	37	70	210	420	17.871
Zambia	7	78	2	6	12	20.91
Asia						
Bangladesh	2	250	1	3	6	20.46
India	6	74	7	21	42	15.75
Philippines	22	115	26	78	156	37.69
Thailand	28	100	56	112	336	12.22
Vietnam	10	425	5	15	30	21.87
Middle East						
Egypt	16	76	9	27	54	9.87
Jordan	33	144	41	123	246	29.08
EE						
Kyrgyzstan --	284	11	33	66	10.96	
Tajikistan	--	27	.5	2	3	--
Turkmenistan	--	100	2	6	12	--
Uzbekistan --	175	6	18	36	78.28	
South America						
Nicaragua	10	104	10	30	60	36.461
Peru	48	169	115	345	690	--

Source: ITU 2002a; ITU 2002b

Predicting the trajectory of the Internet is difficult. As mentioned earlier, an increasing number and variety of technologies can be used to connect people. New technologies such as digital satellites are less reliant on the poor telecommunication infrastructure that inhibited the initial penetration of the Internet in most of the developing world. And even newer technologies just now being widely adopted in the North, such as Web-enabled cell phones, may rapidly increase connectivity once introduced to developing country markets.

Moreover, slower growth in connectivity does not necessarily mean slower growth in Internet access. It is ultimately the degree of access, not connectivity, that causes concern. The best estimate of connectivity is the number of Internet subscriptions. In Table 1, the International Telecommunications Union estimated the number of subscriptions by multiplying the number of ISPs in a country by an actual or estimated number of ISP subscribers (ITU 2002a). Subscriptions, however, may not be a good measure of access in the developing world.

The vast majority of Internet subscriptions in the developing world provides access to multiple users: school personnel and students in the case of a school Internet subscription; organizational staff, if an NGO has access; company personnel, if the Internet subscription is a private commercial subscription; and perhaps most importantly, intermittent users, in the case of CAPs such as "cybercafes," telecenters, and community kiosks. Thus, the number of Internet subscriptions underestimates the number of people with access to the Internet.

Direct Access

The "multiplier" that determines how many users on average are directly accessing the Internet from each listed subscription probably varies from country to country, depending on the barriers and the proportion of CAPs and other shared access points. The proportion directly accessing the Internet is *conservatively* estimated in Table 1 by multiplying the number of Internet subscriptions by a factor of three. While two or three family members may use a household Internet subscription, a cybercafe could provide hundreds of users with direct access.

Indirect Access

Broadly defined, access extends to people who might not be able to actually use the Internet, but can obtain its content through the formal or informal assistance of someone who can. From a health communication perspective, it is access to health content that is important, not access to a computer. As a result, the number of people with indirect access to the information and resources available on the Internet is even larger.

In Table 1, indirect access to the Internet was estimated (conservatively) by multiplying the number of direct access users by a factor of two. For every person who can directly access information or support provided by the Internet, it was assumed that he/she talks about what he/she finds or actively seeks information for at least one other person such as a family member or friend. Many community access points operated by local NGOs or community kiosks operated by entrepreneurs often have a person who sits at the computer and searches the Internet, obtains information, or types and sends an e-mail at the request of a community member or customer. If the estimates are accurate, Internet access may be limited, but its reach is far more extensive than previously considered.

It is important to assess both direct and indirect access to the Internet in a country by asking the following questions:

- What is the proportion of Internet subscriptions that are, in fact, multi-user access points in countries and regions?
- What barriers at the country, region, community, and individual levels affect the access multipliers?

- Does the location of a multi-access point (e.g., a workplace versus a cybercafe) make a difference as far as providing people with indirect access to Internet resources?

Community Access Points

The growth of Internet connectivity and access in the developing world is being fueled in large part by the introduction of CAPs. Many CAPs are publicly financed and government- or NGO-sponsored, including most "telecenters." The South African government originally created the Universal Services Agency (USA) to establish telephone service throughout the country, but it now works with local entrepreneurs to establish telecenters offering Internet service. In Uganda, USAID's LearnLink project established telecenters and a means to connect them in regionally dispersed teacher-training colleges.

Other CAPs are entrepreneurial in nature. This includes the cybercafes or community kiosks springing up in nearly every capital city in the world, a large number of secondary cities, and increasingly in peri-urban and rural areas. Cybercafes were among the first businesses to appear in Kabul, Afghanistan, after the war. The city with the densest concentration of cybercafes is not in the North, but in Irbid, Jordan, along Shafeeq Rushaidat Street (Ghashghai & Lewis 2002). CAP business models vary widely from multi-branch chains, tiered franchises, venture capital-funded small businesses, and micro-loan financed local entrepreneurs.

The CAP business model is still being refined, with the location and pricing of services particularly important. AfricaOnline, for example, set up hundreds of public access kiosks in local stores in Cote D'Ivoire, Kenya, Uganda, Tanzania, and Zimbabwe. Many of these are now closed with AfricaOnline retreating to fewer facilities providing a greater number of services. Elsewhere, the entrepreneurial community kiosk model shows promising results with the numbers of kiosks, cybercafes, or for-profit Internet access services growing rapidly. The N-OGUE model in India is a good example (see box, page 8).

The demand for community kiosks is strong despite the limited services — by Northern standards — that these kiosks provide. Estimates show approximately 15 percent of the inhabitants of Indian communities with an Internet kiosk use at least one of the kiosk's services (Mishra 2002). The services, however, are primarily limited to e-mail and information about local markets since little else is available on the Web in the many local Indian languages. Yet, the demand exists and will continue to grow as the number of services offered increases.

CAPs can be profitable, and thus sustainable, in part because of existing demand, but also because of technologies engineered and priced for developing country contexts. For example, it costs about $850 US (plus a small monthly fee) to set up a community kiosk in India with hardware, software, and Internet connectivity (Dev Sood 2002). While this amount may be more than the income of many Indian households, the cost is marginal when spread over a community on a per-capita basis. Entrepreneurs obtaining a small loan to obtain or lease the technology can charge minimal user access fees and remain profitable (Mishra 2002). Finding estimates of CAPs in countries is difficult, in part because the number is growing so rapidly, but estimates showed 45,000 community kiosks operating in India in 2003.

While CAPs do not add significantly to Internet connectivity, they dramatically increase Internet access. Demand for, and thus sustainability of, CAPs perhaps offers the best hope for widespread access to the Internet in the developing world. CAPs also present an opportunity to use the Internet as a health communication channel.

Community Kiosks

N-LOGUE in INDIA

N-LOGUE Communications Pvt Ltd in India is a company created in part by the Department of Engineering and Computer Science and Engineering of IIT Madras. N-LOGUE installs Internet kiosks in rural, otherwise unconnected villages by renting equipment to a local entrepreneur who then charges a small fee for access. These kiosks consist of a PC, power supply, Internet/voice connection, and office software in the local language. The entrepreneur, or local service provider (LSP), is responsible for maintaining the kiosk. LSPs have a strong incentive to sit at the computer, if necessary, and send e-mails or conduct searches for customers unable to use the technology themselves. N-LOGUE projects have attracted a number of partners, including MIT and Harvard in a Melur, Madurai District project. N-LOGUE reportedly has an agreement with the Tamil Nadu state government to place an Internet kiosk in every village. These Internet kiosks, collectively branded "Chiraag," will provide the rural population with access to online health information, education, entertainment, and e-governance.

WIRELESS TELEPHONY AND THE MOBILE INTERNET

Wireless telephony generally refers to voice communications using a mobile device such as a cell phone, but wireless applications also include short message services (SMS or "text messaging") and Internet connectivity, either from a fixed location or from a mobile device. The growth curves of wireless telephony and the Internet are similar globally with the penetration of the Internet lagging behind wireless phones by about two years. Notably, cell phones and the Web were introduced commercially to a mass market two years apart: cell phones in 1991 and a commercially available Web browser in 1993. At the end of 2001, the Internet had the same level of penetration worldwide as cell phones had in 1999. While wireless telephony is not a central topic here, these technologies may have important long-term implications for the Internet in the developing world.

Wireless communications systems are emerging where there is a lack of fixed-line telephone infrastructure. Developing countries are "leapfrogging" traditional telecommunications systems because wireless systems are state-of-the-art, less expensive to install, and less dependent on existing infrastructures. Africa already has more wireless subscribers than there are households with a telephone line. Mobile systems overtook fixed-line phones in Uganda first, followed closely by Cote D'Ivoire and Zimbabwe (ITU 2002b).

Wireless technologies can connect desktop computers to the Internet (e.g., N-LOGUE uses wireless relay stations to connect their community kiosks) and provide rural communities that lack telephone lines with Internet connectivity. In a small village in Laos, the JHAI foundation set up a computer powered by bicycle with a wireless link that villagers are using to access the Internet (JHAI 2003).

Mobile Internet devices address many of the community- and individual-level barriers in developing

countries, including the lack of convenient access points, lack of rural access in general, the cost of the technology, and the technical literacy required to use a computer. People in developing countries appear to use computers mostly to send e-mails and find information; the suite of software that runs on computers has little relevance to their daily lives. A cell phone capable of browsing the Web and sending text messages could meet the needs of developing country users at a lower cost and more easily.

Table 2 provides estimates of the penetration of fixed line versus mobile telephony as of 2001 in a number of developing countries. As with Internet penetration, a great

Table 2
Wireless Telephony in the Developing World

	Total Telephone Subscribers per 1000* '01	Fixed lines Per 100 '01	Mobile Subscribers Per 1000 '01	New Mobile Subscribers '00-'01	Mobile / Fixed Ratio
Africa					
Ethiopia	5	.5	.04	9.7+	.1
Gambia	58	2.62	3.2	37.4	1.2
Ghana	21	1.2	1.0	63.7	.8
Madagascar	13	.4	.9	84.4	2.5
Mozambique	13	.4	.8	118.8+	1.9
Nigeria	7	.4	.3	300.0	.7
South Africa	324	11.25	21	889.0+	1.90
Zambia	17	.8	.9	- 0.6	1.90
Asia					
Bangladesh	8	.4	.4	241.0	1.0
India	40	3.7	.6	2148.1+	.2
Philippines	177	4.0	13.7	4113.6	3.4
Thailand	221	9.4	11.9	4494.0	1.3
Vietnam	53	3.8	1.5	462.3	.4
Middle East					
Egypt	146	10.3	4.3	1433.9	.4
Jordan	271	12.7	14.4	356.6	11
The Stans					
Kyrgyzstan	--	7.7	.5	--	.1
Tajikistan	37	3.6	.03	.5	.01
Turkmenistan	84	8.0	--	--	--
Uzbekistan	68	6.6	.3	9.6	.04
South America					
Nicaragua	49	3.1	3.0	--	1.0
Peru	137	7.8	5.9	271.1	.8

Source: ITU 2002a; ITU 2002b
+Digital subscribers

variation exists between regions. In Africa and Asia, for example, the ratio of mobile subscribers to fixed telephone lines is high. In Eurasia, the mobile to fixed ratio is relatively low. Important differences are seen within regions as well. While Africa as a whole is increasingly mobile, Ethiopia lacks any telephone infrastructure and has very few mobile subscribers. Madagascar has a poor communications infrastructure, but a rapidly increasing number of wireless subscribers.

As the table indicates, cell phones may already be a potentially powerful channel for reaching some populations. The use of SMS, in particular, is growing dramatically in South Africa, Jordan, and in major cities such as Lagos, Nigeria.

Determining which developing countries will be fastest to adopt the mobile Internet and how quickly this transition will occur is difficult. Many countries that rapidly adopted mobile telephony, such as the Philippines, were slower to adopt the Internet. Other countries rapidly adopting the Internet, such as India, are slower to adopt mobile telephony (ITU 2002b). It is important for health communication professionals to consider the following:

- Mobile devices may reduce the need for computers and also slow the further penetration of related technologies such as CD-ROMs.
- Mobile devices such as Web-enabled cell phones display information differently and are used differently. Internet health applications will have to be designed explicitly for these devices.

ICTs AND HEALTH

The Digital Opportunity Initiative (DOI) — a partnership between the United Nations Development Program (UNDP), the Markle Foundation, and Accenture that was launched at the G-8 Okinawa Summit in 2000—noted the increasing interest of developing country governments in ICTs as a way to enter the global economy. The DOI called for using ICTs, particularly the Internet, to achieve development objectives in the areas of health and education. The DOI identified five possible roles organizations can play with respect to the Internet:

1) **network operators** that develop and maintain Internet and telecommunication systems infrastructure,
2) communication and information technology **device manufacturers**,
3) **service providers** such as ISPs or organizations that provide IT training,
4) **content providers** that develop information and materials for websites, and finally,
5) **content aggregators**, such as Internet portals or databases.

Many NGOs and development agencies act as service providers by setting up access points to the Internet at schools or helping establish telecenters in small towns. Often, these NGOs or agencies established access points as a step towards achieving a specific development objective such as setting up the service so they can act as content providers, often with an educational objective. Yet, projects providing Internet services often meet with difficulty. A quick review of programs involving ICT reveals that the provision of Internet service is difficult to implement and the resulting service is often unsustainable.

Given that providing Internet services is difficult, health NGOs and development agencies should forgo acting as service providers and instead provide health content to audiences or local partners by "piggybacking" access points created by entrepreneurial CAPs and other sustainable initiatives. It is important to assist local NGOs, health services, and Southern partners in building their capacity to develop ICT applications.

Over the next decade, the expansion of the Internet may have two broad effects. First, the Internet eliminates the need for many of the links in the "distribution chain"

between producers and consumers of information. This effect is referred to as "disintermediation." For commercial marketers, disintermediation has a number of benefits. By shortening the distribution chain, producers can enhance their cost-competitiveness, gain more control over the marketing of products and the brand, speed the delivery of products to consumers, facilitate just-in-time manufacturing, and better assure customer satisfaction. Indeed, some of these benefits arguably apply to social marketing of health information: by going straight to consumers, health communication professionals can identify and address the needs of health consumers more quickly and ensure that an accurate source of information is available.

However, disintermediation has a number of potentially negative implications. First, disintermediation may inhibit the growth of local capacity. Second, as with any message, ICT-based health applications may not be effective if they are not tailored to the audience's local needs and concerns. Third, sustainability depends on Southern partners being able to update the information provided on websites and maintain the application over time.

Anecdotally, users in Kampala already access WebMD.com to self-diagnose health problems and identify treatments they administer themselves. This use of WebMD.com or other health websites by people in Africa and elsewhere raises a second possible effect of the Internet: the "decontextualization" of information when it is extended beyond social and cultural boundaries. WebMD.com is designed for a U.S. audience, where it is assumed the user will have access to a physician or a pharmacist. How the information is received, interpreted, and used in Kampala or elsewhere, is unclear.

chapter 2

ICTs & Health Communication Theory

- HEALTH OPINION LEADERSHIP
- SOCIAL CAPITAL IN HEALTH CYBER NETWORKS
- COLLECTIVE ACTION AND ADVOCACY NETWORKS
- INTERACTIVE HEALTH COMMUNICATION

In terms of health communication theory, ICTs can impact individual and social behavior and shape the information and communication environment in which health communication programs operate. But using ICTs effectively depends on understanding the strengths and limitations of the technology in a changing information environment.

The potential effects of the emergence of ICTs on individual and social behavior are considered here, including the Internet and opinion leadership, the effects of ICTs on health-related social capital, and ICTs and collective action. Because of the limited penetration of the Internet in the developing world, this report emphasizes the effects of, and opportunities presented by, diffusion of information and indirect, rather than direct, access.

HEALTH OPINION LEADERSHIP

For programs operating at the community level, one of the most important questions regarding ICTs is the effect and opportunities created by the rapidly increasing number of CAPs. The introduction of a cybercafe, telecenter, or other access point in a community can enable some people to access the Internet (and the new and rich resources it makes available), while others will not have access. The introduction of a CAP may affect the the diffusion of information within the community: those with Internet access may become information providers, while others may assume a smaller role.

ICTs may give renewed importance to opinion leadership, one of the most established concepts or theories in health communication. The concept of opinion leadership was originally put forward to help explain the influence of the mass media on public opinion (Katz & Lazarsfeld 1955). In the "two-step flow" model of opinion leadership, information flows from the media to opinion leaders and from opinion leaders to their social networks. Now the theory may be helpful in

understanding the potential effects of the latest communication technology and particularly the Internet.

Informal opinion leaders gain a special status in their communities not through any specific educational attainment or training, but rather through a perception that they have unique knowledge and expertise in a specific area. Informal opinion leaders are more likely to rely on written and more technical sources of information than others (Rogers & Shoemaker 1971) and/or they are well connected or strategically located in their social network (Kelly et al. 1991). In communities where there is limited Internet access, ICTs may create informal opinion leadership by providing a few people with a relatively exhaustive and in-depth source of information (including technical information) as well as a strategic location in their network as individuals who can access the technology. Given that the Internet and other ICTs are interactive, the model is probably better characterized as a "two-way, two-step flow," rather than simply a two-step flow. Those with access to the Internet will not only relay information to others, they are likely to retrieve health information on request, perhaps first for themselves or a family member, then later for friends and others.

The Internet apparently produced health opinion leaders in the United States in the late 1990s (Maxfield et al. 2000) but whether that occurs in a developing country is uncertain. Theoretically, technology-enabled opinion leadership may be more likely to occur in a developing country context because fewer people will have access to the technology, and so those with access might become even more important. People also have fewer alternative sources of information and the sources that exist, including radio and television, are not nearly as rich. And, the effects of ICTs on opinion leadership and information diffusion in communities may have longer term implications in developing countries than in the U.S. As access increases over time, the role of Internet-enabled opinion leaders should be reduced as others gain the ability to use and access the same sources of information. In developing countries, however, illiteracy and a number of individual-level barriers place a ceiling on the proportion of any community that will be able to directly access the Internet. The intransigence of these barriers (such as illiteracy) may provide Internet-enabled opinion leaders with an enhanced and semi-permanent status.

Public health researchers need to investigate the effect of the rapidly increasing number of CAPs on communities. If health opinion leaders are being created by the introduction of CAPs, strategies could include enlisting these leaders to achieve program objectives. Research could also show whether the flow of health information from the Internet to communities is positive and beneficial, because it is not now clear that a change in opinion leadership will be for the better. Poor quality, inappropriate, and occasionally dangerous information is prevalent on the Web, and myths and rumors about diseases (e.g., the origin of HIV/AIDS) diffuse quickly online through e-mail, chat rooms, and electronic bulletin boards. New opinion leaders, while technically literate, may be health illiterate. Internet-enabled health opinion leaders might gain their opinion leadership status by relaying poor information, and they might displace established and better informed health opinion leaders.

SOCIAL CAPITAL IN HEALTH CYBER NETWORKS

Another theory or concept that might be useful in guiding the use of the Internet and other ICTs in health communication programming is "social capital." Nan Lin (2001) defines social capital as "resources embedded in a social structure that are accessed and/or mobilized in purposive action." In development, social capital theory is receiving growing attention by those concerned with democracy and governance because the theory addresses how social networks can be effective in collectively representing their interests (Fukuyama 2002). Because advocacy by organizations and public interest groups is becoming an increasingly important strategy, social capital is also relevant to health programs and is just beginning to

receive attention from public health researchers and health program developers (Cooper et al. 2002; Gillies 1998).

Social capital is particularly relevant to the Internet. Lin (2001) introduces the idea that cyber networks — social networks established via e-mail, chat rooms, discussion groups, billboards, or listserves — can increase the social capital available to those participating in these electronic forums. In other words, the cyber network provides individual members with resources that others in the forum make available, such as specific expertise in an area, general information, social support, or other forms of assistance. If Lin's hypothesis is accurate, health-related cyber networks can increase the health-related social capital available to participants. Health-related social capital could include knowledge that participants in the network have about health risks and behaviors, informal assistance in obtaining health services, a source of motivation as far as changing health behaviors, or advocacy leadership.

The definition of social capital, however, is subject to debate. While no empirical evidence exists for the central thesis that cyber networks result in increased social capital, programs should consider integrating ICTs into advocacy strategies. Cyber networks and social capital suggest ways to develop advocacy networks that can identify and leverage resources within participating networks in order to achieve program objectives.

COLLECTIVE ACTION AND ADVOCACY NETWORKS

Collective action is defined as organizations or informal associations of individuals voluntarily organizing their resources to address a common need or problem (Knoke 1988). Collective action includes the activities in participatory community development as well as large-scale grassroots lobbying by interest groups. The Internet and other technologies can contribute to collective action in the same way that the technologies contribute to social capital. ICTs such as chat rooms and discussion boards might provide a way to foster interaction among dispersed participants around a common goal, and in doing so, strengthen a shared identity and sense of purpose. ICTs can then be used to direct "offline" activities, dramatically expanding the degree of cooperation and coordination achieved within a large group. Websites can be updated to provide current information to geographically dispersed participants simultaneously. E-mail or text message alerts can be used to coordinate activities or resources at a distance and give advocates or participants an opportunity to provide feedback on obstacles encountered.

While ICTs do not create social movements, they appear to create a communication environment in which collective action can flourish (Deibert 2000). The potential for using ICTs to foster collective action is largely speculative and fraught with challenges, including holding participants accountable, fragmentation over time, and overcoming the inequities in access. Research continues to grow about online communities and the ecology of the online social group, but at this time no tried-and-true models have emerged.

INTERACTIVE HEALTH COMMUNICATION

The Internet offers enormous potential to help people change behaviors (Tate et al. 2003; Gustafson et al. 1999). ICT applications are available that can tailor the health information and support provided to individuals based on their stage of behavior change or based on some other combination of psychosocial or behavioral characteristics. Because these behavior change applications (BCAs) can collect data from users on a routine basis, the information and support provided can be optimized to maximize the likelihood of behavior change.

But because few models exist to use as a starting point, BCAs do not yet have a lot of utility in most developing countries. Behavior change applications now

focus primarily on the prevention of chronic diseases and not the more immediate health concerns present in most developing countries. These applications are also designed for individual users with direct Internet access and other technologies (e.g., SMS).

Nevertheless, these applications promise to reshape how health communication is approached and conducted. To begin with, conceptualizing users of ICT applications as an audience is no longer useful. In place of one-way messages where exposure is the key, behavior change applications could involve an extended dialogue with sequential messages aimed at incremental goals. In order to serve unlimited numbers of users, these systems can be automated using decision logic that responds to the changing needs of intended users.

To exploit the potential of these types of applications, health communication practitioners will need to adopt different approaches and become familiar with new areas of theory and research, such as cognitive planning and goal setting. ICTs will also put additional demands on the health communicator because the interactivity of the technology will require that practitioners have skills and competencies perhaps more in line with counseling, conflict resolution and mediation, and other disciplines with a dialogic skill set, rather than advertising or marketing.

Furthermore, communication research methods that were previously impractical in the field become practical using ICTs. In the same way that the technologies enable new methods of communicating, they will ultimately enable health communication researchers to use a wider variety of study designs. Audio and visual materials can be pretested using a true experimental design by having interviewers use PDAs equipped with computer-assisted personal interviewing (CAPI) software.

Ultimately, technology will enable, if not require, health communication researchers to ask new research questions and build new theoretical approaches to social and behavioral change. Experimental trials of communication materials would not only provide a far more exact and powerful method for assessing the relative effects of messages, visual components, spokespeople, and themes, but would also open the door to research that was confined largely to the laboratory.

What distinguishes ICTs from other media or communication tools is the interactivity of the technology. These new approaches and methods should be distinguished as interactive health communication.

chapter 3

ICT Strategies & Applications

- ICT STRATEGIES
- ICT APPLICATIONS
- ASSESSING THE USE OF ICT APPLICATIONS

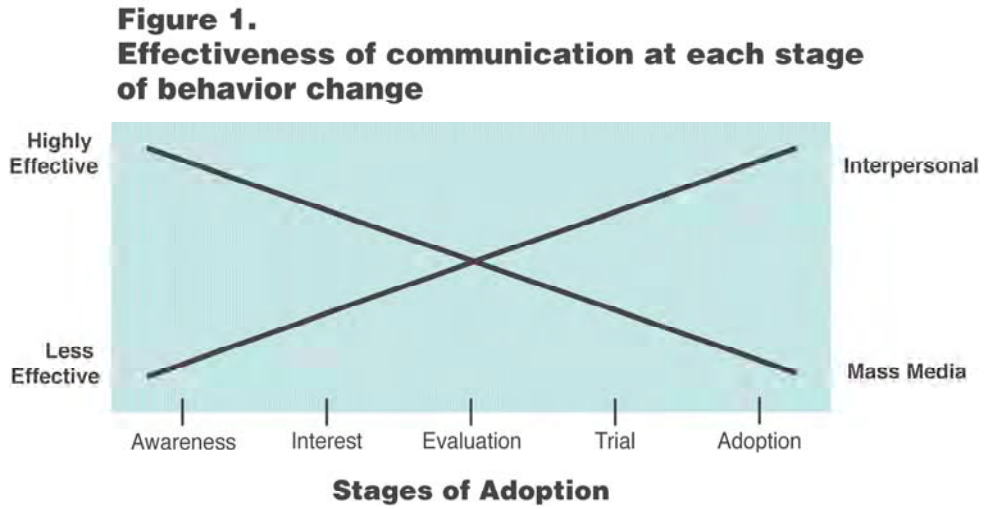
ICT STRATEGIES

The following describes two broad strategies for utilizing ICTs, particularly the Internet, in health communication programs. Programmers should take advantage of the strengths of ICTs to complement other communication channels. They should also work with Southern partners in the design and implementation of ICT applications so the application is sustainable and increases the capacity of the local partner.

ICTs as a Synergistic Channel

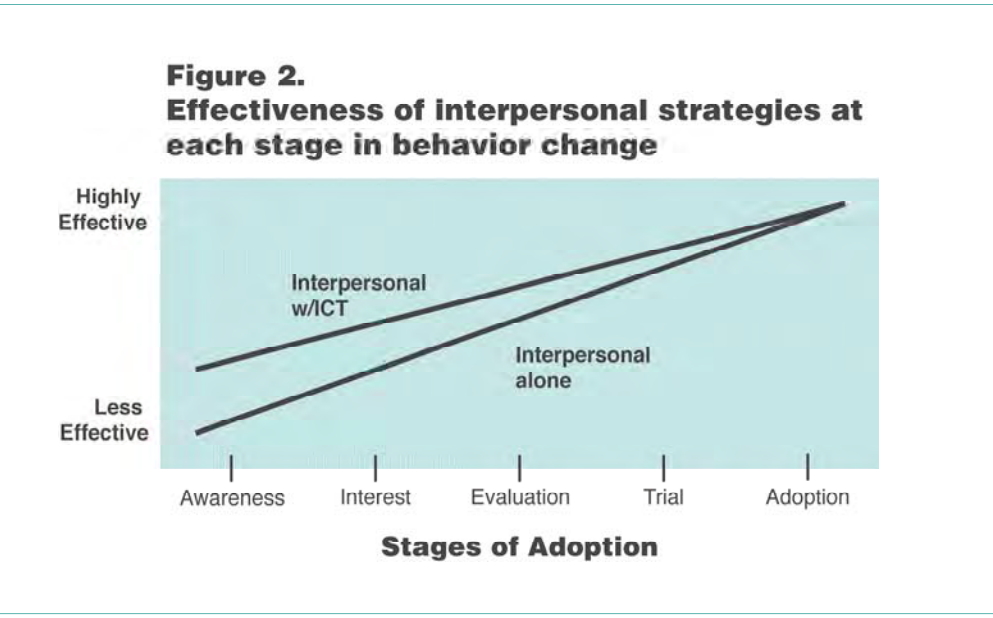
ICTs cannot stand alone in most health programs. The penetration of the Internet and other new technologies is far too limited. Even if it were higher, ICT applications cannot raise awareness about health risks. Advertising, partners or community workers, or health services are needed to motivate and mobilize people to visit and use a website. ICTs should be strategically integrated into health programs so the strengths of ICTs complement and add to the effectiveness of other channels.

Mass media and interpersonal communication strategies can be effective. Figure 1 illustrates the relative effectiveness of interpersonal and mass media strategies in the stages of behavior change. Broadcast technologies such as radio or television are highly effective at increasing awareness because of their reach. Mass media's efficacy is reduced in the later stages, however, when individuals are evaluating and attempting behavioral change. Interpersonal communication or community-based activities are less effective than mass media at increasing awareness about health behaviors because interpersonal communication strategies are difficult to implement on a large scale. Interpersonal channels can be much more effective in the later stages of behavior change because individuals often require support when they encounter obstacles to change.



Using ICTs to enhance TOT

The training of trainers (TOT) is one attempt to implement interpersonal communication at a larger scale. Health communication programmers hope that trainees who train others can affect a larger number of communities by increasing awareness and interest — ultimately affecting greater change among the broader population. However, TOT programs are limited by the high cost of training (e.g., travel expenses), logistical difficulties, and the constraints trainees face once they



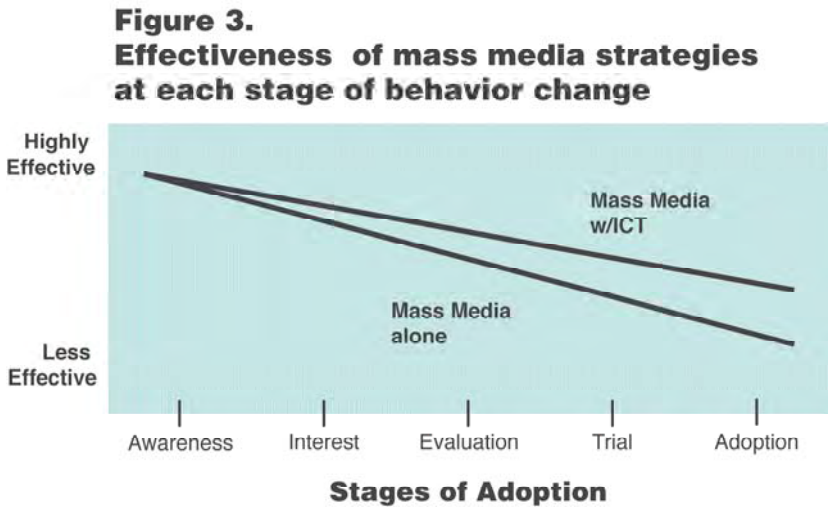


Figure 3.
Effectiveness of mass media strategies at each stage of behavior change

return to their communities. TOT staff also need to follow up with trainees after they return to the field in order to sustain momentum. Using ICTs to deliver e-learning or blended-learning training in conjunction with face-to-face training provides a way to conduct TOT programs at a lower cost and on a much larger scale. ICTs might also contribute to the effectiveness of TOT programs (Figure 2). ICTs can be used to follow up with those trainees who have access in their communities. Online networks of trainees developed during the training might provide ongoing support when the trainees return to the field.

Using ICTs to enhance mass media

ICTs can be used synergistically with mass media in several different ways (Figure 3). In some countries, mass media could create awareness about a risk or health issue and drive audiences to websites or other "e-health" resources to assist them in changing a behavior (e.g., diet or physical activity), finding social support, or joining an advocacy movement. Alternatively, developing country health programs might use ICTs to increase the amount or variety of health programming on mass media channels. A recent effort is underway to connect community FM radio stations to the Internet (e.g., Mali and Nepal). In many places, these community radio stations are desperate for content. By using the Internet, these stations can be provided with programming resources or connected to local health NGOs.

ICTs for Sustainability and Capacity Building

ICTs have the potential to make a significant contribution to the sustainability of activities and the capacity of local partners and communities because information, as well as sophisticated interactive applications, can be made

available or reproduced and disseminated at nearly zero marginal cost. This includes e-learning modules and information or material resource databases such as HCP's Media/Materials Clearinghouse (M/MC).

Because computers, Internet access, and the facilities required can be unsustainable, programs seeking to use ICTs to build capacity and contribute to sustainability need to identify ways to piggyback existing Internet access points. Programs also need to develop applications in a template format that can be easily adapted and tailored for local use.

For those with Internet access, web-based resources (e.g., the M/MC or the Communication Initiative) offer vast and up-to-date information and databases, but they should provide useful materials or information and be easily navigated and accessible in terms of language and level of literacy. Because the maintenance of these databases represents an ongoing challenge, health communication programs should explore ways to automate functions such as submissions of materials and even the scoring or ranking of materials.

Integrating ICTs into partnerships may contribute to the capacity of local partners and the sustainability of their activities. Some scalable web applications, for example, are designed explicitly to facilitate information sharing and enhance communication and coordination in international partnerships for development. These products include web and database applications that allow partners and their respective field offices to coordinate calendars, manage budgets, and hold virtual meetings. They can also prompt partners to update program data stored in a centrally accessible repository, automatically generate reports on process indicators, and disseminate the reporting to appropriate staff or external stakeholders. Hornik (1988) noted that communication technologies can help provide an organizing structure to an effort so changes can be maintained over an extended time. If IT applications are successfully incorporated into the workflow so local partners begin to use and rely on the application, it could form a foundation for the partner's efforts long after the partnership has ended. If the application is easy to implement and produces visible short-term to medium-term benefits, partners may continue to collect and update program data, share it with external stakeholders, and report on, and hopefully respond to, process indicators.

The emergence of the Internet and other ICTs also means local NGOs and communities will increasingly need capacity in designing and implementing ICT applications. Health communication practitioners should consider identifying decision trees and behavioral logic for use in ICT health applications and promoting the strategic design of ICT health applications.

Providing tailored health information, decision support, or conducting training through interactive automated websites requires decision trees or decision logic that can query users and respond to their input. Health program officers need to identify decision trees or logic in the areas of reproductive health, child survival, and HIV/AIDS that can be used in websites and other automated ICT services (e.g., SMS). Decision trees have already been explicated and are available in a variety of areas in books, training programs, brochures, and counseling cards. Health communication professionals could translate these into a format suitable for ICT developers and make them available in a template format for use by local developers.

Health communication practitioners also need to promote a systematic, research-based approach to the strategic design of ICT health applications. ICT health applications should be planned and produced through the same process of communication analysis, design, and development used in producing other communication materials. For example, HCP could develop case studies for applying the P-Process or A-Frame to ICT health applications.

ICT APPLICATIONS

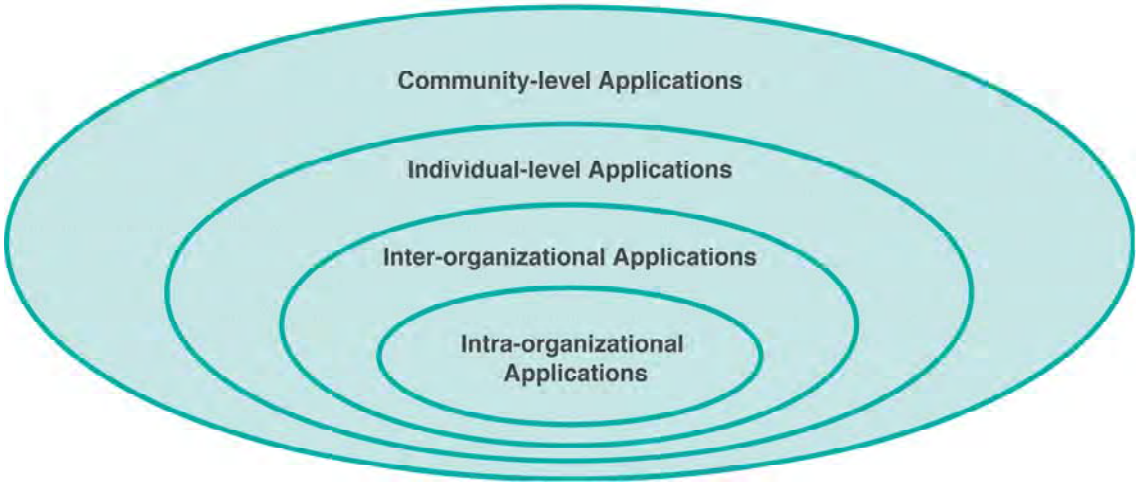
One of the strengths of the Internet and other ICTs is that they can serve as multi-functional platforms for development communication (Digital Opportunity Initiative 2001). Information on nearly any health issue can be provided in a variety of formats, automated applications can be developed that respond to a user's needs, and networks or online communities can be established to provide social support, foster collective action, and/or encourage collaboration between partners.

The following section proposes four categories or types of ICT applications: intra-organizational, inter-organizational, community level, and individual level. The proposed categories are not based on any particular technology since the Internet, cell phones, or PDAs can be "programmed" to achieve any number of objectives. Rather, they are based on the program's objectives and intended audience (Figure 4).

Intra-Organizational: ICT applications can be discretely integrated into a specific programmatic activity in order to increase the scale, scope, efficiency, or effectiveness of the activity. The organization itself accesses and uses the application, thus the interface is designed for internal use. Examples of enhanced activity applications include the use of PDAs and computer-assisted interviewing (CAPI) software in survey data collection or program management applications.

Inter-Organizational: ICT applications can be designed to facilitate the exchange of information between organizations. The objectives of these types of applications could include coalition building, advocacy, project management, or training. Depending on the objective of the application, the partner organizations will require some level of access to the application, thus each organization requires some technically skilled staff. Examples of enhanced partnership organizations include SCOPE, an interactive software program developed by CCP that allows users to design strategic communication programs, and more generally, listserves, coalition-building websites, or program management web applications shared by the partners.

Figure 4. ICT applications in the layers of a program



Community Level: ICT applications can be designed specifically for groups of audience members, including communities or mobilization teams, informal social networks among at-risk populations, or organizations. An application might provide interactive modules that assist community action teams in the formative analysis, design, development, and implementation of activities. Community-level applications would also include applications that provide feedback on health indicators to community leaders or health education modules for schools. With this type of application, not everyone in the community, group, or team needs to be able to use the technology. Instead, community-level ICT applications would be designed for an intermediary that would use the technology for a larger group.

Individual Level: Applications can also be designed for individual members of the audience. These types of applications would include interactive websites that provide tailored health information based on a user profile or applications that link individuals to online communities or online networks. Please note that these applications do not require that individuals have access from either their households or some other form of private access. Instead, the user and the objective differentiate this type of application from community-level applications. The user, in this case, accesses the application for his or her personal benefit, not for the benefit of a larger group, and the application is designed accordingly. Individual-level applications would also include e-learning modules for "upstream audiences" such as health care providers or community health workers.

ASSESSING ICT APPLICATIONS

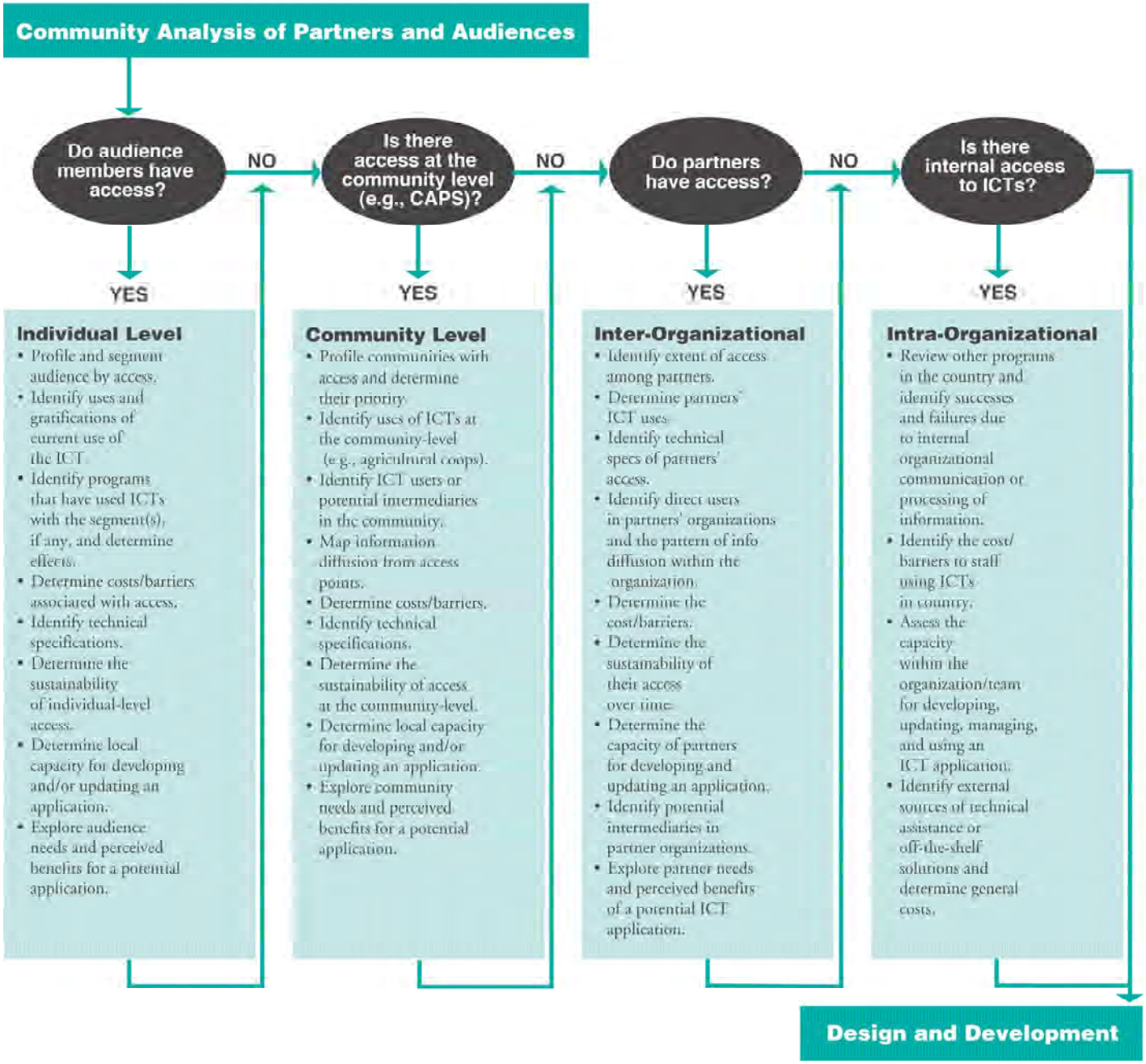
The assessment of ICTs should occur in the formative research or communication analysis phase of planning programs. Once potential audiences and partners have been preliminarily identified — including audiences such as health care workers, community health workers, or media gatekeepers — assessment teams can begin to look at the potential application of ICTs. Programmers want the strengths of ICTs — interactive or dialogic communication over extended periods of time, a platform for the formation of social networks, the cost-free reproducibility, and the programmable or automated provision of information — to be used either synergistically with other channels or as a tool for capacity building. Because several technologies, including the Internet (e-mail and web) and SMS, possess these strengths, the assessment should look broadly at access to ICTs and not simply focus on one technology.

Figure 5 provides a flow chart outlining the assessment process. The first step is to determine the level of access to ICTs in the different layers of communication that occur within a program, beginning with the audience at the individual and community levels, then partners, and finally, internally within the organization. In some cases, the assessment will be brief because the audiences or partners lack access to ICTs. In other cases, the assessment should proceed to a more detailed look at access and ICT.

The decision to use an ICT should follow the detailed assessment. In fact, the decision to develop and implement an ICT application should depend on a range of factors, but should be considered in the design and development stage of the program planning process, including the objectives of the program, the resources available for developing an ICT application, the timeline of the program, and the needs contained within the larger program strategy.

If the audience has access to ICTs, detailed assessments of ICTs should be conducted, even if the resources available or the timeline suggest otherwise. ICTs are new tools that can be applied in a number of different ways. The detailed assessments may reveal opportunities that would otherwise be missed.

Figure 5. ICT Assessment Tool



chapter 4

Using ICTs in the Field

- DESIGNING AND DEVELOPING ICT APPLICATIONS
- POTENTIAL ICT APPLICATIONS
- ICT APPLICATIONS IN HEALTH COMMUNICATION PROGRAMS

DESIGNING AND DEVELOPING ICT APPLICATIONS

Many of the lessons learned in designing and developing other types of effective communication materials, including radio serial dramas or counseling cards, apply equally to ICT health applications. The audience should participate, wherever possible, in ICT design and development.

Granted, ICTs differ in a number of respects from other communication media such as print or radio, so the following should be considered:

1. *Design around the location of access points.*

   The locations of access points in communities are important considerations in both the marketing and design of applications. With CAPs, social differences may be less accentuated in retail or market access points versus religious sites. The degree of privacy available to users may also vary by location.

2. *Design for information-seekers.*

   Ideally, programs will motivate or mobilize audiences to use an ICT application, but ultimately, it is only active information-seekers with at least a minimal knowledge about the health behavior that will use an ICT application. People need a reason to use a website and they need to know where to find it. The design and development of ICT applications should focus on providing an immediate benefit to those in search of information or support.

3. *Design templates that can be adapted to local needs.*

   Although a website can be accessed globally, its success will depend upon its local relevance. To better leverage resources, ICT applications should be developed as templates that can be easily replicated

SMS

In Germany, a company called Materna is producing SMS serial dramas in which subscribers receive twice-daily text messages that develop a story over a period of weeks. This application could be used in producing entertainment-education (EE) serial dramas in a growing number of developing countries. Increasingly popular and widespread, SMS is used for both information and entertainment purposes. Because receiving SMS messages is often free (e.g., Philippines or Nigeria), it is often a preferred mode of communication. Soon it will be possible to combine animated graphics, still images, and sound effects along with text in messages for multimedia EE.

SMS is also being used to boost compliance with drug regimens such as ART. A South African company, On-Cue, has developed, tested, and is now running an application for a health clinic in Cape Town. The clinic enters the patient's information into a database, including the prescription, the time of day a message should be sent, and the patient's telephone number, and the application will then send the patient a personalized text message at a specific time as a reminder (On-Cue 2003).

from one community, one country, or one region to the next, but it is critical that the template then be adaptable to local situations. This need for flexibility also requires local partners who can adapt the template to local needs.

4. *Design applications for long-term dialogic communication.*

ICT applications should be designed for interactive or dialogic communication over the long term, not the one-time broadcast of information (i.e., "brochureware"). Applications should continually query users about their needs and their situation, and the information or support provided to them should be tailored accordingly.

5. *Design applications for social support.*

The information provided in ICT applications should be combined with mechanisms such as bulletin boards or chat rooms that encourage social networking, social reinforcement, and the creation of online communities. Users can be linked to others that are at the same stage of change (including partners or group- or community-level users), face the same constraints, or share the same concerns about health issues.

6. *Design and develop applications that increase the scale, scope, or efficiency of programs.*

The benefits of ICTs include faster communication, the elimination of distance as a consideration, and the automation of information provision, all of which can translate to a more efficient use of resources and a more adaptable program. The integration of an automated attendant in a live counseling telephone hotline can screen out erroneous calls to increase the

SA Promising Community-Level Application

AfriAfya (www.afriafya.org) is a consortium of health NGOs set up to explore the use of ICTs in rural communities in Kenya (including Aga Khan Health Services, African Medical and Research Foundation, CARE Kenya, Christian Health Association of Kenya, HealthNet Kenya, the Ministry of Health, PLAN International, and World Vision International). Funded by the Rockefeller Foundation, the project began in January 2001 and ended an exploratory phase in September 2002.

AfriAfya established a coordinating hub along with seven field sites, including a government dispensary, a primary school, a mission hospital, a WHO IMCI site, and a health center located in an informal urban settlement. The consortium selected communities because their members had ongoing health interventions in these locations. HIV/AIDS was the primary topic during the exploratory phase.

The project called for HIV/AIDS information to be collected by the hub and disseminated to the seven field sites using WorldSpace satellite receivers connected to desktop computers. Three or four people at each field site, including community health workers, were trained to use the technology.

At the conclusion of the 18-month exploratory period, AfriAfya had functional ICT equipment at each field site, trained staff, and "a system of communicating and exchanging health information with their communities and the hub" (AfriAfya Technical Report 2002). AfriAfya did encounter problems, however. As with many community-based, participatory, or mobilization efforts, the quality of leadership in each field site was critical. Developing content that the communities wanted or would act on was also difficult. AfriAfya began by compiling "hard medical facts," but the community demanded practical answers within a local and cultural context. Finally, while the authors of the AfriAya technical report say that it was relatively easy to train community health workers and "rural people, especially rural women" to use ICTs, they also said "the way technologies are marketed makes them sound deceptively easy to use, but in reality, to make them work properly and fully utilize them takes hard work and requires proper training, upkeep, maintenance, and re-training—all of which take time."

Overall, however, the early evaluation of AfriAfya suggests that it was successful. The evaluation found an increased level of discussion about HIV/AIDS in the communities as well as targeted behavioral effects, including increased condom uptake and requests for voluntary counseling and testing. Field sites also experienced a set of positive, but largely unexpected outcomes, including increased attendance at "health action days," an overall improvement of immunization coverage, and increased health facility utilization. Communities also took the information disseminated by the "hub" and adapted it for local use, including posters, songs, and drama. These materials were then disseminated to the other field sites, both directly and through the hub. Neighboring communities were intensely interested in being added to the network.

capacity of call centers or link callers to operators who have an information specialty, such as voluntary counseling and testing for HIV (VCT) or antiretroviral therapy (ART).

7. *Design integrated applications.*

Once a community or individual begins to use a website for one health issue, the site's credibility as well as the user's familiarity and comfort with the site can be leveraged to achieve other strategic health objectives. Much of the cost in implementing an effective website is spent in creating awareness and interest in the site and it is not necessary or desirable to incur these expenses multiple times. This will require designing, developing, and implementing health applications in such a way that additional health topics can later be integrated. For example, instead of calling the site protectagainstaids.org, it can simply be protect.org.

8. *Design for multimedia.*

Computers and the Internet offer a multimedia communication channel with graphic and audio capabilities that should be utilized wherever possible. With touchscreens or roller balls rather than keyboards, it will be increasingly possible to design graphic or audio interfaces that provide access to low-literacy or non-literate populations.

9. *Design the application with the lowest common denominator in mind.*

The technology available to the audience or partner matters, not the technology available to the application designer. ICT programmers tend to use the most recent technologies and software, such as digital or streaming video. However, lower tech alternatives such as graphic animation (e.g., animated graphic interchange formats or "gifs") are more accessible than other animated files because they are smaller.

SOUTH-TO-SOUTH APPLICATIONS

Web-based applications can provide a foundation for South-to-South partnerships or coalitions. For example, a website could be developed for community FM radio stations in a country. This website would link community FM radio stations together so that they could assist each other in technical troubleshooting, and more importantly, share programming material and ideas.

Such a website could be linked to local or international health NGOs or agencies. Utilizing "web channel" technologies, the community FM radio station website could automatically draw health information or health news provided by these other sources of information.

POTENTIAL ICT APPLICATIONS

The following are examples of potential ICT applications at the individual, community, inter-organizational, and intra-organizational levels of communication within a program.

EXAMPLE: APPLICATION FOR COMMUNICATION RESEARCH

SATELLIFE is using handheld computers, or personal digital assistants, in a two-phase project with the American Red Cross. In the first phase, SATELLIFE trained 30 Ghanaian volunteers over a two-day period to conduct survey interviews using the PDAs. The PDAs were equipped with computer-assisted personal interview (CAPI) software provided by Pendragon, Inc.

SATELLIFE found that the volunteers had little trouble in learning how to use the PDAs and the software, even though many had never before used a computer. These volunteers managed to conduct 2,400 interviews over a three-day period; the data was "synced" to a computer in an Excel format and then analyzed in a single day (SATELLIFE 2002).

In the second phase of its project, SATELLIFE will be distributing PDAs to medical students at Moi University. These PDAs will be loaded with medical information resources, including medical textbooks from Skyscape; HIV/AIDS, TB, and malaria guidelines specific to Kenya and Uganda; MedCalc, a medical calculator with over 40 formulas including a pregnancy calculator; the World Health Organization (WHO) Essential Drug List; and the Essential Drug List specific to Kenya and Uganda (SATELLIFE 2002).

Individual

Collaborative e-learning

Health service providers, local NGOs, the media, and other groups that are often the focus of training efforts increasingly have Internet access available to them. Web-based training provides a way to train large numbers of individuals while reducing the costs of training. Distance training reduces the time that participants spend away from their sites and new Internet-based approaches may provide trainees with much-needed resources at their sites (Sullivan 2003).

JHPIEGO's experience with electronic training indicates that, whether by web or CD-ROM, it should be combined with some face-to-face component. Trainees can meet initially for a brief orientation and then return to the field where they complete an online or CD-ROM-based course. The electronic component should include highly interactive exercises, multimedia examples of the skills being imparted, testing that is required to move from one stage to the next, and comprehensive reference materials (Sullivan 2003).

Continuing medical education (CME) has a long history of using distance education, beginning with correspondence study, then audio conferencing, and now, interactive technologies such as the web (Curran et al. 2000). Recently, a "collaborative learning" approach was incorporated into CME training modules. In collaborative learning, the instruction is problem-based rather than didactic. Trainees are presented with scenarios or example problems and are then asked to collaborate on solutions via a discussion bulletin board, chat room, or e-mail. This approach contributes positively to the motivation level of trainees and can enhance their learning (Weicha & Barrie 2002).

Web-based e-learning or e-training incorporating a collaborative approach could also create networks of trainees. The networks established in the collaborative

exercises might function as an ongoing resource for trainees after the training is completed and they return to their sites. In fact, trainees could be assigned to collaborative working groups based on the constraints they face at their sites, so that their working group is in a better position to provide assistance and support. Again, it is important to note that once the module is developed, including the chat rooms and web mail that the module provides for collaborative learning, it costs little to add users and almost nothing to maintain.

Community

A Community Mobilization Application

Applications can be developed to support and facilitate the work of community-based action committees or other community-based work. These applications could assist groups in planning and implementing activities by providing them with interactive tools for setting objectives, identifying and utilizing local resources, planning and implementing activities, tracking progress, and communicating and working with other community-based teams. Notably, the attractiveness of the Internet as a new technology may help in mobilizing the community.

Inter-organizational

Applications for Coalitions, Capacity Building, and Sustainability

The Internet is a uniquely powerful medium for building coalitions (Schultz et al. 2000; Meier 2000; Dezendorf & Green 2000). The Internet can serve as a platform for organizations to exchange and share information, develop rapport, plan and coordinate activities, participate in joint problem-solving, and evaluate their efforts.

Coalition-building applications customized for specific activities might also contribute to the sustainability of those activities. Some "off-the-shelf" applications are explicitly designed for organizations working in international development and include mechanisms for tracking and reporting on program indicators, coordinating field staff, and storing, updating, and sharing other types of program data. If local partners adopt applications like these in conducting activities, the partner may continue to use the application once the partnership has ended.

Intra-organizational

Computer-Assisted Personal Interviews (CAPI)

ICTs offer the greatest immediate potential for health communication organizations in expanded, more efficient, and faster communication research. In the SATELLIFE example (page 29), data collection that would have taken weeks, took days, at a lower cost, and with less interviewer error. As data can be downloaded to a computer in Excel format, the time required to analyze and report on it is reduced enormously.

The use of PDAs in data collection also opens the door to different types of research design, and by extension, different research questions. PDAs can be used in the field to conduct true experimental design research to "trial" different communication materials and/or assess relative effectiveness themes, spokespeople, tag lines, sound effects, story lines, or characters in the case of serial dramas. With modifications to off-the-shelf CAPI software, the PDA could randomly assign research participants to "condition" using a random-number generator. Using the PDA, the interviewer could then expose the research participant to his/her assigned treatment, such as a rough execution of a radio or print material, or graphic illustration of a service or behavior, and collect post-treatment data. Using this technology can help ensure that the most effective materials are developed and implemented, which will, in turn, ensure programs achieve their intended effects.

ICT APPLICATIONS BY HEALTH COMMUNICATION PROGRAMS

Country assessment teams should consider ICTs as a possible channel or component and include ICTs in their program planning. This process should always begin with the determination of access to ICTs at the different levels of communication within a program (in communication with individuals and communities in the audience, with partners, and also internally) and then proceed to a more detailed assessment if access exists. If the assessment suggests that an ICT application is possible, the design and development of a specific application should be considered *vis a vis* the program objectives, timeline, and resources available.

Table 3 provides a few examples of how ICT applications might be applied to HCP's country programs if access is available. Most of the ICT applications used as examples are described in greater depth in the previous chapter, including e-learning, SMS, coalition-building websites, and CAPI-based formative research.

In considering the examples, please note the following:

- Do not "reinvent the wheel" with ICT applications. In several of the examples cited, the architecture and content of SCOPE-type applications can be converted to web-based e-learning modules for behavior change communication. Collaborative learning mechanisms can be incorporated into the architecture at appropriate points. Similarly, a South-to-South web portal or coalition-building website, which is designed to link local partners and allies together, can be developed in a template format that can be adapted to different countries. PDAs equipped with CAPI software can be carried or shipped to different locations as needed.

- The applications can also be integrated across the layers of programs. In the Ghana example, "Scaling-up Community-Based Health Planning and Services," the proposed interactive website designed for CHPS could also incorporate e-learning modules in behavior change communication, participatory communication for members of partner organizations, and a shared program management application accessible to USAID, HCP, selected local NGOs, and the MOH.

Table 3. Examples of ICT Applications by HCP Programs (2003-2004)

COUNTRY	ACTIVITY	TYPE OF APPLICATION			
		INDIVIDUAL LEVEL	COMMUNITY LEVEL	INTER-ORGANIZATIONAL	INTRA-ORGANIZATIONAL
Bangladesh	Adolescent Reproductive Health: Building a Healthy Future			Coalition building website for partners	PDAs with CAPI used to pretest print materials
Egypt	Communication for Healthy Living	Web-based SCOPE with collaborative learning for key members of partners		Shared Program management website for MOH, NGOs	
Ghana	Scaling-Up Community-Based Health Planning and Services	Web-based e-learning modules combined with a collaborative learning for CHOs via CAPs	Interactive CHPS website that includes a CDS component for CAPs	Shared Program management website for MOH, NGOs	PDAs with CAPI used to pretest new components of *He Ha Ho* radio serial drama
India	Maharashtra State: Building Capacity of Local Institutions to Prevent the Spread of HIV/AIDS	Web-based e-learning combined with collaborative learning for partners on BCC and advocacy			
	Uttar Pradesh: Developing Leaders & Practitioners in BCC	Web-based SCOPE for members of partner organizations			
Indonesia	Blending Media and Community Initiatives	SMS advocacy alerts; SMS health news alerts (e.g., SARS) for providers	A Web-accessible tool to assist community mobilization teams and link communities via CAPs	Coalition-building website designed to support partners in specific advocacy activities	
Mozambique	Integrated Promotion of Family and Community Practices Critical for Child Health and Nutrition				PDAs with CAPI used to pretest message concepts, themes, and potential spokespeople
	Strengthening MOH Capacity to Deliver Quality Information and Strategic BCC Initiatives	Web-based e-learning modules for health providers and communication managers		Shared program management website for MOH, integrated functions for central, provincial, and district levels	
	Promoting Youth Friendly Services to Reach Adolescents & Young Adults	YFS interactive website that provides information & online community for YFS activists			
Nicaragua	Strengthening Civil Society Participation in Democratic Development			Website linking community FM radio stations on issues of democracy & governance	

continued

Table 3. Examples of ICT Applications by HCP Programs (2003-2004)

COUNTRY	ACTIVITY	TYPE OF APPLICATION			
		INDIVIDUAL LEVEL	COMMUNITY LEVEL	INTER-ORGANIZATIONAL	INTRA-ORGANIZATIONAL
Nigeria	Communication for Polio Eradication		A Web-accessible tool to assist community mobilization teams & link communities via CAPs		
	Communication to Reduce Malaria & High-Mortality Childhood Illnesses: The Home-Based Care Approach	Tailored information on request via SMS for PMDs			
	Building Partnerships and Support for Family Planning				PDAs with CAPI for roughs of alternative TV spots, spokespeople or message concepts
	Youth Empowerment for HIV Prevention	Interactive EE serial drama for youth via SMS in Lagos/Abuja; "auto-attendants" into hotline			
South Africa	TV Programs to Model Positive Health Behavior	Cross-programmed interactive SMS that builds off Tsha Tsha			PDAs with CAPI used to pretest *Tsha Tsha* scripts and/or characters
	Scaling up the Community Response to HIV and TB	Web-based e-learning modules with collaborative problem-solving in HIV prevention and destigmatization for peer leaders (via CAPs)			
	Improving Media Reporting on HIV/AIDs			Web channels incorporated into media website that will automatically feed in national and international content from other HIV-related websites	
Tanzania	From Awareness to Action: The ISHI National HIV/AIDS Campaign			Web-accessible shared program management application for partners	
	Scaling up the Quality of Reproductive and Child Health Services			Advocacy/coalition-building website designed around the advocacy and activation kits	
	Integrated Activity – Zinduka Radio Drama				PDAs with CAPI used to pretest radio serial drama voice actors and scripts
Zambia	Scaling Up Neighborhood Health Committees		A Web-accessible tool to assist community mobilization teams and link communities via CAPs		
	Malaria Prevention and Care Seeking			Website linking community FM radio stations to each other and to Neighborhood Health Committees	

Conclusion

Information and communication technologies are changing rapidly; it is not at all clear whether a desktop computer will be needed to access the Internet even a few years from now. As noted, "texting" is preferred by youth in Lagos over the telephone; in the Philippines, tens of millions of text messages are exchanged each day.

The Internet provides people in otherwise information-starved environments with an unparalleled resource and window on the larger world. Without access to a "customer-friendly" health service, it is conceivable that the local cybercafe could become a substitute provider of health information. While it is now commonplace for patients in the United States to ask their physician about health information on the Internet, people in many of these areas will not have the same opportunity to ask a qualified health worker about the accuracy of health information or recommendations found online.

Much of what is available on the Internet is inaccurate, purposively misleading, or could easily be misinterpreted. To date, there is only limited anecdotal evidence for negative health effects resulting from use of the Internet for health information in the United States, but the potential for people obtaining misinformation, or misinterpreting information and acting on it could be magnified a hundred-fold in the developing world. People may be more likely to rely on online sources of health information because of a lack of convenient or quality health services; they are also less likely to have the health literacy required to evaluate information found online.

Health programs should be ready to confront the rapid diffusion of misinformation on the Internet, as well as the increased speed at which misinformation and myth can diffuse through a population. As access increases in the developing world, many health-related crises could parallel social and political movements that have resulted, at least in part, from these technologies (e.g., the use of the Internet by the Falun Gong in China or the role that SMS played in the destabilization of a Philippine government). Hong Kong, for example, narrowly missed mass panic as a result of misinformation being posted to a falsified website concerning SARS. Elsewhere, decision-makers have been misled by, or chosen to misuse, information found on the Internet (e.g., South African President Mbeki's stance on HIV/AIDS). For health communication programs, the Internet may become a countervailing factor and an obstacle as a source of misinformation and myth, particularly in the areas of infectious diseases and HIV/AIDS.

While no intrinsic value exists for health in people gaining access to the Internet, innumerable opportunities exist in learning how to piggyback the thousands of Internet access points created each day. The following represents some of the many applications available to health communication professionals:

- Strategies could provide ICT-enabled resources to a much larger proportion of the population by encouraging the diffusion of information from formal (e.g., community health workers) or informal (e.g., health opinion leaders) sources.
- The Internet can enable advocacy coalition members to interact with one another online, develop a shared identity and common agenda, exchange information, and mobilize to collective action. Their "offline" activities can be coordinated via SMS.
- The application of ICTs to distance education can strongly enhance the traditional face-to-face TOT

(training of trainers) model, while fostering networks that trainees can rely on as a resource when they return to the field.

- "Hi-tech (computers and the Web) can be integrated into current programs utilizing "lo-tech" (radio and telephones) to increase the scale or scope of programs. Examples of hi/lo-tech integration include incorporating specific automated functions into live counseling hotlines; increasing the capacity and efficiency of call centers; or digitally producing, pretesting, and distributing audio content such as PSAs or radio serial dramas to radio stations in order to speed up the production, pretesting, and placement of health messages.
- Newly developed applications can help partners manage the workflow involved in field activities. If local partners begin to rely on these applications, they are likely to continue to use them after the partnership is ended, increasing the likelihood that activities will be sustained.
- A community is more likely to become aware of, rely on, and repeatedly use one website that provides a variety of health information (e.g., developed in modular form by a variety of NGOs) rather than 20 relatively specific websites, each sponsored by a different NGO. The costs of developing and maintaining integrated ICT applications and making an audience aware of the resource can be shared. If communities begin to rely on particular integrated sites, different NGOs and funders will have an incentive to add to the application to reach the audience (creating a sustainable source of funding).

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