Target 5: Connect health centres and hospitals with ICTs[1]

Introduction

As with most of the other WSIS targets, the wording of Target 5 aims to provide high-level guidance to countries, allowing scope for interpretation. The ultimate goal of the targets is to connect the citizens of the world, and the institutions and facilities which serve them, so as to provide the communications infrastructure to deliver online the tools and services of the information age. The WSIS targets are essentially ICT targets, reflecting the composition of the WSIS delegates, who were primarily from the ICT sector.

In the *Geneva Declaration of Principles*, all WSIS stakeholders resolved to work together to "*ensure that everyone can benefit from the opportunities that ICTs have to offer*." The health sector was among those identified as potentially benefiting from ICT applications, for example through the more efficient delivery of healthcare services and the provision of health information to the general public, resulting in Target 5: Connect health centres and hospitals with ICTs.

At the second phase of WSIS, the *Tunis Agenda for the Information Society* stakeholders elaborated on Target 5 by aligning the work more closely with that of the Millennium Development Goals (MDG), stating "*we are committed to improving access to the world's health knowledge and telemedicine services…*."[2] It is proposed that governments strategically align Target 5 with MDG Goal 8F, which promotes the public-private partnership (PPP) approach for development, in order to "*in cooperation with the private sector, make available the benefits of new technologies, especially information and communications*."

Target 5 needs to be considered in the context of WSIS Action Line C6 (Enabling environment), which addresses the creation of an enabling environment,[3] and Action Line C2 (Information and communication infrastructure), which states that, in the context of national e-strategies, countries should provide and improve ICT connectivity, including for health institutions.[4] The health sector is also specifically mentioned in Action Line C7 (ICT applications), which relates to benefits in all aspects of life, notably through e-health applications.[5]

Use of ICT for health as an internationally agreed goal

The World Health Organization (WHO) defines the use of ICT for health as "e-health."[6] Carefully planned introduction of ICT into the health sector should result in improved ways in which data and information are collected, stored, retrieved and shared. ICT has proven to be a powerful tool in supporting more effective delivery of health services and increasing the efficiency of health systems. Trends show that the adoption of e-health enabling policies and actions in the health sector started to gain momentum in high-income and upper-middle income countries in the early 1990s. Uptake by developing countries started more slowly, but has significantly accelerated since 2000 [WHO, 2006].

It should be noted that while Target 5 refers to hospitals and health centres, these are not well defined. Health systems are highly complex structures that vary from country to country and consist of many inter-related components. These components are the facilities and institutions which care directly or indirectly for citizens' health needs, professional and support staff, infrastructure, health commodities such as medication and technical equipment, logistics management and finance. They deliver care in public health and educate and deploy the health workforce. As health systems become increasingly sophisticated and, therefore, a greater challenge to manage, the use of ICTs in processing patient, hospital and health-facility information is becoming an integral part of health-systems management at all levels of care.

Health systems in most countries comprise three levels of service — primary, secondary and tertiary, but not all countries have all of these levels. Primary care is the first level of care that a citizen will encounter. Primary care is non-emergency care, and is usually provided by a medical or nursing practitioner in health centres. Secondary care is more specialized, and is provided in a hospital setting as either inpatient or outpatient services. Tertiary care refers to the provision of complex treatments offered in specialized hospitals and provided by medical specialists.

The health sector is highly information-intensive. Providing effective health services requires the extensive collection of patient data in analogue and digital forms, which are then processed and disseminated within the same institution or sent to other institutions. Increasingly, these data will not only be shared within the same country, but will be sent to other countries, if necessary for the treatment of the patient. E-health also serves to broaden the information and communication horizons of healthcare workers. Knowledge, information and data can now be accessed and exchanged locally, nationally, regionally and globally. These opportunities apply equally to developing countries and to developed countries although, clearly, the challenges are greater in the developing world.

The face of public health services is changing as they adopt ICTs. Examples of applications in the health sector include:

- Electronic health records/electronic medical records EHR/EMR (often used interchangeably): the use of ICTs to generate, store and share longitudinal real-time electronic records of a patient's healthcare information
- Telehealth/telemedicine: the use of ICTs to offer diagnostic and treatment services remotely
- M-health/mobile health: the use of mobile devices such as mobile phones for health purposes (Box 5.1)
- Decision-support systems (DSS): the use of online information resources for clinical decision-making
- E-learning: the use of ICTs for the education and ongoing training of health professionals and students
- E-journals: the use of ICTs to create and publish virtual journals and disseminate them via the Internet or CD/DVD if connectivity is poor.

An example of an initiative that supports the latter two applications is provided in Box 5.2.

Box 5.1: M-health

M-health (also known as mobile health) is a relatively recent term for medical and public health practice supported by mobile devices, such as mobile phones, patient monitoring devices, PDAs and other wireless devices [Germanakos *et al*., 2005]. M-health presents a unique opportunity to improve health services. The massive expansion of mobile technology worldwide coupled with the continued lack of adequate Internet connectivity in many poorer countries provides fertile ground for m-health to grow. By the end of 2009, there were an estimated 4.6 billion mobile cellular subscriptions, 3.2 billion of which in the developing world [ITU, 2010]. Thus, with an estimated mobile cellular penetration rate of 56.8 per 100 inhabitants in the developing world, mobile technologies constitute a powerful tool for health-related purposes on a large scale.

M-health offers a number of areas of application for public health, including:

- Remote diagnosis and support
- Medication adherence and remote monitoring
- Disease outbreak surveillance and associated data collection and reporting
- Mass dissemination of public health information.

The following case study illustrates the use of m-health in the fight against HIV/AIDS in South Africa.

The use of cell phones in combating HIV/AIDS in South Africa

South Africa enjoys a very high mobile cellular penetration rate: 90.6 mobile cellular subscriptions per 100 inhabitants in 2008 [ITU, 2010]. The prevalence rate of HIV and AIDS in adults aged 15 to 49 is 18.1 per cent.[7] *Cell-Life*, a Cape Town-based NGO, is seizing the opportunity to capitalize on the existing highly developed mobile communications infrastructure to combat the AIDS epidemic by using mobile phones as a health communication tool.

A major ongoing programme of Cell-Life is *Aftercare*, where health workers provide home-based care to HIV/AIDS patients receiving antiretroviral treatments (ART). The Aftercare programme uses mobile technology to support treatment. Regimens are discussed and clinical information is captured using mobile devices. The information is then sent as a text message to a central patient database. There, a care manager monitors incoming patient data and can respond to health workers' questions or provide additional information for the patient. Not only is the programme proving to be effective due to its immediacy in providing information, but it is helping to build a database of the severity and prevalence of HIV in the region. The cost of the programme has been kept relatively low through the use of data-collection software which operates even on low-cost mobile phones.

Source: WHO.

Measuring Target 5 — Proposed indicators

As with the other WSIS targets, there is a need for further clarification of what is being measured and how it is to be measured. Each element in the target requires a definition in order to ensure national and global consistency of measurement and reporting and comparable results.

The following definitions are suggested for Target 5:[9]

1. **Hospital** — Residential establishment equipped with inpatient facilities for 24-hour medical and nursing care, diagnosis, treatment and rehabilitation of the sick and injured, usually for both medical and surgical conditions, and staffed with at least one physician. The hospital may also provide outpatient services.

Box 5.2: HINARI *(Health InterNetwork Access to Research Initiative)* — When content drives connectivity

The *HINARI* project is a concrete example of how providing connectivity to teaching hospitals and universities can profoundly improve researchers and health professionals, in training and in practices, through access to the world of scientific literature. The initiative provides access for health professionals and students to thousands of online biomedical journals. It grew out of the *Health Internetwork* (HIN) which originated from the United Nations Millennium Summit in 2000. HIN builds its foundation for the successful introduction of digital initiatives on four pillars: connectivity, content, capacity building and supporting policy. As a programme, HINARI satisfies all of these criteria and has grown to be the largest electronic journals programme of its kind in the world.

HINARI's mission is to provide online access to the leading biomedical journals of the world at no, or very low, cost. The programme targets non-for-profit health-related institutions in developing countries, with the objective of bridging the digital knowledge divide between rich and poor countries. As a public-private partnership, HINARI is a collaborative effort between WHO and the world's major academic publishers. Launched in 2002 with 1 500 online journals from just six publishers, the service has now grown to an offering of 6 200 journals from 150 publishers.[8]

Eligible institutions include universities; schools of medicine, nursing, pharmacy, public health and dentistry; teaching hospitals; research institutes and national medical libraries. Eligibility and the pricing structure are based on World Bank GNI per capita figures. Countries with a GNI per capita of less than USD 1 250 enjoy free access to all journals. Countries with GNI per capita of between USD 1 250 and USD 3 500 pay USD 1 000 per annum per institution for unlimited access to the content.

Most of the journal articles are in PDF format, resulting in large files and the need for adequate connectivity to download them. HINARI recommends a minimum speed of 56 kbit/s. It would be useful to know what the connection speed is for each of the four thousand participating institutions but, unfortunately, subscribing institutions provide only limited details when registering and connectivity data are not known to the service providers at WHO.

At the beginning of 2010, the number of participating institutions had reached 4 221 across 109 countries (Table 1 Box 5.2).

Table 1 Box 5.2: HINARI institutions by WHO region, 2010

WHO Region	Number of institutions	Percentage of total institutions with HINARI
African Region	1 510	35
Americas Region	724	17
Eastern Mediterranean Region	531	13
European Region	578	14
South East Asian Region	459	11
Western Pacific Region	419	10
World total	**4 221**	**100**

Note: These regions reflect WHO conventions.
Source: HINARI programme data.

The rapid distribution of up-to-date international health-science knowledge across so many developing countries would not have been possible without Internet connectivity. Not only would the cost have been prohibitive, so would the complex logistics of delivery and storage in these resource-poor settings. The digitization of the journals, and the selection, packaging and pricing of the content for developing-country environments, now makes it possible for WHO and its publishing partners to offer HINARI as an invaluable virtual library to over 100 developing countries at little or no cost.

In summary, HINARI is an excellent example of how content can drive connectivity. In the early days of the programme many institutions were not well equipped or connected. The motivation to have access to the wealth of digital content on offer prompted institutions to arrange for connectivity and the operating costs were often borne by the institutions themselves.

2. **Health centre** — A facility that provides (ambulatory) medical and sanitary services to a specific group in a population.

3. **Connect** — Reliable and continuous access to the Internet. In a health context, this is for obtaining information, processing and transmitting data, communicating, and providing and receiving e-health services. Broadband connectivity is now considered essential in order to be able to work effectively with e-health tools and services using ICT.

To date, no organization or institution is collecting data on the connectivity of health institutions at the international level. The suggested indicators (Table 5.1) would be needed to track this target, though even these basic indicators are not always straightforward to collect. Nonetheless, the ministries of health in countries should have up-to-date registries of public hospitals, although health centres are far more difficult to track, and particularly in developing countries.

Table 5.1: Proposed indicators for monitoring Target 5

Indicator	Description
Hospital	1. Proportion of public hospitals with Internet access, by type of access (narrowband, broadband)
Health centre	2. Proportion of health centres with Internet access, by type of access (narrowband, broadband)
Electronic health records — hospital	3. Proportion of public hospitals using computers/the Internet to collect/process/transmit individual patient information
Electronic health records — health centre	4. Proportion of health centres using computers/the Internet to collect/process/transmit individual patient information

There are several measurement challenges. Many developing countries do not know how many health centres there are in the country. Furthermore, these centres may only be staffed by one person on a rotating basis and open infrequently. Depending on the centre, the availability of staff, supplies and the size of the community it serves, it may be the case that records are not kept. Hospitals pose a different measurement challenge. The WSIS target does not differentiate between secondary or tertiary services. The situation is further complicated by the fact that most countries have public, private and charity-based hospitals, as well as public and private health centres. Many countries have a private healthcare system with private hospitals and clinics. The relative proportions of each vary across countries, and the exact number of non-public facilities may not be known by the ministries of health. Thus, measurement of healthcare entities is complicated by definitional problems, as well as, in many cases, incomplete records on the number of facilities.

It should also be noted that there is no agreed international norm for measuring health facilities. The closest established and measured indicator available is that of the number of hospital beds per 10 000 population published annually by WHO in the *World Health Statistics Database.*[10] This is not the same as measuring the number of hospitals, and does not provide a breakdown by type of hospital. Health centres are not measured by WHO.

A few organizations collect data on health and ICT-related indicators (Table 5.2). WHO, through its *Global Observatory for eHealth* (GOe), is currently the only international organization which focuses on trends and developments in e-health worldwide (Box 5.3). The *Healthcare Information and Management Systems Society* (HIMSS) is well established and offers detailed information at health-facility level, but only collects data in North America, although there are plans to extend it to Europe and the Middle East. OECD data focus on OECD member countries. Thus, the GOe is the only programme which collects data globally and with a dedicated focus on e-health in developed and developing countries. However, its level of granularity does not extend to measurement at the individual hospital or health-centre level. In summary, none of the existing data sources provide comprehensive, global coverage of the indicators relevant for measuring Target 5.

Table 5.2: Prime sources of health and ICT-related data

Main areas reported and key indicators	Strengths	Weaknesses
Global Observatory for eHealth (GOe)[11]		
• Global survey data on e-health from over 110 countries • Data on the uptake of e-health technologies and policies	• Data focusing on the adoption of e-health policies and other supporting actions to provide an enabling environment for growth of e-health in countries • E-health country profiles for all participating WHO Member States. • Data collected by survey every two years	• Granularity of the data is at the country level; no lower-level data (by region or by health facility) • Survey results based on self-reporting • Expert informants can change from survey to survey
Organisation for Economic Co-operation and Development (OECD)[12]		
• Data on ICT and health at the country level • Literature review and case studies of ICTs for health in four OECD countries	• A range of ICT indicators as well as health-system indicators for OECD countries. Case studies on e-health in OECD countries	• Data available only for the 30 OECD Member Sates • No comprehensive collection of data on the use of ICTs in the health sector
Healthcare Information and Management Systems Society (HIMSS)[13]		
• Detailed information on ICT usage at the health-facility level, including the type of network connection and service provider, for over 5 100 hospitals and 32 000 medical facilities in the US and Canada • EMR adoption model — scores hospitals based on their level of EMR adoption • Hospital benchmark reports	• Continuously updated data based on annual survey of health facilities • Established data quality assurance procedures, HIMSS peer-reviewed research analysis	• Data available only for health facilities in the US and Canada.

Status of Target 5

Internet access

Currently, data on ICT access in health institutions are not collected internationally in a comprehensive or regular manner. ITU carried out an ad-hoc survey in 2009 in the context of monitoring the WSIS targets. The questionnaire included questions on ICT access in health institutions, including by type of access. The results point to large differences in connectivity, especially for broadband connections (Table 5.3). It is not surprising to find that connectivity tends to be higher in developed than developing countries, and usually with broadband access. There are countries, including developed countries like the Czech Republic, Latvia, Lithuania and New Zealand, where health institutions with access to the Internet do not have a broadband connection. Internet access may also vary considerably within a country. In Thailand, for example, 90 per cent of subdistrict health centres have access to the Internet, but only 60 per cent of them have broadband access.

Some countries also provided information on the number of health institutions with websites. For example, Croatia reported that 64 per cent of health institutions had a website in 2009, while 18 per cent were connected to the *Na-*

Box 5.3: The Global Observatory for eHealth

In recognition of the rapidly growing importance of the use of ICT for health services and systems, the fifty-eighth World Health Assembly in May 2005 adopted Resolution WHA58.28[14] establishing an e-health strategy for WHO. The resolution urged Member States to plan for appropriate e-health services in countries according to their needs. In the same year, WHO launched the *Global Observatory for eHealth* (GOe). The observatory is dedicated to the improvement of health systems and services by providing Member States with strategic information and guidance on effective practices, policies and standards in e-health. It is the only observatory to monitor e-health developments in countries through surveys conducted every two years.

GOe publications include: [15]

- *eHealth Tools and Services: Needs of Member States* (2006)
- *Building Foundations for eHealth: Progress of Member States* (2007)
- *Building Foundations for eHealth in Europe* (2008)

Work is in progress on an eight-volume series based on the 2009 global survey on e-health. The first survey on m-health will be released in summer 2010.

The 2009 survey focused on new areas such as:

- establishing enabling actions for e-health
- trends in the uptake and application of mobile health (m-health)
- the use of telehealth services and barriers to their introduction
- the adoption of e-learning for health professionals and students
- the transition from paper-based patient records to electronic health records
- legal and ethical issues in the e-health domain.

To date, GOe surveys have been conducted at the national level and the data and information sources are provided through a group of nationally recognized experts in e-health. They are usually nominated by the ministry of health and draw on the expertise of other related sectors such as ICT, telecommunications, education, academia and research. Questions address national issues, as current financial resources are inadequate for carrying out the survey work at district or local level. It is anticipated that GOe, with suitable partners, will perform more detailed surveys at district level as funds become available.

tional Research and Educational Network (NREN). In the Czech Republic, over 16 per cent of health institutions had a website (2008), as against five per cent in Lesotho (2007). In Hungary, half of all health institutions maintained a portal (2009), while in Paraguay a unified site operates for 88 health institutions together (representing close to eight per cent of total health institutions in 2009). In Singapore, each of the 24 hospitals reportedly had a website in 2009, but no data were available for other types of health institutions.

Management of patient information

The collection, storage and transmission of patient information can be considered as another measure of the uptake of ICT by health facilities. Results from the WHO GOe survey 2009 demonstrate that, today, patient records are still primarily kept in paper format (Chart 5.1), with exactly half of the responding countries reporting that this method was used in more than 75 per cent of their health facilities. While 90 per cent of countries report at least some use of electronic patient records, they appear to be used intensively in only a small proportion of responding countries. Indeed, only six per cent report that over 75 per cent of health facilities are using such records (“very high” in Chart 5.1). Similarly, close to 80 per cent of countries report at least some use of electronic data transmission, but only as little as three per cent of responding countries report that over 75 per cent of health facilities are transmitting data to other health facilities (“very high” in Chart 5.1). It is these facilities that need ICT connectivity in order to communicate data, so this gives an indication, but certainly not a reliable measurement, of the availability of Internet access in healthcare facilities.

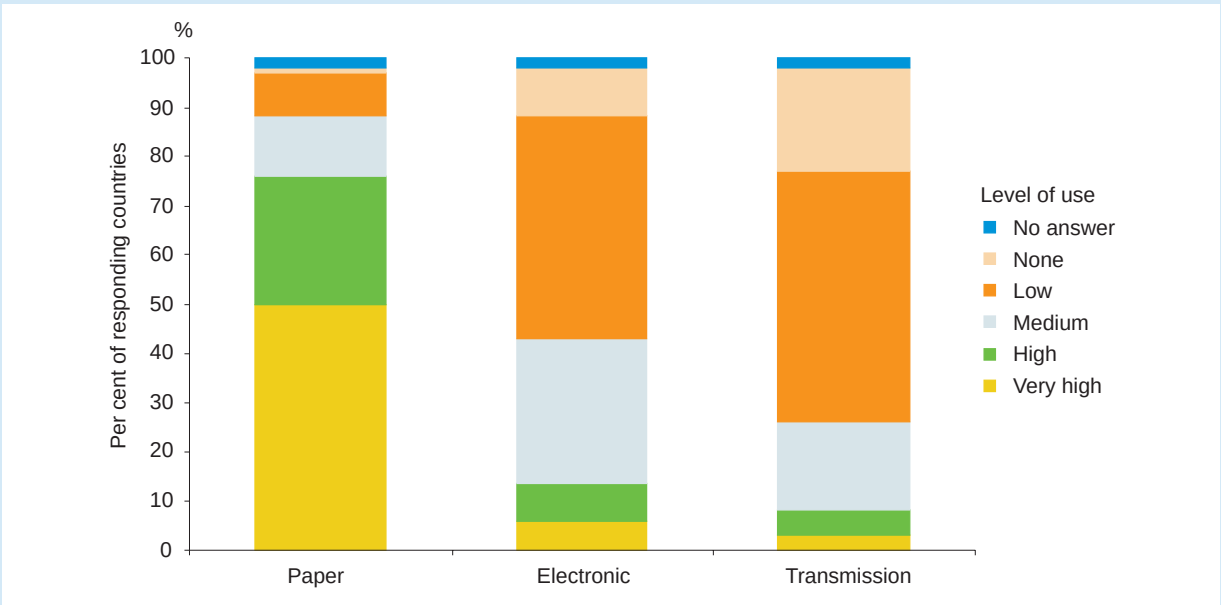
Looking at the results by World Bank income group (Chart 5.2), as may be expected, it is the high-income countries which display the highest incidence of electronic patient data usage. Only countries in the high-income group reported very high use of electronic data formats with the ability to transmit the data electronically (i.e. indicating the use of Internet), with 22 per cent reporting high or very high use. Close to 90 per cent of upper-middle income

Table 5.3: Percentage of health institutions with access to the Internet, 2009**

	Any type of connection	Broadband only
Andorra	100	100
Bhutan	100	...
Bolivia	2	1
Botswana	97	27
Croatia	100	100
Czech Republic	70	48
Djibouti	14	14
Egypt	6	1
Finland	100	...
Hungary	100	100
Korea (Rep.)	100	100
Latvia	99	39
Lesotho	6	...
Lithuania	100	65
Mexico	5	...
Nauru	100	100
New Zealand	100	47
Paraguay	17	4
Singapore*	100	...
Slovak Republic	77	77
St. Vincent and the Grenadines	3	3
Sweden	100	...
Thailand	91	...

Note: * Hospitals only. ** Or latest available year. The country names in this table reflect ITU conventions. "...": data not available.
Source: ITU Survey on the WSIS Targets.

Chart 5.1: Proportion of local healthcare facilities using paper, electronic and electronic plus transmissible patient information, by level of use, 2009



Source: WHO GOe survey 2009.

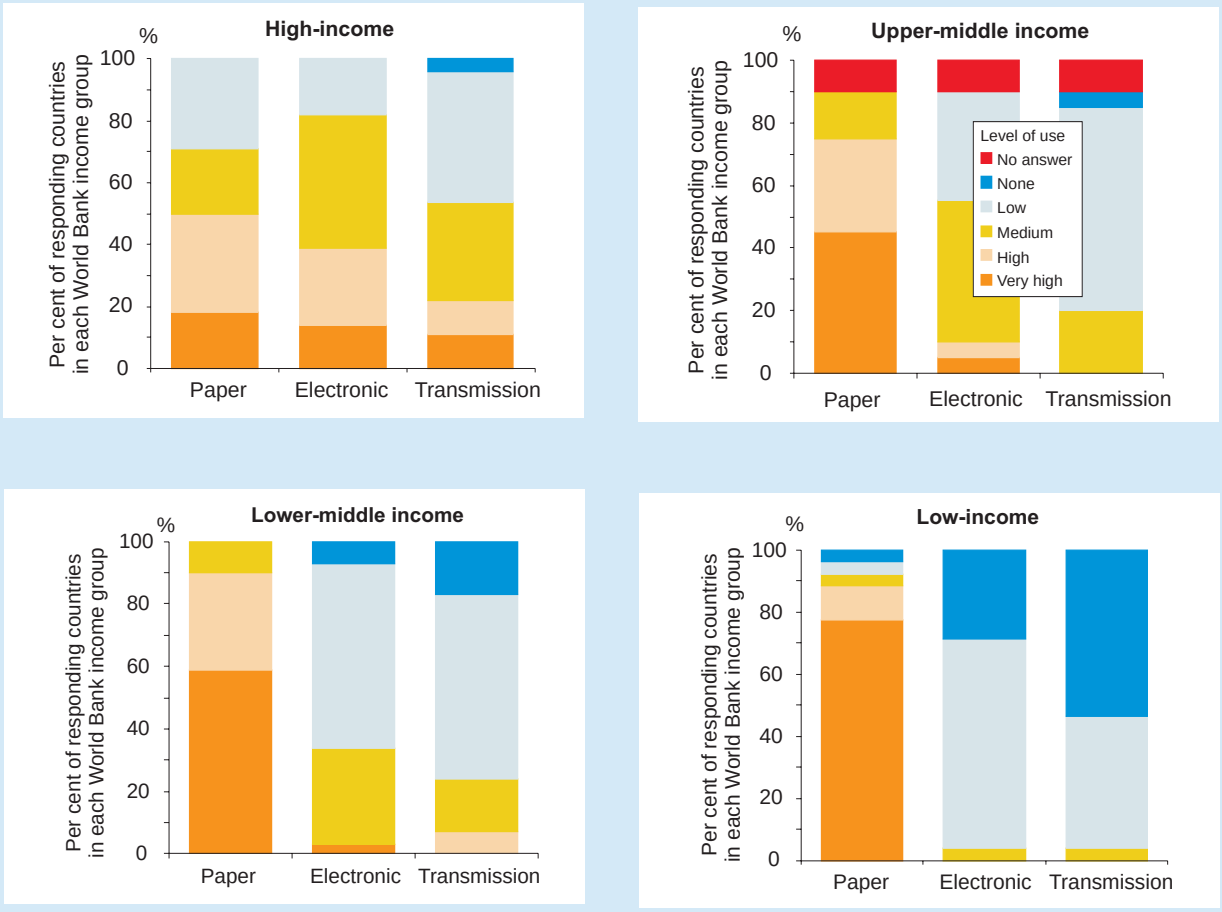
countries report at least some electronic data transmission, compared with over 80 per cent of lower-middle income countries, and around 40 per cent of low-income countries. However, even in the high-income category, high and very high use of electronic records is only just under 40 per cent, reflecting the difficulties of making the transition from a paper-based to an electronic health-record system. Countries in lower-income categories show greater use of paper records and less use of electronic data and data with electronic transmission. In the low-income category, no countries reported high or very high use of electronic data; 50 per cent reported that their health institutions do not use electronic data transmission; and over 40 per cent reported that less than 25 per cent of health institutions transmit data electronically ("low" in Chart 5.2).

Policy framework indicators

In order to complement the limited data on ICT access and use in health institutions, this section reviews data on government efforts in the adoption of foundation actions for building health-sector connectivity. Measuring whether foundation actions (Table 5.4) have been introduced in countries recognizes the importance of policy in developing an enabling environment for e-health.

This method does not provide numerical data on, for example, the percentage of hospitals and health centres with Internet access, but gives a broader overview of the state of progress in countries, at least with respect to the efforts made to put the framework conditions for e-health into place.

Chart 5.2: Proportion of local healthcare facilities using paper, electronic and electronic plus transmissible patient information, by level of use, by World Bank income group*, 2009



Note: * See Annex 5.1.
Source: WHO GOe survey 2009.

Table 5.4: Foundation actions

Indicator	Description
Policy framework	E-health, ICT and other supporting policies such as e-government which provide the blueprint for development of e-health and the necessary connectivity in a country
Funding framework	Financial resources, including any combination of government, private, public-private partnership or donor funding, which support building connectivity for public institutions including the health sector
Infrastructure planning	National e-strategies, or "roadmaps," which plan for the building of country infrastructure, including the health sector

Source: WHO.

Measurement of growth in the adoption of key policies, including infrastructure policies, and of the allocation of funding resources, should provide a high-level overview of ICT development for health by country, region and globally. It is important to note, however, that while the adoption of these actions by countries is a clear signal of their intent to connect the health sector, it does not necessarily mean that this connectivity has already been achieved.

At this time, the only body collecting these data systematically and internationally, although the data are not entirely complete, is WHO's GOe (Box 5.3). Although the data will provide a reliable picture of the environment and policy support for action, it must be recognized that the final step in making progress on health-sector connectivity in a country can only be through the joint action of the three key stakeholders, namely the ICT, finance and health sectors. An example of health-sector reforms, including initiatives to put in place an electronic health-records system, is given in Box 5.4.

GOe measures a series of indicators which are considered as enablers for the introduction of ICT for health. These are listed in Table 5.5, and preliminary results are provided in Table 5.6.

National e-government policies will promote ICT access and use across the entire public sector, while national e-health policies will drive ICT uptake specifically in the health sector. Preliminary results show that a very high proportion of all responding countries (84 out of 101) have national e-government policies — 96 per cent of responding high-income and upper-middle income countries, and 72 per cent of responding lower-middle and low-income countries (Table 5.6).

The figures for national e-health policies do not look quite as positive. Of 101 responding countries, 55 report having an e-health policy — 79 per cent of responding lower-middle and low-income countries and 32 per cent of responding upper-middle and high-income countries. These data indicate that e-health enjoys less of a focus than other ICT policies and that many countries start by adopting e-government policies first.

Looking at the funding support available, 63 out of 101 responding countries report donor support for e-health development — 85 per cent of responding lower-middle and low-income countries, and 38 per cent of responding high-income and upper-middle income countries. Public funding for e-health is available in 81 countries — 74 per cent of responding lower-middle and low-income countries, and 96 per cent of responding high-income and upper-middle income countries.

The aim of Target 5 is for countries to employ a strategic and sustainable approach to the introduction of connectivity for the health sector. This is only likely to happen if countries adopt a systematic approach to deployment of ICT across the whole public sector, and if special rates for connectivity for public-sector services are negotiated with providers. These elements should generally be addressed nationally through e-government or e-health policies.

Box 5.4: Belize — an example of a model national e-health programme in a developing country setting

Background
The beginnings of health-sector reform in Belize date back to 1999 when, working with a management consultancy, the newly appointed regional health management teams identified that health-sector reform could only occur through the introduction of a national health-information system. The Ministry of Health recognized the opportunity and made a significant investment in the development of the *Belize Health Information System* (BHIS), an electronic health-records system developed by the country itself and launched in 2004.

The Belize National Health Information System
BHIS works to improve the health of its population by providing comprehensive health information about patients which can be accessed anywhere in the country by registered users as soon as the patient data have been entered into the system. System architecture features include high levels of functionality, security and full interoperability. The mission is to ensure that all Belizeans have their own individual health record. This appears to be realistic and achievable due to the relatively small population and the rapid diffusion of technology in the country, and most importantly thanks to the commitment of government to the success of the programme.

The system consists of a series of interconnected modules which form the core of a sophisticated electronic health-records system and include:
- Hospital admissions, transfer and discharge
- Clinical order entry
- Laboratory testing
- Billing
- Supply chain management
- HIV/AIDS patient management.

In its next strategic move, the Belize government will extend the impact of BHIS by linking all other government sources of health information including Vital Statistics, Social Security and the National Health Insurance Scheme. The government's motivation is to maximize the sharing and use of patient data, and to improve efficiency in the deployment of human resources for health services.

In 2009, it was estimated that approximately 80 per cent of encounters in the public health system were recorded and stored by BHIS. The private-sector health services displayed a slightly lower percentage, but it was still significantly high.

Policy and funding environment
To gain a better picture as to why Belize has been so successful in its mission to build a successful electronic health-records system, it is important to look at what enabling actions may have been put in place by the government. According to Belize's response to the 2005 global survey on e-health, a number of key actions were taken which helped to build the system. In 2004, Belize introduced both a national e-policy as well as a national e-health policy. These are fundamental elements to assist in the building of e-health initiatives in the health sector. In addition, since 1998, e-health activities have been supported through both public and private funding, increasing the likelihood of sustainability. Citizen protection actions were introduced in 2004 in order to safeguard the privacy of patient information, in particular in the context of electronic patient records. The adoption of e-health standards to promote interoperability occurred in around 2005. ICT infrastructure development in the health sector is fundamental to ensuring access to ICTs for health professionals in hospitals and health centres. This is supported by a *National Plan for ICT Development in Health*. The plan, which sets targets for health-sector connectivity, was deployed from 2004, early on in the project.

Measuring system successes
Significant successes reported by BHIS include:
- Highly improved management of mother-to-child HIV transmission, lowered from 20 per cent to one per cent per annum
- 90 per cent decrease in hospital cases of adverse drug reactions
- Estimated decrease of over eight per cent in medical expenses thanks to increased efficiencies
- H1N1 case information available in real time across the country due to efficiency in monitoring and reporting

These achievements are largely attributable to the effectiveness of the information system deployed and the staff who use it. It could almost be taken for granted that the connectivity which is required to run such an operation was already there. For this system to work, the Belize government has had to connect all elements of the health system, hospitals (public and private) as well as health centres, so that they can all communicate with each other as one integrated system. Without this ICT connectivity a complex and sophisticated national health information system could not exist.

Support for achievements
The national government has been a strong supporter of BHIS. Furthermore, Belize has received financial and technical support from the Health Metrics Network, as well as technical support from Pan-American Health Organization (PAHO/WHO) and financial support from the inter-Caribbean country meeting to share its lessons learned with Eastern Caribbean countries.

Table 5.5: Enabling actions for ICT for health

Indicator	Description (GOe definitions)[16]
National e-government policy	Lays out the vision and objectives for the use of ICT to exchange information, provide services and communicate with citizens, businesses and other sectors.
National e-health policy	Lays out the vision and objectives to promote ICT specifically for the health sector
National ICT in health development plan*	Also sometimes referred to as a "technology roadmap." A plan for the national development and deployment of ICT infrastructure, services and systems in the health sector
*Funding sources for e-health***	*Can be any combination of the following:*
Public funding	Support through financial resources provided by government — may come from national, regional or district level government
Private funding	Support through financial or in-kind services provided by the private or commercial sector
Donor/non-public funding	Support through financial or in-kind resources provided by development agencies, banks, foundations or other non-public funding bodies. These can be international, regional or national bodies
Public-private partnerships	Joint ventures between public organizations and private-sector companies to work together to achieve a common goal

Note: *This indicator was measured in the 2005-06 but not in 2009. **This does not cover all of the possible funding and investment sources.
Source: WHO.

Table 5.6: Preliminary WHO GOe survey results 2009

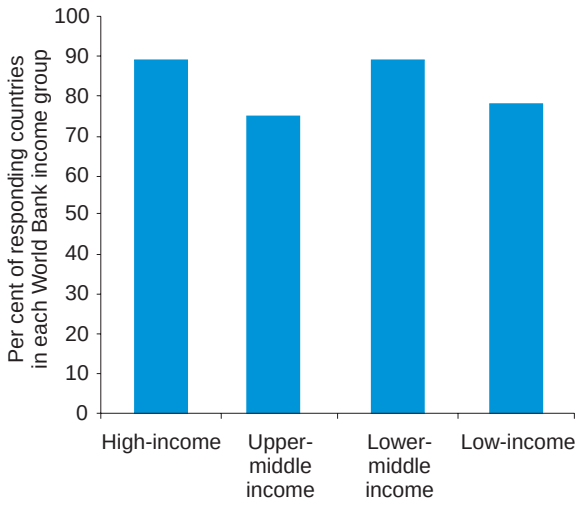
Indicator	Total number of countries reporting action (n= 101)	% World Bank upper and upper-middle income countries (n=48)	% World Bank lower-middle and low-income countries (n=53)
National e-government policy	84	96% (46)	72% (38)
National e-health policy	55	79% (38)	32% (17)
Public funding	85	96% (46)	74% (39)
Private funding	38	42% (20)	34% (18)
Donor / non-public funding	63	38% (18)	85% (45)
Public-private partnerships	40	44% (21)	36% (19)

Source: WHO GOe survey 2009.

M-health and telemedicine

Two other areas that are important for the uptake of e-health in countries relate to activities in m-health and telemedicine services.[17] It has already been noted in this chapter that m-health has huge potential as a public health and medical practice supported by mobile devices.

Chart 5.3: Countries reporting at least one m-health initiative, by World Bank income group*, 2009

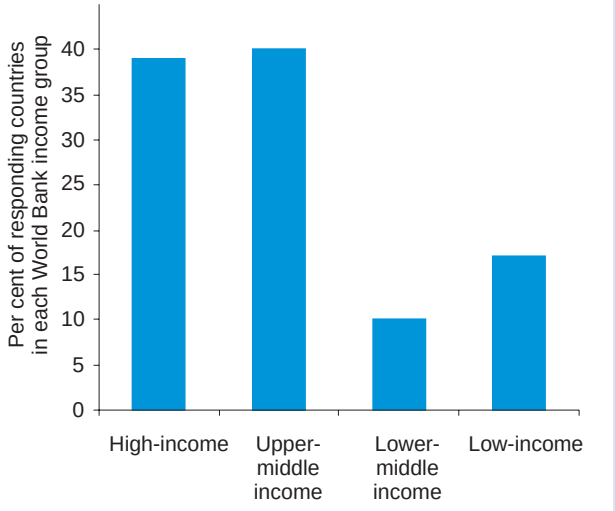


Note: * See Annex 5.1.
Source: WHO GOe survey 2009.

The extent to which m-health has already been adopted by country health systems is illustrated in Chart 5.3. It shows that at least one m-health initiative has been implemented across the vast majority of countries, and in most cases there are many more. The figures range from around 90 per cent of responding countries in the upper and lower-middle income groups, to about 75 per cent for the upper-middle and lower-income groups. It is encouraging to note the absence of a dramatic difference in reported activity between the richer and poorer countries.

The existence of a national telemedicine policy is an indicator of the likelihood of a country offering telemedicine services to its citizens. The proportion of countries in each income group reporting the existence of a national telemedicine policy is relatively low: around 40 per cent of responding high-income and upper-middle income countries, around ten per cent of lower-middle income countries, and around 20 per cent of low-income countries (Chart 5.4). Although telemedicine is not a new e-health service, the data indicate that much work will need to be done before it is integrated into health services worldwide.

Chart 5.4: Percentage of countries with a national telemedicine policy, by World Bank income group*, 2009

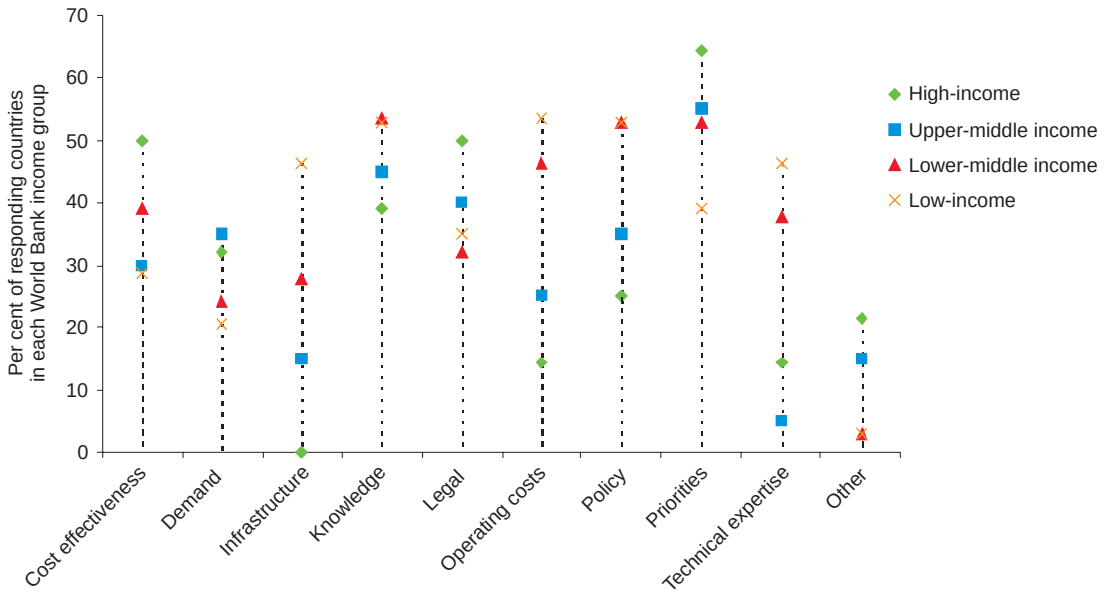


Note: * See Annex 5.1.
Source: WHO GOe survey 2009.

Another approach to assess ICT uptake in the health sector would be to look at the reasons cited for not using m-health and telemedicine, which include infrastructure barriers. While this does not give an indication on what proportion of health centres have access to the Internet, it does give an indication whether infrastructure, or other barriers, matter for taking up this application. Infrastructure is mentioned as a barrier to implementing m-health solutions (except in the highest income group), and the importance of this barrier is inversely related to income: the lower the income level, the greater the percentage of countries citing infrastructure as a barrier (Chart 5.5).

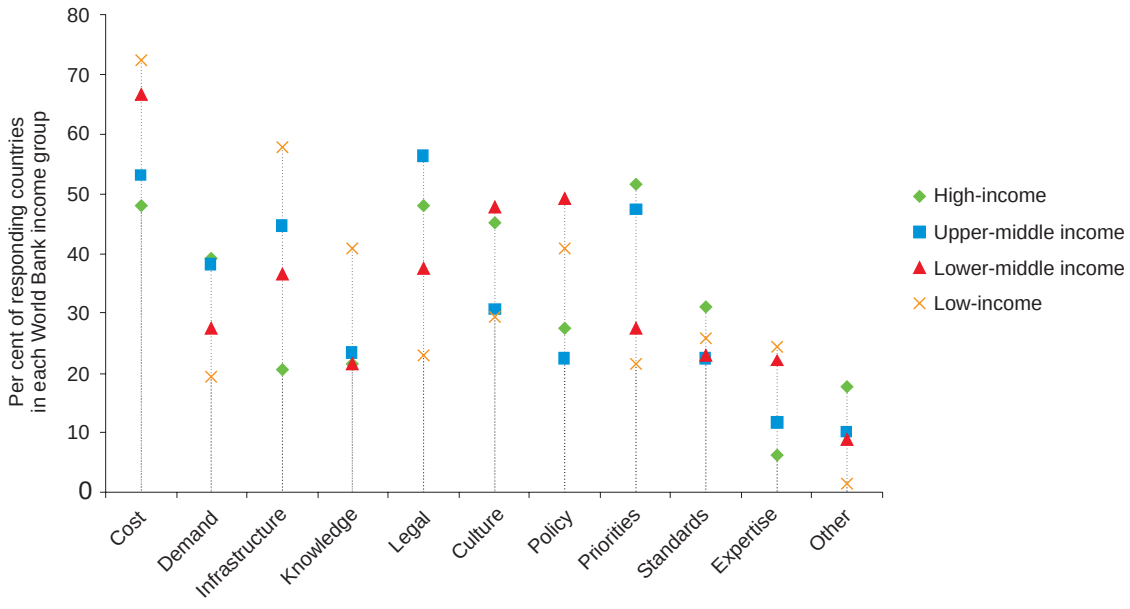
Similarly, infrastructure is also cited as an important barrier to implementing telemedicine solutions, including in the highest income group (Chart 5.6). Countries in the lower-middle income group cite this barrier relatively less often than those in the upper-middle and low-income groups. Indeed, infrastructure is more likely to be an issue for telehealth than for m-health services, as the

Chart 5.5: Most important barriers to implementing m-health solutions, by World Bank income group*



Note: * See Annex 5.1.
Source: WHO GOe survey 2009.

Figure 5.6: Barriers to implementing telemedicine solutions, by World Bank income group*



Note: * See Annex 5.1.
Source: WHO GOe survey 2009.

former require adequate Internet access, as well as the additional hardware and software needed for the telehealth service both at the service-provider and the patient location. The m-health infrastructure is being built by telecommunication service providers and only requires a mobile cellular telephone.

Conclusions and recommendations

The available data point to some progress in connecting health institutions, including in developing countries. Many countries have also introduced the use of ICTs, for example through the connection of health institutions to HINARI or the introduction of electronic patient records, though these facilities are not yet intensively used. Over 75 per cent of countries also report at least one m-health initiative, and mobile health is an area which holds great potential for further growth given the soaring use of mobile technologies, including in the developing world.

Although incomplete, the available figures suggest there is some way to go before reaching full connectivity in health centres and hospitals. However, with five years left until the deadline for the target it is still possible, and likely, that much can be achieved, especially since this represents a fairly distant horizon in terms of ICT advancement. If countries find it possible to measure connectivity in hospitals and health centres, it is most likely that significant improvements in the proportion of these health facilities having access to the Internet will be observed over the next five years. However, it is also likely these trends will tend to occur first in the major cities of developing countries, and less so in remote and isolated regions, even though ICTs can potentially bring even greater benefits in these latter geographical areas.

Substantial efforts are required if the target is to be achieved by 2015. Attention needs to be paid to ensuring that governments are putting in place and implementing foundation actions such as e-government and e-health policies, which will be critical for the successful and sustainable growth of connectivity in the health sector. WHO's GOe proposes to include a series of questions specific to this issue in the 2011 global e-health survey, while ensuring that definitions and feasibility of accurate measurement are tested and piloted well in advance. WHO is also planning to create guidelines for the development and evaluation of e-health strategies that will provide a valuable framework for the many developing countries which still may be operating in an e-health policy vacuum.

Many of the indicators that could be used to measure Target 5 are broad and indirect measures. Most are such that the measurement would generally be made in the public health sector only. An alternative approach would be to invite individual countries to submit data by means of a special brief WSIS topic-specific survey conducted by WHO GOe or any other appropriate institution. This could include questions on the above indicators, as well as questions addressing numbers of hospitals and health centres (if known) and the connectivity situation, both current and planned by 2015. Should funding be available, the data could be collected, processed and analysed during a nine-month period. Otherwise, more current data will be available after the 2011 GOe global survey on e-health.

Finally, a mix of policy recommendations is required to achieve Target 5, including:

- *Government support and recognition*
  Large-scale national connectivity projects require the full support and commitment of governments in order to succeed. The government needs to recognize the importance of connectivity for the health sector, and the benefits it will bring for the health of citizens, not to mention the potential for cost savings through increased efficiencies. This support will need to be reflected in the policy environment as well as the funding environment.

- *Creating an enabling environment*
  The importance of an enabling environment to build connectivity and e-health has been emphasized throughout this chapter. E-government, e-health, e-strategies and funding approaches need to be in place to create an environment for growth in ICT connectivity.

- *Agreement by parties*
  Any significant connectivity initiatives in the e-health domain will need to be agreed on and governed by three ministries: health, ICT/communications, and finance. An understanding and agreement on the mission, strategic approaches, costs and implementation time-line must be shared by all parties if the project is to succeed.

- *Funding*
  One of the biggest impediments to the spread of e-health is insufficient funding allocation to achieve the objectives. Governments must be confident that e-health projects will be adequately funded. Not all sources will necessarily come from public funds. Donor or private funds may be available, as well as public-private partnerships, which are central to the mission of connecting health facilities with ICT.

Notes

1 This chapter was prepared by Misha Kay with Najeeb Al-Shorbaji, Joan Dzenowagis, Marina Takane, Jonathan Santos and Diana Zandi from the World Health Organization, Geneva, in collaboration with ITU. The authors are staff members of the World Health Organization. The authors alone are responsible for the views expressed in this publication and they do not necessarily represent the decisions or policies of the World Health Organization.

2 See WSIS Tunis Agenda for the Information Society, 2005, at: http://www.itu.int/wsis/outcome/booklet/tunis-agenda_D.html , § 90g).

3 See WSIS Geneva Plan of Action, 2003, at: http://www.itu.int/wsis/docs/geneva/official/poa.html#c6.

4 See WSIS Geneva Plan of Action, 2003, at: http://www.itu.int/wsis/docs/geneva/official/poa.html#c2, § 9c).

5 See WSIS Geneva Plan of Action, 2003, at: http://www.itu.int/wsis/docs/geneva/official/poa.html#c7.

6 WHO Global Observatory for eHealth 2009 survey http://www.who.int/goe/data/global_e-health_survey_2009_en.pdf.

7 UNAIDS South Africa Country Response http://www.unaids.org/en/CountryResponses/Countries/south_africa.asp.

8 HINARI: http://www.who.int/hinari/en/.

9 European Observatory on Health Systems and Policies: http://www.euro.who.int/observatory.

10 World Health Statistics, Health workforce infrastructure, essential medicines, WHO 2009 http://apps.who.int/whosis/data/Search.jsp?indicators=%5bIndicator%5d.%5bHSR%5d.Members.

11 http://www.who.int/goe/en/.

12 http://www.oecd.org.

13 http://www.himss.org.

14 http://apps.who.int/gb/ebwha/pdf_files/WHA58/WHA58_28-en.pdf.

15 http://www.who.int/goe/publications.

16 GOe glossary of survey terms: http://www.who.int/goe/data/Global_eHealth_Survey-Glossary-ENGLISH.pdf.

17 Telemedicine (also known as telehealth) involves the delivery of healthcare services where distance is a critical factor. The telemedicine approach uses ICTs for the exchange of information for diagnosis, treatment and prevention of diseases and injuries, for research and evaluation, and for the continuing education of healthcare providers (WHO Global Observatory for eHealth 2009).

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WHO (2006), *Building Foundations for e-health — Progress of Member States*, WHO Global Observatory for eHealth, WHO, Geneva.

Annex 5.1: Breakdown of responding countries in the 2009 GOe global survey on e-health, by World Bank income group 1-4

WB1 — High income	WB2 — Upper-middle income
Austria	Argentina
Belgium	Belarus
Brunei Darussalam	Botswana
Canada	Brazil
Croatia	Bulgaria
Cyprus	Colombia
Czech Republic	Dominican Republic
Denmark	Fiji
Estonia	Latvia
Finland	Lebanon
France	Libya
Germany	Lithuania
Greece	Mauritius
Hungary	Mexico
Iceland	Montenegro
Israel	Panama
Korea (Rep.)	Peru
Kuwait	Poland
Malta	Seychelles
New Zealand	Turkey
Norway	
Oman	
Portugal	
Slovak Republic	
Slovenia	
Spain	
Switzerland	
United Kingdom	

WB3 — Lower-middle income	WB4 — Low income
Albania	Bangladesh
Armenia	Benin
Azerbaijan	Burkina Faso
Belize	Burundi
Bhutan	Cambodia
Cameroon	Chad
Cape Verde	Comoros
Congo	Eritrea
Egypt	Ethiopia
Indonesia	Gambia
Iran (I.R.)	Ghana
Jordan	Guinea-Bissau
Lesotho	Kyrgyzstan
Maldives	Lao P.D.R.
Moldova	Madagascar
Mongolia	Mali
Morocco	Mauritania
Pakistan	Nepal
Paraguay	Niger
Philippines	Senegal
S. Tomé & Principe	Sierra Leone
Sri Lanka	Togo
Sudan	Uzbekistan
Syria	Yemen
Thailand	Zambia
Tonga	Zimbabwe
Turkmenistan	

Note: The country names in this table reflect ITU conventions.