4. ICTs and the Millennium Development Goals

4.1 The Millennium Declaration

The turn of a century is often marked by reflection on the past and fresh aspirations for a better future. One way this has been addressed at the global level is through the Millennium Declaration, adopted by 189 Member States of the United Nations at its fifty-fifth General Assembly in September 2000.[1] Through the Declaration, some 147 Heads of State and Government reaffirmed their commitment to working together to uphold the principles of human dignity, equality and equity at the global level, and to reducing poverty.

The Declaration makes a commitment that the number of people who live on less than one dollar a day should be halved by the year 2015. This forms part of the eight Millennium Development Goals (MDGs) that outline specific areas for achieving improvement in people's lives, including poverty reduction, education, gender, health and the environment. The last goal, developing a global partnership for development, proposes a means of achieving the first seven. Along with the eight goals, 18 specific targets are set out for achieving the MDGs (Table 4.1). Monitoring is based on 48 indicators formulated to measure the 18 targets.

4.2 Target 18: Information and communications

The Millennium Declaration acknowledges that ICTs are an important tool to achieve its overall goals; ICTs can help alleviate poverty, improve the delivery of education and health care, make government services more accessible, and much more. Target 18 of Goal 8 calls upon the Declaration's adherents to: "*In cooperation with the private sector make available the benefits of new technologies, specifically information and communications*".

ITU was charged with providing the indicators to help measure this particular target. However, of all the different targets, number 18 is the most vague (raising the questions of which ICTs should be made available, to whom and by when). A trade-off between the ideal indicator and widespread availability had to be considered. In addition, the number of indicators for the MDG targets had to be kept to a manageable amount. Given these constraints, three indicators were chosen to measure ICT availability in countries: *total number of telephone subscribers per 100 inhabitants*, *personal computers per 100 inhabitants* and *Internet users per 100 inhabitants*. In light of the fact that the goal states: "…benefits of *new* technologies", the indicators are targeted around ICTs such as mobile phones, computers and the Internet. Fixed telephone lines can also be included under "new" technologies, because, besides being an ICT in their own right, they are the main conduits for, and therefore integral to, accessing the Internet. Indeed, there is a certain synergy between the three indicators in that the predominant way of accessing the Internet is via a fixed telephone line using a personal computer. The indicators are infrastructure-based since networks and connectivity are prerequisites for making available the benefits of ICTs as specified in the goal. However, this report endeavours to highlight the fact that infrastructure is not the only factor that can impact the availability of ICTs. The next chapter of this report, Chapter 5, sets out a composite measure that could be used to track Target 18.

Table 4.1: Eight Goals, 18 Targets, 48 Indicators

Millennium Development Goals, targets, indicators

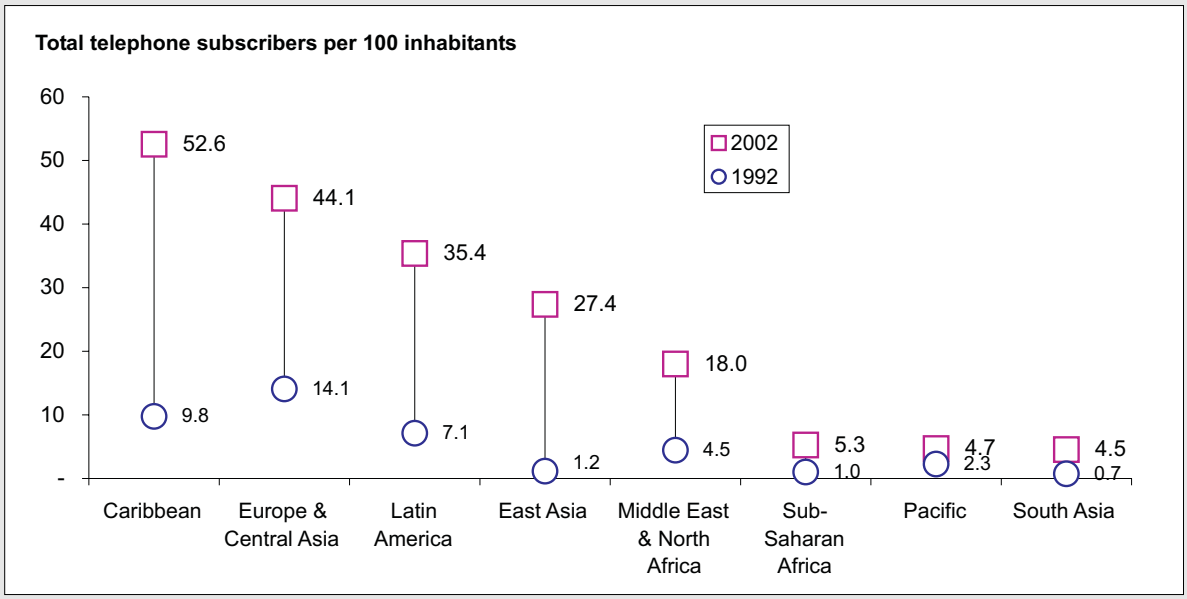
Goals and Targets	*Indicators for monitoring progress*
Goal 1: Eradicate Extreme Poverty and Hunger	
Target 1: Halve, between 1990 and 2015, the proportion of people whose income is less than one dollar a day	1. Proportion of population below $1 (PPP) per day 2. Poverty gap ratio (incidence x depth of poverty) 3. Share of poorest quintile in national consumption
Target 2: Halve, between 1990 and 2015, the proportion of people who suffer from hunger	4. Prevalence of underweight children under-five years of age 5. Proportion of population below minimum level of dietary energy consumption
Goal 2: Achieve universal primary education	
Target 3: Ensure that, by 2015, children everywhere, boys and girls alike, will be able to compete a full course of primary schooling	6. Net enrolment ratio in primary education 7. Proportion of pupils starting grade 1 who reach grade 5 8. Literacy rate of 15-24 year-olds
Goal 3: Promote gender equality and empower women	
Target 4: Eliminate gender disparity in primary and secondary level education preferably by 2005 and to all levels of education no later than 2015	9. Ratio of girls to boys in primary, secondary and tertiary education 10. Ratio of literate women to men 15-24 year-olds 11. Share of women in wage employment in the non-agricultural sector 12. Proportion of seats held by women in national parliament
Goal 4: Reduce child mortality	
Target 5: Reduce by two-thirds, between 1990 and 2015, the under-5 mortality rate	13. Under-five mortality rate 14. Infant mortality rate 15. Proportion of 1 year-old children immunised against measles
Goal 5: Improve maternal health	
Target 6: Reduce by three-quarters, between 1990 and 2015, the maternal mortality ratio	16. Maternal mortality ratio 17. Proportion of births attended by skilled health personnel
Goal 6: Combat HIV/AIDS, malaria and other diseases	
Target 7: Have halted by 2015 and begun to reverse the spread of HIV/AIDS	18. HIV prevalence among 15-24 year old pregnant women 19. Condom use rate of the contraceptive prevalence rate 19a. Condom use at last high-risk sex 19b. Percentage of population aged 15-24 with comprehensive correct knowledge of HIV/AIDS 20. Ratio of school attendance of orphans to school attendance of non-orphans aged 10-14
Target 8: Have halved by 2015 and begun to reverse the incidence of malaria and other major diseases Goal 7: Ensure environmental sustainability	21. Prevalence and death rates associated with malaria 22. Proportion of population in malaria risk areas using effective malaria prevention and treatment measures 23. Prevalence and death rates associated with tuberculosis 24. Proportion of tuberculosis cases detected and cured under DOTS (internationally-recommended TB control strategy)

Goals and Targets	*Indicators for monitoring progress*
Goal 7: Ensure environmental sustainability	
Target 9: Integrate the principles of sustainable development into country policies and programmes and reverse the loss of environmental resources	25. Proportion of land area covered by forest 26. Ratio of area protected to maintain biological diversity to surface area 27. Energy use (kg oil equivalent) per $1 GDP (PPP) 28. Carbon dioxide emissions (per capita) and consumption of ozone-depleting CFCs 29. Proportion of population using solid fuels
Target 10: Halve, by 2015, the proportion of people without sustainable access to safe drinking water and basic sanitation	30. Proportion of population with sustainable access to an improved water source, urban and rural 31. Proportion of urban and rural population with access to improved sanitation
Target 11: By 2020, to have achieved a significant improvement in the lives of at least 100 million slum dwellers	32. Proportion of households with access to secure tenure
Goal 8: Develop a global partnership for development	
Target 12: Develop further an open, rule-based, predictable, non-discriminatory trading and financial system Includes a commitment to good governance, development and poverty reduction – both nationally and internationally	*Official Development Assistance (ODA)* 33. Net ODA, total and to LDCs, as percentage of OECD/ Development Assistance Committee (DAC) donors' gross national income (GNI) 34. Proportion of total bilateral, sector-allocable ODA of OECD/DAC donors to basic social services (basic education, primary health care, nutrition, safe water and sanitation)
Target 13: Address the special needs of the least developed countries Includes: tariff and quota free access for least developed countries' exports; enhanced programme of debt relief for HIPC and cancellation of official bilateral debt; and more generous ODA for countries committed to poverty reduction	35. Proportion of bilateral ODA of OECD/DAC donors that is untied 36. ODA received in landlocked countries as proportion of their GNIs 37. ODA received in small island developing States as proportion of their GNIs
Target 14: Address the special needs of landlocked countries and small island developing states (through the Programme of Action for the Sustainable Development of Small Island Developing States and the outcome of the twenty-second special session of the General Assembly)	*Market Access* 38. Proportion of total developed country imports (by value and excluding arms) from developing countries and LDCs, admitted free of duties 39. Average tariffs imposed by developed countries on agricultural products, textiles and clothing from developing countries 40. Agricultural support estimate for OECD countries as percentage of their GDP 41. Proportion of ODA provided to help build trade capacity
Target 15: Deal comprehensively with the debt problems of developing countries through national and international measures in order to make debt sustainable in the long term	*Debt Sustainability* 42. Total number of countries that have reached their Heavily Indebted Poor Countries Initiative (HIPC) decision points and number that have reached their HIPC completion points (cumulative) 43. Debt relief committed under HIPC initiative, US$ 44. Debt relief as a percentage of exports of goods and services
Target 16: In co-operation with developing countries, develop and implement strategies for decent and productive work for youth	45. Unemployment rate of 15-24 year-olds, each sex and total
Target 17: In co-operation with pharmaceutical companies, provide access to affordable, essential drugs in developing countries	46. Proportion of population with access to affordable essential drugs on a sustainable basis
Target 18: In co-operation with the private sector, make available the benefits of new technologies, especially information and communications	**47. Telephone lines and cellular subscribers per 100 population** **48. Personal computers in use per 100 population and Internet users per 100 population**

Source: Adapted from the United Nations Statistics Division.

Figure 4.1: A decade of ICT progress

Total teledensity (main telephone lines and mobile users per 100 inhabitants), in 1992 and 2002, in developing regions



Note: Developed countries are excluded. For definitions of regions, see: www.worldbank.org/data/countryclass/classgroups.htm.
Source: ITU World Telecommunication Indicators database.

Of all the MDG targets, number 18 is perhaps where the most progress was made during the 1990s. As shown in Figure 4.1, all of the developing regions of the world have grown their fixed and mobile telephone networks at a faster rate since 1992 than in the entire period before that date. In the exceptional case of East Asia (which includes China), the number of telephone subscribers per 100 inhabitants (i.e. total teledensity) in 2002 was 24 times higher than in 1992. In all cases except in the developing Pacific, total teledensity was at least three times higher in 2002 than it was in 1992.

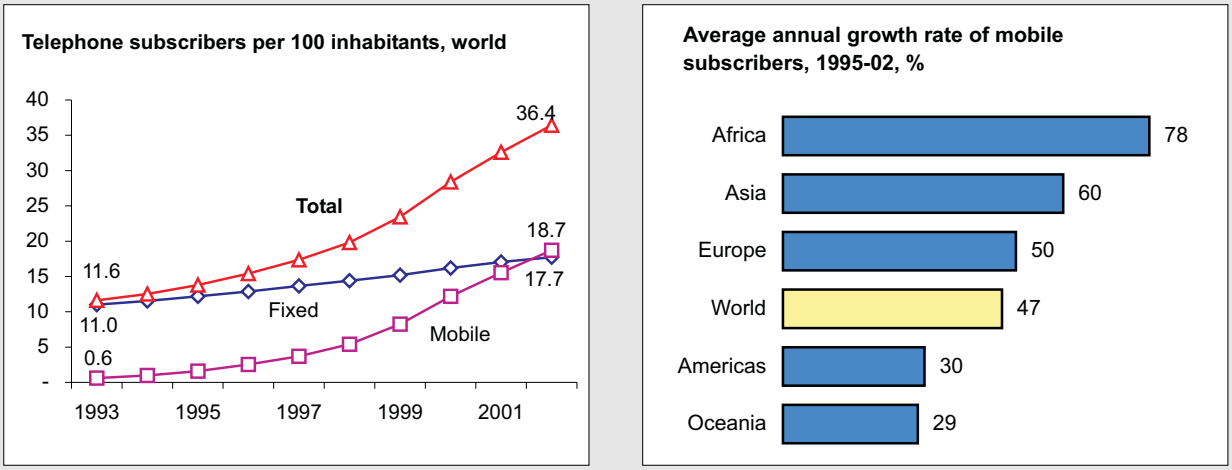
4.2.1 Total telephone subscribers per 100 inhabitants

The *total number of telephone subscribers per 100 inhabitants (total teledensity)* is the sum of fixed lines in operation and cellular mobile subscribers divided by the population of a country, and multiplied by 100. The possibility of double counting is the major drawback of using total teledensity since a subscriber could have both a fixed and mobile telephone. One way to overcome this is to use *effective teledensity* which may be defined as *either* fixed telephone subscribers *or* cellular mobile telephone subscribers per 100 inhabitants, whichever is highest. Effective teledensity is a better measure of total *coverage*, but not necessarily of *access*. In a home that has both a mobile phone and a fixed-line, there is more likely to be improved access between household members of different age or gender. For that reason, total teledensity is the preferred measure in the context of the MDGs.

Globally, access to telephone networks (fixed and mobile) tripled in the ten-year period 1993-2002 from 11.6 subscribers per 100 inhabitants to 36.4 (Figure 4.2, left). The most rapid growth occurred in the use of mobile phones due to the evolution towards second-generation wireless systems, liberalization of mobile telecommunication markets and introduction of prepaid cards. By the end of 2002, there were more mobile cellular subscribers than fixed telephone lines in the world.[2] Growth has been particularly strong in Africa (Figure 4.2, right), the first region where mobile overtook fixed and where almost all countries now have more mobile phones than fixed telephones. Mobile phones seem to grow faster in countries where incomes are declining than where they are growing (Box 4.1). Although this seems counter-intuitive, it indicates the high and often inelastic demand for mobile communications. Developing countries now account for almost half (49 per cent) of total telephone subscribers in the world, up from just 19 per cent in 1990.

Figure 4.2: Telephone subscribers

Main lines, cellular mobile and total telephone subscribers per 100 inhabitants, 1993-2002, world (left) and annual average growth in mobile cellular subscribers, 1995-2002, world regions, per cent (right)



Source: ITU World Telecommunication Indicators database.

4.2.2 Personal computers per 100 inhabitants

The second indicator for Target 18 is p*ersonal computers per 100 inhabitants*. Unlike data for telephone subscribers, obtaining data on PCs is often difficult. Few countries compile statistics on the number of computers in their country (although more do compile data on the number of computer users). Data collected from countries are supplemented by sales and import figures, adjusted to take into account the average life of a computer. However, these data are not widely available for developing nations. Sales and import figures can also be misleading because of re-shipment, re-assembly and evasion.

It is estimated that there were 615 million computers in the world at the end of 2002, up from just 120 million in 1990. One reason for this increase is that computers are the leading access devices for the Internet. Falling prices, reductions in trade barriers, domestic production, and greater functionality have driven computer sales. While developing countries accounted for around 20 per cent of computers in the world in the early 1990s, they now own about 30 per cent.

4.2.3 Internet users per 100 inhabitants

The third indicator used to monitor target 18 is the *number of Internet users per 100 inhabitants*. For most developed and larger developing nations, Internet user data are based on surveys conducted by national statistical agencies or market research associations. For economies where Internet user surveys are not available, data are generally estimated derived from average multipliers for the number of users per subscriber.

Cross-country comparison of the number of Internet users should be carried out with caution. The data for this indicator can be misleading and can be affected by the differences in the frequency of use (i.e. last week, last month, last year) and the services used (e.g. e-mail only). Also, different surveys carried out in the same country often show conflicting results due to differing sampling sizes and interview techniques. Convergence has also contributed to methodological ambiguity in counting Internet users, as in some countries Internet can be accessed using a mobile phone, personal digital assistant (PDA) or video game console.

In just over a decade since the first World Wide Web (WWW) browsers became available, the Internet has become an important means of communication for many. From only 27 economies that had a direct connection to the Internet in 1990, the figure grew to almost every country in the world by the end of 2002, corresponding to some 600 million users. Unsurprisingly, developed countries account for the lion's share of connected users: over half the adult

Box 4.1: For richer, for poorer

The United Nations Development Programme (UNDP) labelled the 1980s a "lost decade" for development and the 1990s a "decade of despair". Although average income per capita among developing and transition economies grew by three per cent per year during the 1990s, it declined in 54 developing economies. The majority of the economies that fared poorly during this period are in sub-Saharan Africa, though this group also includes the republics of the former Soviet Union. The developing countries of Asia and the Americas generally fared better. In other words, the decade was good for some, but bad for others, and the average figure disguises a wide variation in performance.

To what extent is the general economic performance of a particular economy correlated with its performance in ICTs? One answer to that question is to divide developing countries into two groups: those that grew richer during the period (as measured by gross national income (GNI) per capita), and those that grew poorer. The relative performance of the ICT sector can then be compared for the two groups.

The results are revealing (see the table below):

- For fixed-line networks, the first group (richer) grew their networks by almost ten per cent per year, which is more than three times the growth rate achieved by the second group (poorer).
- For mobile networks, the two groups performed at about the same level, with the second group (poorer) marginally outperforming the first group (richer).
- For Internet services, the first group (richer) outperformed the second group (poorer), though by not as much as for fixed lines.

Groups		*Compound annual growth rate in:*		
Based on change in GNI per capita, 1990-2001	*# of economies in each group*	*Fixed lines, 1990-2001*	*Mobile users 1995-2001*	*Internet users, 1997-2001*
1. Economies getting richer	78	9.3%	62.7%	71.8%
2. Economies getting poorer	54	2.8%	68.8%	58.7%

How can these differences in performance in different parts of the ICT sector be explained? It seems that the role of the State is the critical factor. For historical reasons, the government is usually closely involved in fixed-line telecommunications (through State-ownership of incumbents and regulation). It is not so involved in mobile communications, where the private sector usually plays the dominant role, typically in a more competitive environment. Internet is half way between the two, with the State often involved in providing the dial-up network, but the private sector involved in acting as Internet service providers (ISP).

In those economies whose citizens are getting poorer, the government may be regarded as failing, with the relative performance of different ICT sectors reflecting the level of State involvement. In those economies whose citizens are getting richer, the performance of the State does not hinder ICT market growth.

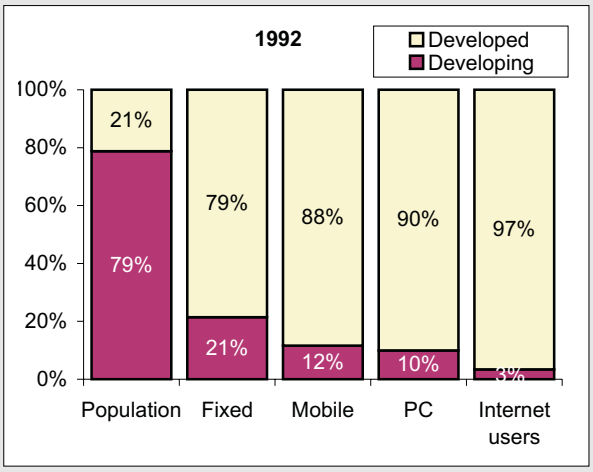
Given the focus in the Millennium Declaration on alleviating poverty, one could infer that mobile phones are likely to be more useful to poor households as there seems to be less price elasticity for mobiles than for fixed lines. Ultimately, it is the ability to communicate that is important, and mobile phones are more readily available to poor people in failing States than fixed-line telephones.

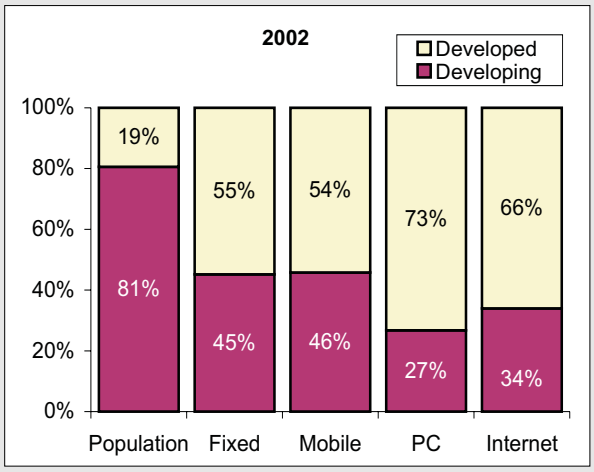
population is online in most developed countries. Just over ten per cent of all Internet users, and 22 per cent of all Internet subscribers have access to broadband connections, and the signs are that this figure is set to grow rapidly.

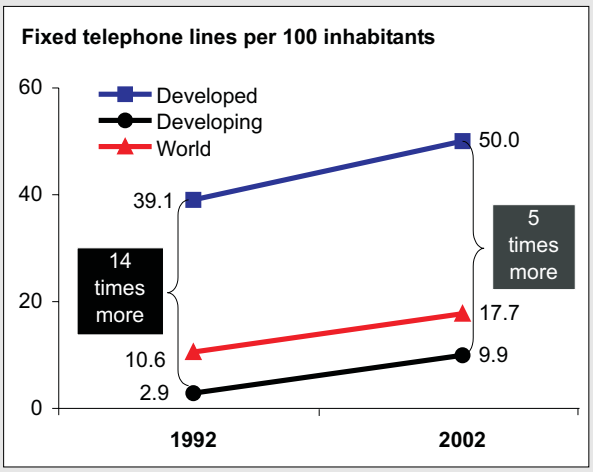
In some countries, third-generation mobile services have been launched that provide Internet access via mobile networks at speeds higher than a dial-up telephone line. At the same time, there are a growing number of locations around the world providing high-speed wireless Internet access for suitably equipped laptop computers at special locations (so-called "hotspots"). While developing countries' share of Internet users is less than their share of telephone subscribers (Figure 4.2, top left), the Internet has been growing fastest in these nations. In 2002, 34 per cent of users were in developing countries, a big jump from the three per cent in 1992.

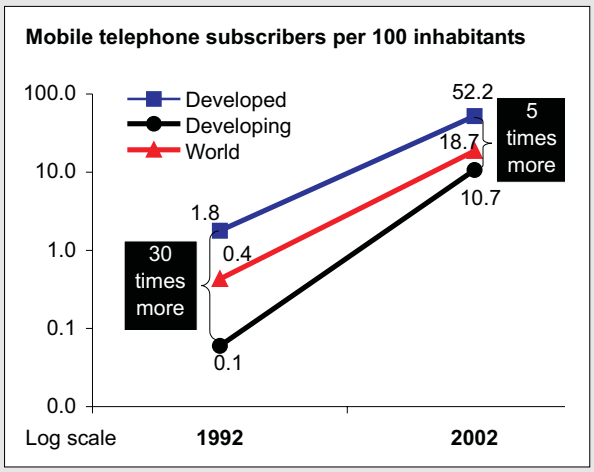
Figure 4.3: How wide the divide?

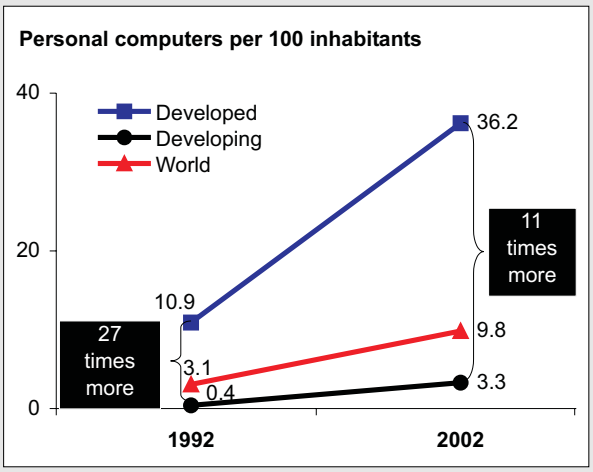
Distribution of population, fixed and mobile telephone subscribers, personal computers and Internet users and fixed and mobile telephone subscribers, personal computers and Internet users per 100 inhabitants, by economic grouping, 1992 and 2002

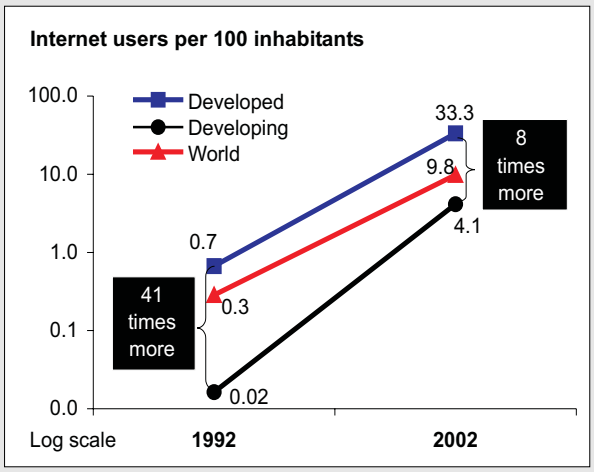












Note: Developed includes Western Europe, Australia, Canada, Japan, New Zealand and the United States. Developing refers to all other countries.
Source: ITU World Telecommunication Indicators database.

Box 4.2: ICT gender statistics

Like other indicators selected for the Millennium Development Goals (MDGs), a breakdown by gender is significant for information and communication technologies (ICTs). It was recognized that the achievement, measurement and analysis of MDGs differ according to the gender of the population. An agreement was made by statisticians and policy analysts to present the MDG indicators disaggregated by gender whenever possible.

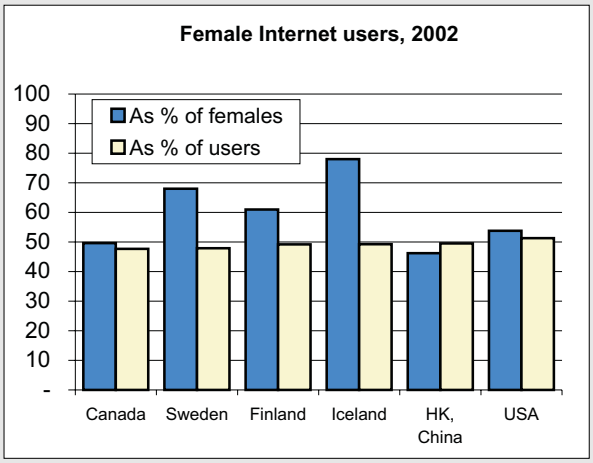
Unfortunately, the availability of gender-disaggregated statistics for ICT indicators is limited.[3] Data for the number of telephone subscribers and computers come from administrative records that do not break down the data by gender. Instead, analysis must rely on survey data. In the case of Internet users, surveys can show the profile of users, for instance by age, gender, frequency of use and educational attainment. Within gender, two indicators are relevant: *females using the Internet as a percentage of all Internet users* and *females using the Internet as a percentage of the female population*.

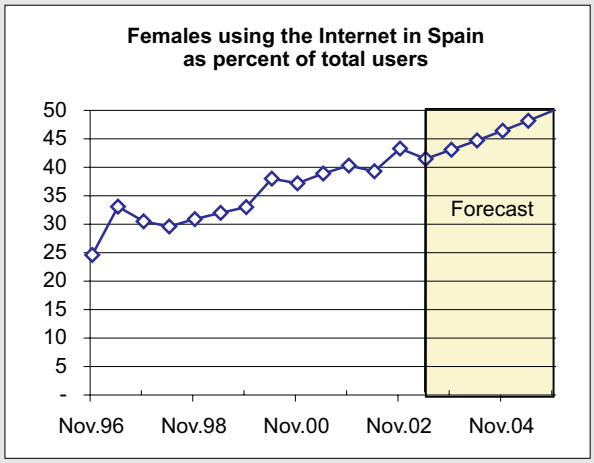
In the case of 39 economies where surveys are available with a breakdown by gender, a simple average indicates that 43 per cent of Internet users are female. The highest levels are found In North America and the Nordic nations (Box Figure 4.2, left). The latter group of countries is noteworthy for having the highest level of females online. For those economies where a time-series is available, the trend is towards an increasing proportion of female users over time (Box Figure 4.2, right).

The analysis of ICT gender aspects is in its infancy. One serious limitation is the lack of surveys in most developing countries. Only when surveys are in place will it be possible to go beyond the simple analysis of the share of women online to more serious reflection, such as why they are or are not online, the type of applications they use and the impact of ICTs on gender.

Box Figure 4.2: Internet use by gender

Top economies by highest percentage of females among total Internet users, 2002 (left) and percentage of females using the Internet among total Internet users, Spain (right)





Note: Data for Canada (2002) refer to age 15 and above; Sweden, Finland and Iceland (2001) age 16 and above; Hong Kong, China age 10 and above; and the United States (2001), age 3 and above. Data for Spain refer to age 14 and above.
Source: ITU World Telecommunication Indicators database.

4.3 Measuring the impact of ICTs on the Millennium Development Goals

On a general level, there is little doubt that ICTs are generating social, economic, cultural and political changes. However, it is difficult to quantify the impact of ICTs and to separate their influence from those of other factors, such as governance or economic growth. Although there is a growing body of evidence that ICTs have a significant macroeconomic impact (Box 4.3), it is not clear to what extent ICTs have helped to directly reduce major development concerns reflected in the MDGs such as poverty, hunger or sickness.

One reason for the lack of evidence is that MDG monitoring only started recently. Although possible impacts of ICTs have been identified by researchers (Table 4.2), the real effects of ICTs on the MDGs may never be fully known, and in any case will only

become clearer in the long term. Where monitoring and collecting data on the impact of ICTs on the MDGs is concerned though, the role of ICTs as tools for storing, processing and disseminating the statistics used to monitor the targets is indispensable. There are already several international MDG websites and it seems likely that national databases will be developed.[4]

There are numerous anecdotal accounts about ICTs dramatically improving and even saving lives. While useful for raising awareness, in order to provide a firm basis for evaluation these stories need to be translated into indicators to measure the impact of ICTs within and across countries. This is more difficult than it sounds, because of the lack of quantifiable information. Even where measures can be made, one-off data is not sufficient; in order to be useful, such data needs to be collected over a period of time for an accurate, and comparable measure of impact. Also, while the net effect of ICTs is generally perceived as positive, they can also have negative impacts on health and the environment, and can aggravate existing disparities (Box 4.4). Measurements of these effects are also worth carrying out.

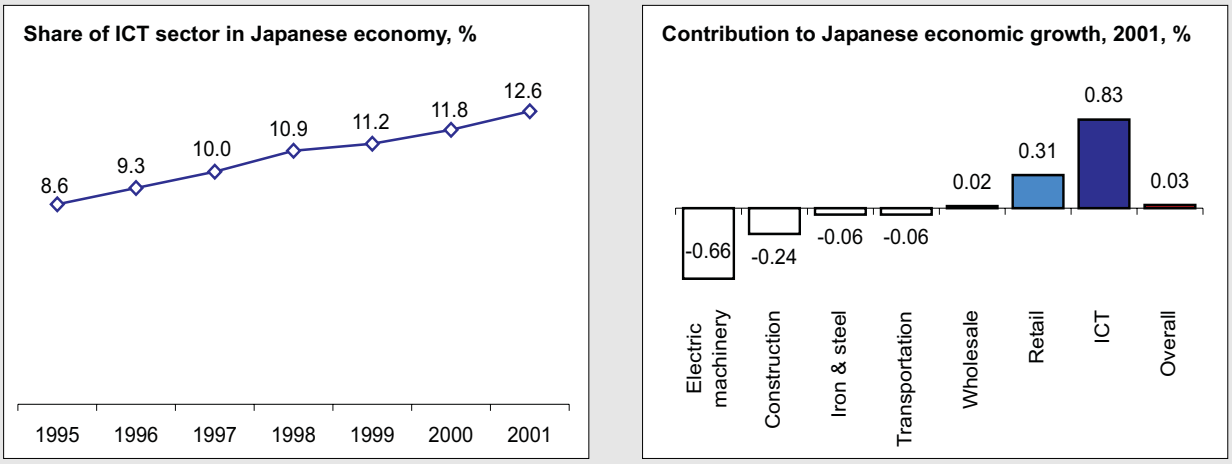
This section outlines indicators that could help measure the impact of ICTs on specific MDGs, although of course the range of impacts of ICTs on poverty, health, education and the environment is very wide. As one of the aims of these proposals, it is hoped to stimulate discussions among policy-makers, sector specialists and statistical experts, for example on the feasibility and refinement of these indicators and methods for collecting them.

Box 4.3: ICTs and the Japanese economy

Information and communication technologies (ICTs) are an important and growing part of the Japanese economy. Growth in the ICT sector in Japan has risen 9.3 per cent a year from 1995-2001 compared to just 1.2 for the overall economy. Indeed if it had not been for the ICT sector, the Japanese economy would have been in recession in 2001 (Box Figure 4.3, right). The rapid growth of ICTs has seen that sector's share of Gross Domestic Product (GDP) rise four percentage points from 8.6 in 1995 to 12.6 in 2001 (Box Figure 4.3, left). The ICT sector employs 3.8 million, 7.1 per cent of the labour force and is now Japan's third largest employer. It is not only the ICT sector itself which is important but also investment by other industries in telecommunications and computer hardware and software. The Japanese government reckons that the ¥ 25'024 (US$ 206) billion investment in ICTs in 2001, generated some ¥ 40'692 (US$ 335) billion and created 1.5 million jobs. No wonder the Japanese government is keen about ICTs being a core component of its drive to a "New Japan-Inspired IT Society".[5]

Box Figure 4.3: Towards the new, Japan-Inspired IT Society

Share of ICT sector in Gross Domestic Product, 1995-2001 (left) and contribution of different sectors to GDP growth, 2001(right), per cent, Japan



Source: ITU adapted from MPHPT (Japan).

Box 4.4: The downside of ICTs

While it is generally agreed that the net effect of information and communication technologies (ICTs) on reducing poverty and hunger, enhancing education and gender equality, and improving health and environmental sustainability is positive, ICTs do have their downsides.

In the area of health, for example, there have been numerous allegations over the years about the dangers of excessive use of ICTs. Electromagnetic fields from antennas and mobile phones are alleged to emit radiation that can cause cancer and other illnesses.[6] Other studies have shown links between extensive computer use and physical ailments such as poor eyesight due to flickering and reflection on the screen and muscular pain caused by static and poor posture. Excessive movement of the wrist and hand have been said to lead to inflammation of the tendon and carpal tunnel syndrome.[7] Another modern-day illness related to increased use of computers and the Internet is *infostress* related to an overwhelming load of information.[8] Excessive use of modern ICTs can even be deadly. In the Republic of Korea, where online game addiction has become a serious problem, a teenager died at his terminal in an Internet café after three days of continuous playing.

Also with regard to health, while the Internet has afforded greater public information and autonomy in understanding health matters, not all the information available on the Internet is reliable. The danger is that false or misleading information may be harmful to those seeking to diagnose and treat themselves, or even to treat others.[9] Similarly, the growing amount of spam, viruses and hacking incidents are not only bad for the constructive benefits of ICTs and an inconvenience to users, but can also have serious safety consequences.

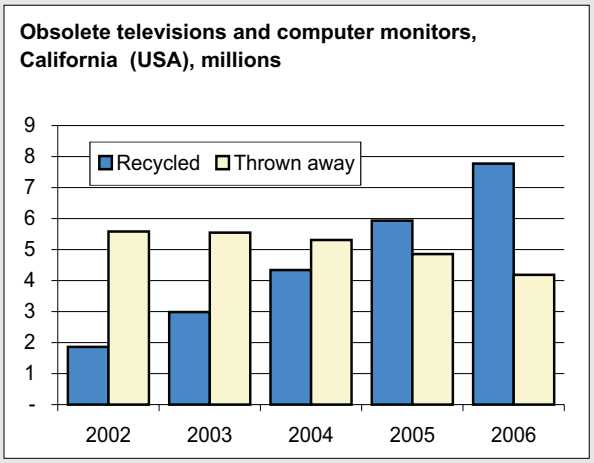
While there has been much talk about e-government, e-education, and e-health, e-waste is perhaps a less-documented, but increasingly distressing area of concern. Rapidly expanding ICT diffusion and more computers brings with it new environmental and related health problems. The number of worldwide PCs in use has doubled, from 288 million units in 1997 to 584 in 2002. With the average life span of a computer constantly shrinking, the number of obsolete PCs is increasing.[10] ICT devices such as computers, scanners and screens are made with lead, arsenic, hexavalent chromium and other toxins. Only some parts are recyclable and toxic waste can leach into groundwater and pose serious health hazards. In the US state of California alone it is estimated that some 7.4 million Cathode Ray Tubes (CRTs) from televisions and computer monitors became obsolete in 2002.[11] This figure is projected to rise to 12 million by 2006. Even under the most optimistic recycling assumptions, some four million CRTs will still be dumped in the garbage by 2006 (Box Figure 4.4, left). Particularly distressing and working against achieving the MDGs is the fact that some e-waste, instead of being recycled, is simply exported from rich to poor nations. According to studies, in 2002 over 50 per cent of the United States' e-waste was shipped to developing countries where environmental regulations are weak or non-existent.[12]

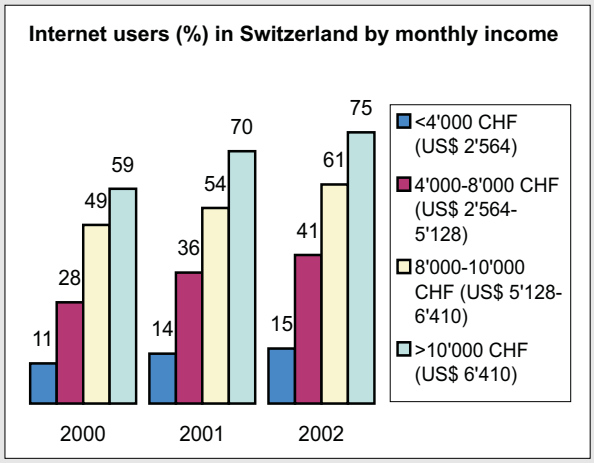
On a social level, ICTs can also exacerbate existing inequalities. Access to ICTs remains largely a function of affordability in many countries, with the risk that existing inequalities are reinforced or exacerbated. Indeed, an analysis of the digital divide between, but also within, countries shows that those with higher incomes are the biggest users of the Internet (Box Figure 4.4, right). Telework and ICT-based distance training have been cited as major opportunities for women to work or be educated from home and thus increase gender equality. Sceptics might argue that these online replacements keep women at home, reinforcing existing barriers to equality.

Only a clear understanding of these issues can help limit the negative effects of ICTs. Identifying hazards, designing indicators and collecting data must be part of this undertaking.

Box Figure 4.4: ICTs working against the MDGs

Number of obsolete televisions and computer monitors, California (USA), 2002-2006 (left) and Internet users by income group, Switzerland (right)





Source: ITU adapted from Silicon Valley Toxics Coalition and Swiss Federal Statistical Office.

Table 4.2: How ICTs can help achieve the Millennium Declaration Goals

Goal/Target	*Role of ICTs*
1. Eradicate extreme poverty and hunger Halve, between 1990 and 2015, the proportion of people whose income is less than one dollar a day Halve, between 1990 and 2015, the proportion of people who suffer from hunger.	Increase access to market information and reduce transaction costs for poor farmers and traders. Increase efficiency, competitiveness and market access of developing country firms. Enhance ability of developing countries to participate in global economy and to exploit comparative advantage in factor costs (particularly skilled labour).
2. Achieve universal primary education Ensure that, by 2015, children everywhere, boys and girls alike, will be able to complete a full course of primary schooling	Increase supply of trained teachers through ICT-enhanced and distance training of teachers and networks that link teachers to their colleagues. Improve the efficiency and effectiveness of education ministries and related bodies through strategic application of technologies and ICT-enabled skill development. Broaden availability of quality educational materials/resources through ICTs.
3. Promote gender equality and empower women	Deliver educational and literacy programmes specifically targeted to poor girls and women using appropriate technologies. Influence public opinion on gender equality through information or communication programmes using a range of ICTs.
4. Reduce child mortality 5. Improve maternal health 6. Combat HIV/AIDS, malaria, and other diseases Reduce infant and child mortality rates by two-thirds between 1990 and 2015 Reduce maternal mortality rates by three-quarters between 1990 and 2015 Provide access to all who need reproductive health services by 2015	Enhance delivery of basic and in-service training for health workers. Increase monitoring and information-sharing on disease and famine. Increase access of rural caregivers to specialist support and remote diagnosis. Increase access to reproductive health information, including information on AIDS prevention, through locally appropriate content in local languages.
7. Ensure environmental sustainability Implement national strategies for sustainable development by 2005 so as to reverse the loss of environmental resources by 2015 Halve, by 2015, the proportion of people without sustainable access to safe drinking water. Have achieved, by 2020, a significant improvement in the lives of at least 100 million slum dwellers.	Remote sensing technologies and communications networks permit more effective monitoring, resource management, mitigation of environmental risks. Increase access to/awareness of sustainable development strategies, in areas such as agriculture, sanitation and water management, mining, etc. Greater transparency and monitoring of environmental abuses/ enforcement of environmental regulations. Facilitate knowledge exchange and networking among policy-makers, practitioners and advocacy groups.

Source: ITU adapted from Department for International Development (United Kingdom).

4.3.1 ICTs and eradicating extreme poverty and hunger

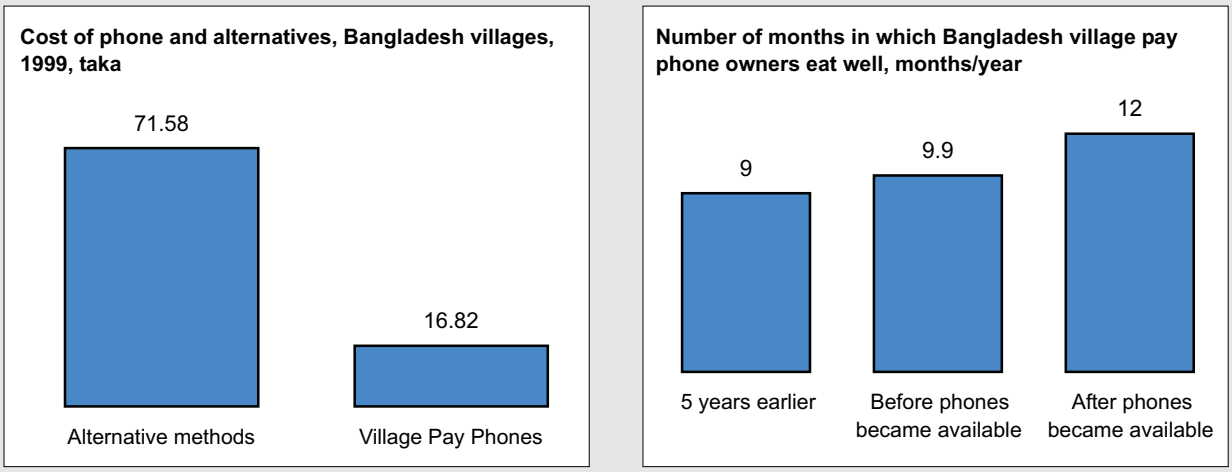
Goal one of the MDGs has the targets of halving the proportion of people whose income is less than one dollar a day, and halving the proportion of people who suffer from hunger. A number of macroeconomic indicators currently are used to measure the impact of ICTs on creating wealth and employment. These include the contribution of the ICT sector to the economy, the contribution of ICT investment to economic growth and the number of workers in the ICT sector. These statistics help to quantify the link between ICT and wealth creation at the level of the national economy in a general way. But while capturing the global picture, these indicators fail to measure specific, micro-level and people-oriented indications of the role of ICTs in lessening poverty and hunger.

One way in which ICTs do have a direct impact on people's livelihoods — particularly for many developing countries where agriculture is the main source of family income — is by raising crop and livestock yields, thereby reducing both poverty and hunger. ICTs improve agricultural practice through access to information on crop selection, irrigation, fertilizers and fishing and livestock conditions. "Village Knowledge Centres"—facilities with ICTs including Internet access—have, for example, been established at several locations in the Indian state of Pondicherry. Information in the centres' agricultural databases have helped save farmers' crops from pests and increased yields. Weather information such as wave heights is also downloaded and disseminated to fishermen, contributing to maritime safety and increasing fish catches.[13] The *use of ICTs by farmers/ fishermen* could be an indicator of how use of ICTs improves agricultural practice.[14]

Another way that ICTs assist agricultural workers is through price information. There are numerous examples of ICTs being used to relay market information to farmers and fishermen, helping them get a better price for their products and minimizing costly and time-consuming trips to market. The result is increased incomes.[15] These benefits also accrue to other poor households, allowing them to increase earnings or save, resulting in more money available for necessities such as food. Research from a "Village Pay Phone" project in Bangladesh indicates that providers of telephone service managed to eat well 12 months of the year compared to only 9.9 months prior to when telephones became available (Figure 4.4, right).[16] The study also suggests that users of Village Pay Phones save up to four times more in terms of opportunity costs (considering the time spent and transport costs if telephones were not available, Figure 4,4, left). The indicator: *increase in incomes and savings of poor households from the use of ICTs* could measure this.

Figure 4.4: Phones, poverty and hunger in Bangladesh

Impact of the Village Pay Phone project in Bangladesh, 1999



Note: The left chart shows opportunity costs of alternative methods to phones in terms of time spent and transport.
Source: ITU, adapted from ZEF Bonn, Germany.

4.3.2 ICTs and achieving universal primary education

There are a number of barriers to achieving the MDG target of all children receiving primary school education. One of the most pervasive is a shortage of facilities and teachers, often due to financial constraints.[17] ICTs can help overcome these shortages in an efficient and economical way for countries facing budgetary limitations.[18]

ICT-based distance training can help overcome a lack of primary school teachers by accelerating instruction.[19] This is particularly relevant for countries with large rural areas where potential teachers have difficulty travelling to formal learning centres. There are a number of examples of primary teacher distance-education programmes in developing nations.[20] ICTs can enhance distance education through more rapid and interactive dissemination of learning materials compared to traditional correspondence-based formulas. Several nations have integrated old and new ICTs into primary teacher education programmes. Examples include Nepal where training is delivered over radio to around 9'000 aspiring teachers[21] , as well as Latin America, where a course from Mexico is beamed over satellite and the Internet to some 1'800 teachers throughout the region.[22] Widespread adoption of ICT-based training could help alleviate the teacher shortage and increase the capacity of countries to enrol more primary school students. One indicator to measure this would be the *number of primary school teachers trained through ICT-based education.*

ICTs can also supplement primary school teaching, thereby helping to overcome shortages. For example, a number of countries use radio programmes to broadcast subjects to primary schools while others have gone further integrating ICTs such as CD-ROMs and web-based software into the daily instruction time.[23] An indicator that could measure the impact of new technologies for teaching students might be the *number of primary school pupils using ICTs for learning*.

ICTs could also be used to emphasize the importance of primary school attendance particularly where there are strong social or cultural barriers to doing so. Radio and television broadcasts could be used to emphasize this with a possible indicator of the *number of students enrolled in primary school as a result of radio / television broadcasts*.

Finally, many countries suffer from a shortage of primary school textbooks that affects learning and causes students to drop out.[24] ICTs can help overcome this limitation through electronic learning materials. Students in a rural primary school in the United States used the Internet to get information about geography with the teacher noting "You would need a couple dozen textbooks to get through all the information they wanted".[25] The growing trend towards the production of electronic textbooks could alleviate shortages in developing countries through innovative distribution techniques. The indicator *number of primary school learning materials provided through ICTs Internet* could measure this.

4.3.3 ICTs and promoting gender equality and empowering women

Goal three of the MDGs has the specific target to "eliminate gender disparity in primary and secondary education preferably by 2005 and in all levels of education no later than 2015". ICTs promote gender equality by providing online opportunities to women that are not always available in the "off-line" world. A woman's traditional role as homemaker and mother can inhibit the ability to attend school. In some countries, social customs make it difficult for women to participate in activities that involve mixing with men.[26] In some cases, female school enrolment begins to taper off at childbearing age due to pressure to marry and have children. ICT can help overcome these barriers through applications such as distance education.

One area of measuring the impact ICTs on promoting gender equality is in ICT-based training. This is particularly relevant for tertiary education where students are not only mature enough to participate in ICT-based training but also where other activities such as employment or caring for children prevent them from participating in campus based education. Studies have found that female participation in distance education outnumbers men in many countries.[27] The *number of females enrolled in ICT-based distance education* can help evaluate the impact of ICT on enhancing equality in education. In Australia, data show that four fifths of employed women enrolled in distance-education are members of family; of those, one-third have children under the age of 15.[28] Open Learning Australia (OLA) offers higher education through a combination of distance and on-line teaching. In 2002, there were 6'129 students enrolled in OLA of which 3'485 were females (56.9 per cent). This is higher share than in overall higher education (54.9 per cent). As a result of OLA enrolment, female tertiary school enrolment is 0.8 per cent higher. The impact would be far greater in developing nations than in Australia where there are already a large number

of higher educational institutions with a large share of female enrolment.

4.3.4 ICTs and improving maternal health and combating HIV/AIDS, malaria, and other diseases

MDG goals 4-6 deal with health and have the specific targets of reducing infant and maternal mortality and halting and reversing the spread of HIV/AIDS, malaria and other major diseases. One of the main causes of death among young children is a lack of knowledge regarding childhood diseases. Access to information through the Internet could help medical practitioners and parents find solutions to treat sick children. In the United States, a telemedicine project found those parents who used the facility reported a 10 per cent higher quality of child care than those who did not.[29] The *percentage of parents using ICT-based health tools* could measure the impact of ICTs for enhancing infant health.

In a similar area, research has shown that the main factor impacting successful births is the presence of skilled attendants.[30] Midwives, nurses or doctors attend some 60 per cent of the births around the world. The challenge is to raise this figure and to enhance the training of skilled attendants. ICTs can help in this effort through more rapid diffusion of information about good maternal practice. The World Health Organization's (WHO) electronic Reproductive Health Library (RHL) consists of pregnancy information on diskettes and CD-ROMs accessible through computers. This assists health workers who do not have access to the latest reliable information because of the high cost of journals or unreliable delivery. The interactive RHL is being trialled in 22 hospitals in Mexico, and 18 in Thailand, to determine if interactive dissemination of information improves obstetric practice. Computer databases can also model the impact of the existing situation in maternal health calculating how many lives could be saved and disabilities avoided through proper attention. For example a computer-modelling tool showed that 5'500 infants died each year in Ghana due to sub-optimal breast-feeding.[31] The Dreyfus Health Foundation Communications for Better Health (CBH) program has established interactive centres in 14 countries for the dissemination of computerized health information. The CBH system contains a vast amount of computerized information for example on local practices, and some of it is in local languages. It has been distributed to some 1'000 health facilities in Ghana including maternal and child centres. The system is being further expanded to localize information and create digital videos aimed at enhancing maternal health.[32] A July 1999 evaluation of a maternal health project in the Tororo district of Uganda based on radio technology, found that maternal mortality dropped 50 per cent following implementation of the project.[33] The *decrease in the number of maternal/infant deaths because of use of ICTs* is an indication that ICTs have an important role in saving both mother and child.

An often overlooked, older ICT, radio, can be an important vehicle to improve awareness about the prevention of deadly diseases. A broadcast campaign aimed at reducing the incidence of HIV/AIDS among the young in the Dominican Republic found that a majority of listeners and viewers remembered the advertisements, retaining messages such as the need for protection and fewer partners.[34] Radio soap operas that dramatize the impact of HIV/AIDS also have an effect. In Tanzania, 82 per cent of listeners surveyed said they had adopted a method of prevention as a result of listening to a radio soap opera, while in South Africa a majority of respondents indicated that they gained the most useful information about the disease from a radio dramatization.[35] A January 1995 - September 1998 evaluation of an entertainment-education radio soap opera on family planning and HIV prevention in St. Lucia found that condom imports rose 143 per cent after the programme was aired.[36] A possible indicator for measuring the impact of media campaigns on HIV/AIDS (as well as other diseases) prevention could be the *number of people that adopted healthy lifestyles as a result of broadcasting*.

The Internet also plays a role in HIV/AIDS prevention. It has vastly expanded the amount of information available for health workers and the public. The Internet also offers anonymity to those that might be embarrassed about discussing sexually related diseases in person. It allows users to contact others, establish support groups and obtain advice.[37] A possible survey-based indicator for measuring the impact of ICTs on preventing disease could be the *percentage of population who feel the Internet has helped them adopt a healthy lifestyle*.[38]

4.3.5 ICTs and environmental sustainability

MDG Goal 7 has three associated indicators: integrating the principles of sustainable development into country policies and reverse loss

of environmental resources; halve the proportion of people without access to safe drinking water and achieve a significant improvement in the lives of slum dwellers.

ICTs enable greater participation by the population in activities to protect the environment through networking, and information exchange.[39] ICTs also provide researchers with critical tools for the observation, simulation, and analysis of environmental processes.[40] Environmentally friendly work habits are promoted through ICTs in areas such as the reduction of paper and working from home. All of these contribute to sustainable development and protecting environmental resources.

ICTs also allow activities such as work, shopping, personal finance, health and education to be carried out online. This can reduce vehicular traffic to offices, shops, banks, doctors and schools, resulting in less pollution. Indicators such as the number of teleworkers, Internet banking subscribers, consumer-to-business e-commerce transactions and students enrolled in ICT-based distance training already exist in some countries. The challenge is to map these statistics to environmental change. For example, in Ireland, the 2.3 per cent of the employed population who are teleworkers have no need to drive to work (Figure 4.5, left). More teleworkers could help reduce Ireland's greenhouse gas emissions that rose 82 per cent between 1994 and 2000.[41] Another area of research would be to determine if the promise of the paperless office—one of the oft-cited benefits of ICTs—is being fulfilled. Has there been a reduction in paper production—and a corresponding reduction in the destruction of forest areas—as a result of increased use of electronic documentation and communication (Figure 4.5, right)?[42]

Water is an important environmental resource that is threatened in many parts of the world. ICTs improve access to safe water in a number of ways. Computerized monitoring combined with geographical information systems and databases can measure water quality and pinpoint sources of pollution; satellites can locate new sources of water and information technology helps consumers use water more efficiently.[43] These give rise to a number of indicators such as *number of polluted water supplies found through the use of ICTs, new sources of fresh water discovered through ICTs* and *the amount of drinkable water conserved through ICTs*.

Other roles played by ICTs include the facilitation of improvement of human living conditions and access to fundamental life resources. The environment

Box 4.5: No Smoking

The World Health Organization (WHO) estimates that four million people die around the world annually due to tobacco use. If unchecked, the figure could reach ten million by 2030. There are numerous studies indicating a strong link between tobacco advertising and product sales. Just one example was a 1988 RJ Reynolds media campaign aimed at the youth market. It featured 'Joe Camel', a cartoon figure to advertise their cigarettes. Within two years, Camel sales grew from $ 6 million to $476 million — a 80 — fold increase.[44]

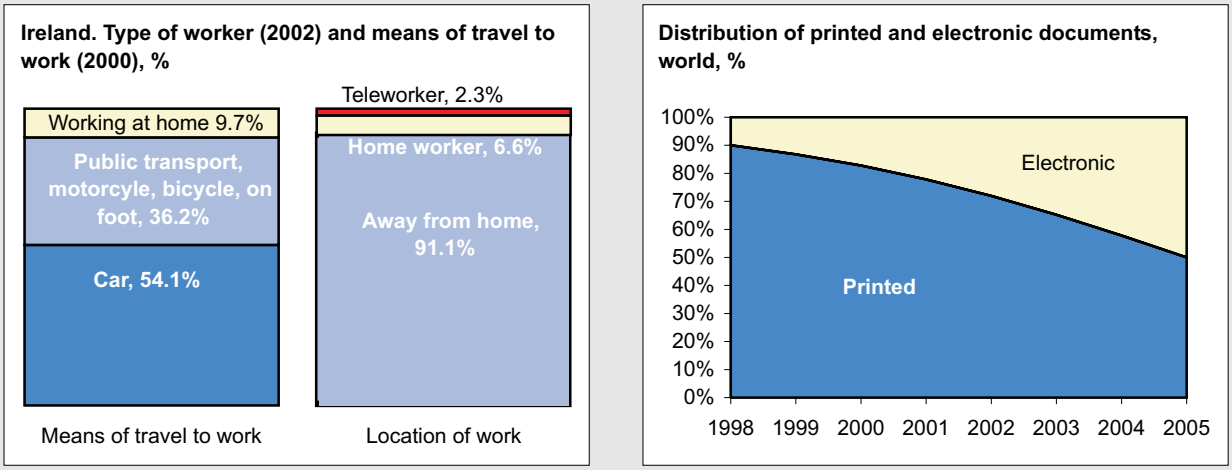
The challenge is whether anti-smoking campaigns can equal or even exceed the effectiveness of smoking advertisements. In fact, it was as early as the 1960s that the effects of public anti-smoking campaigns began to be felt. The Fairness Doctrine carried out between 1967-1970 in the United States, required television networks to provide one anti-smoking messages for every three cigarette advertisements.[45] Research has shown that the anti-smoking messages resulted in a decline in per capita cigarette consumption of at least five per cent, and a reduction in the prevalence of teenage smoking of three per cent. The Fairness Doctrine came to an end in 1970; smoking began to rise in 1971.

Using different media to publicize the same message multiple times can maximize the impact of smoking cessation messages. Most commonly, each message is disseminated through broadcast media, print advertising and other forms (e.g. outdoor billboards). These approaches need to be supplemented not only by non-traditional advertising outlets (e.g. the Internet), but also through telephone help lines. The latter give smokers who are trying to quit, personalised, anonymous, and expert support when needed. Help lines can also be popular. In New Zealand, for example, the numbers of calls to telephone help lines increased by almost 400 per cent as a result of increased advertising on television. In California, non-smoking messages had to be withdrawn several times because the resulting call volumes were too high for help line staff to manage.

The use of the Internet for advertising has increased and this new media has become a new battleground for tobacco control advocates and pro-tobacco forces. More research is required to measure the impact of strategies conducted by both sides on websites and chat rooms.

Figure 4.5: Is there a link?

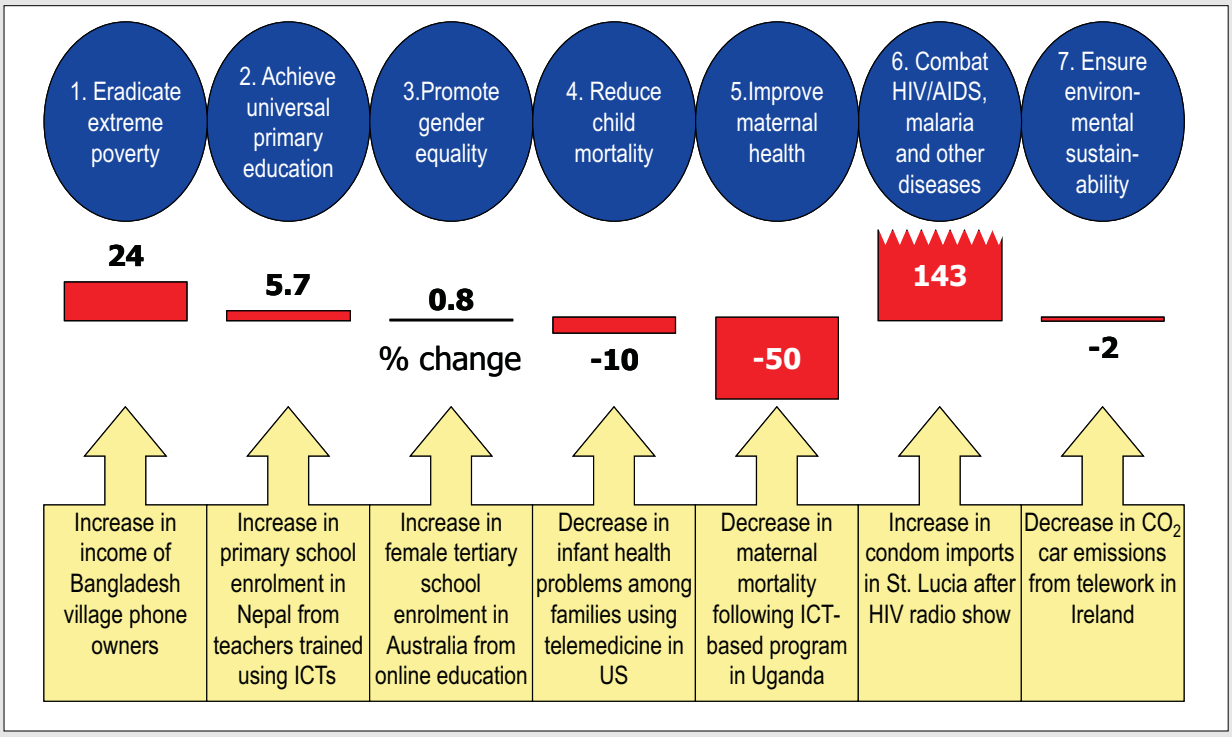
Means of travel to work (2000) and location of work (2002), Ireland (left) and distribution between printed and electronic documents, 1998-2005 (right)



Note: Data in the right chart have been estimated based on the trend between 1998 and forecast for 2005.
Source: ITU adapted from Central Statistics Office (Ireland) and Microsoft.

Figure 4.6: The impact of ICTs on the MDGs

Percentage change in different MDG indicators caused by ICT-based activities



Source: ITU.

of slum dwellers is characterized by poor infrastructure and poor access to services. ICTs can enhance monitoring of existing housing and the design and construction of new houses in poor urban areas.[46] ICTs can also benefit the quality of life of slum dwellers by delivering services such as government, education and health information online. ICTs also create economic opportunities through online promotion and sale of products, access to employment information and training. Slums in Brazil, India and Kenya are three examples where innovative ICT projects are working to improve the lives of the local community.[47] Suitable indicators include *number of slum dwellers trained in ICTs*, *number of slum dwellers using ICTs* and *number of slum dwellers whose lives have improved because of ICTs*.

Table 4.3: How ICTs can impact the MDGs
Selected examples

MDG	*Indicator*	*Impact*
Goal 1. Eradicate extreme poverty and hunger	Increase in income from ICTs	A 1999 study of so-called Village Pay Phone (VPP) owners in 50 villages in Bangladesh found that income from providing phone service constitutes 24 per cent of these households' total income.
Goal 2. Achieve universal primary education	Primary school teachers trained by ICT-based education	In Nepal an average of 4'430 people were being trained as primary school teachers using radio-based distance education in 2001. Based on the current student-to-teacher ratio of 40, an additional 176'616 new primary school students could be enrolled once these teachers complete their training. This would raise the net primary school enrolment rate 5.7 per cent.
Goal 3. Promote gender equality and empower women	Females enrolled in ICT-based education as percentage of total female tertiary enrolment	Open Learning Australia (OLA) offers higher education through a combination of distance and on-line teaching. In 2002, there were 6'129 students enrolled in OLA of which 3'485 were females (56.9 per cent). This is higher share than in overall higher education (54.9 per cent). As a result of OLA enrolment, female tertiary school enrolment is 0.8 per cent higher.
Goal 4. Reduce child mortality	Percentage of parents of small children using ICT-based health tools	Baby CareLink is a telemedicine program for parents of infants in the United States. A 1997-99 evaluation of 56 patients found those parents who used Baby CareLink reported a 10 per cent higher quality of care than those who did not use Baby CareLink.
Goal 5. Improve maternal health	Percentage of maternal health workers using ICTs	A July 1999 evaluation of a maternal health project in the Tororo district of Uganda based on radio technology, found that maternal mortality dropped 50 per cent following implementation of the project.
Goal 6. Combat HIV/AIDS, malaria and other diseases	Percentage of adult population adopting health lifestyle after exposure to ICT-based health information	A January 1995 - September 1998 evaluation of an entertainment-education radio soap opera on family planning and HIV prevention in St. Lucia found that condom imports rose 143 per cent after the program was aired.
Goal 7. Ensure environmental sustainability	Teleworkers as percentage of total in employment	There are 38'700 teleworkers (Q3 2002) in Ireland (2.3 per cent of total in employment). A little over half (54.1 per cent) of those employed in Ireland drive to work. On average, a private car emits 0.00582 kilograms of CO_2 emissions per year. Therefore those who telework—and therefore work at home—cause a reduction of 2 per cent in CO_2 emissions by not having to drive to work. If all those in Ireland who say there job lends itself to teleworking (28 per cent of total employment) could telework, there would be a 30 per cent reduction in CO_2 emissions.

Source: ITU.

4.4 WSIS objectives, goals and targets

While the MDGs set out goals and targets relating to ICTs, they omitted specifying global deadlines and targets in this regard. This is remedied to some extent in the WSIS draft Plan of Action. The latest draft contains ten targets relating to ICT access, to be achieved at the latest by 2015.[48] These targets derive from the different inputs to the drafting process. How realistic are the targets? And how can they be monitored? One issue is that many of the targets are vague, making it difficult to define precise indicators for measuring them. Another issue is that most are infrastructure based. As is obvious from the analysis below, many of the targets have already been, or are close to being, achieved in terms of infrastructure availability. Thus while a majority of the world's inhabitants will have theoretical access to most ICTs in the future, their ability to use them will depend on knowledge and affordability.

Target 1: To connect villages with ICTs and establish community access points.

In monitoring this target, there are several methodological difficulties:

- What constitutes a village? For instance, in Mexico, there were 197'930 localities with a population of less than 4'999 tabulated in the 2000 Census. Of those, three quarters are in localities with a population of less than 100, of which practically none has telephone service (Figure 4.7, left). However, the population living in those small villages only accounts for 2.7 per cent of the total in the country. Overall, only six per cent of the population is without access to telephone service. For the purposes of measurement, it might be necessary to specify a minimum village size of, say, 100 people, for international comparisons (Figure 4.7, right).

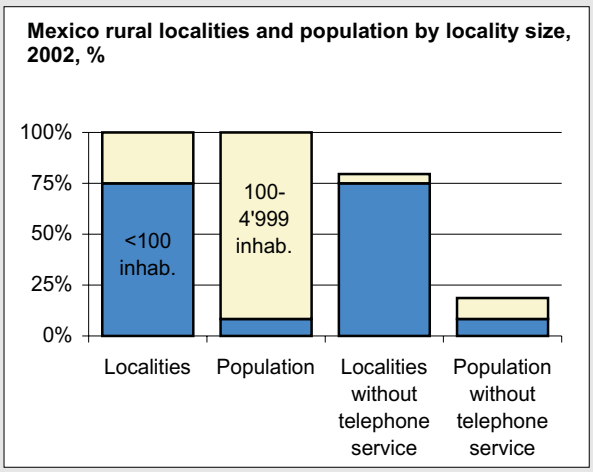
- What are the boundaries of a village? In areas of highly dispersed or migrant populations, a central access point may not be very useful.

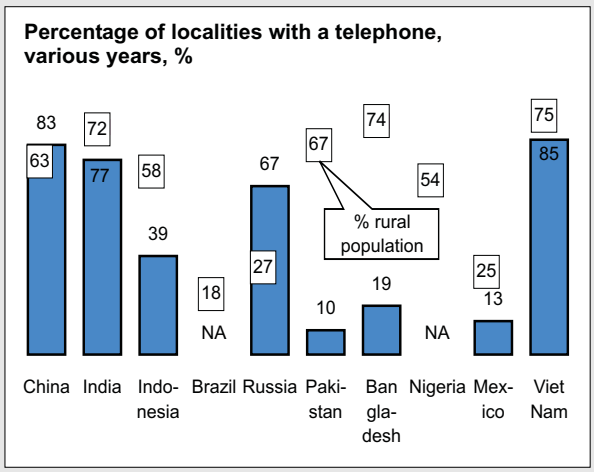
- What does it mean to be "connected"? The vagueness in the WSIS draft Plan of Action is deliberate in the sense that it seeks to be technologically neutral (not specifying if the connection should be fixed or mobile and not specifying a minimum connection capacity). However, the costs of providing every village with an Internet connection (which would normally require a computer and modem) would be higher than just providing a telephone connection.

- What is a community access point? Again there is some ambiguity over this target, but the main intention is to highlight the importance of shared access (for instance, through a school, post office, Internet café, public call box, etc). Technological

Figure 4.7: Connecting villages

Distribution of rural localities by population size and availability of telephone service, Mexico, 2002 (left) and percentage of localities with telephone service, top ten countries with largest rural population, various years (right)





Source: ITU research and SCT (Mexico).

neutrality again dictates that the precise means of access, and the quality, is left open to local interpretation and implementation.[49]

- How many villages are there? It is hard to say because there is no comprehensive database about the number of villages worldwide, let alone about those with telephone service. ITU has carried out research in South Asia and Africa with mixed results. Many telecommunication authorities and national statistical offices were unable to provide the necessary data. It is clear that a starting point for measuring this target would be a broad effort to tabulate the existing status.

Is this target realistic? Extrapolating from available data, it is estimated that some 1.5 million villages in developing nations remain unconnected to telephone networks.[50] Assuming a figure of around US$ 750 per village for telephone service or up to US$ 4'200 per village including Internet access, the total amount would be US$ 1.1 billion for telephone service or up to US$ 6.3 billion including Internet access.[51] This works out at between US$ 90 – 525 million per year from 2004-2015. Global coordination of the project would help to bring down costs significantly, for instance by providing a standardized solution and allowing for bulk purchasing of equipment and capacity. But it does require a political commitment, at both national and international level.

Target 2: To connect universities, colleges, secondary schools and primary schools with ICTs.

Target 3: To connect scientific and research centres with ICTs.

Target 4: To connect public libraries, cultural centres, museums, post offices and archives with ICTs.

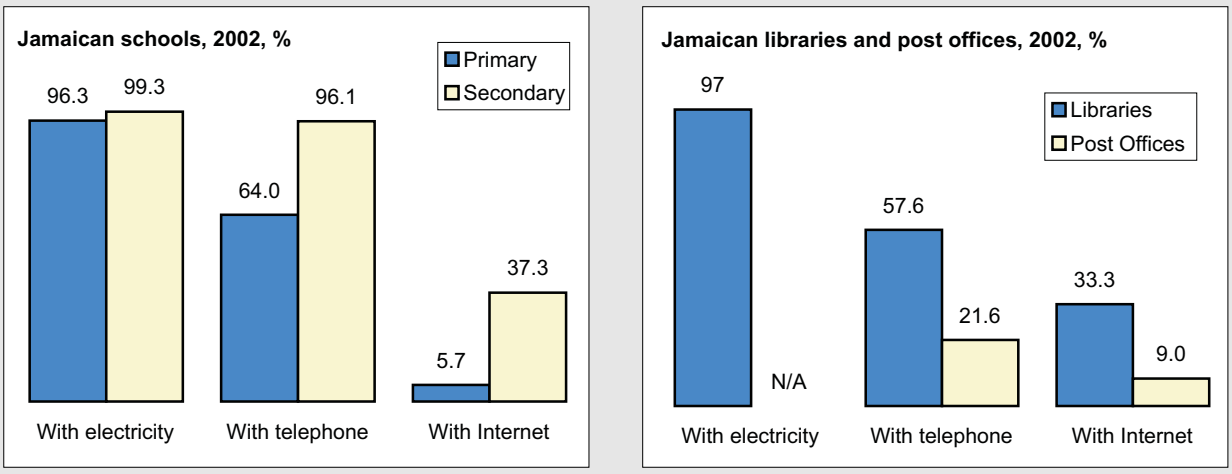
Target 5: To connect health centres and hospitals with ICTs.

Target 6: To connect all local and central government departments and establish websites and e-mail addresses.

Targets 2-6 are concerned with the availability of ICTs in different sectors such as education, health and government, an area dealt with at more length in Chapter three of this report. These targets can be seen as being closely related to target one, which calls for all villages to be connected, and to target ten, which aims for half of the world to have access to ICTs. The widespread availability of ICTs in schools, libraries and post offices would significantly enhance access around the globe. As with target one, the definition of what it means to be "connected … with ICTs" is vague, with the emphasis therefore being on the infrastructure capability to connect rather than specifying any particular service.

Figure 4.8: Connecting schools, libraries and post offices in Jamaica

Percentage of primary and secondary schools with electricity, telephone service and Internet access (left) and percentage of post offices and libraries with electricity, telephone service and Internet access (right) Jamaica, 2002



Source: ITU adapted from Office of Utility Regulation, Jamaica.

Most developed countries and some developing ones have already achieved these targets. They also remain relevant for the majority that have not. Even for those that have high levels of achievement, getting connected is just the first step to using ICTs efficiently and effectively. The existence of these targets is an important element in the action plan because it shows that governments and other stakeholders have recognized the importance of public access in a world where commercial access to ICTs is unaffordable for many in developing nations. There is no mention of connecting business, presumably because this is not something governments would do. However, government policies can significantly impact the ability of businesses to get connected.

As noted in chapter three, there is a grave measurement problem with targets 2-6. Although some developing countries compile the necessary statistics (Figure 4.8), most do not. Resources are needed to take stock of exactly where the world is in accomplishing these targets.

Target 7: To adapt all primary and secondary school curricula to meet the challenges of the Information Society, taking into account national circumstances.

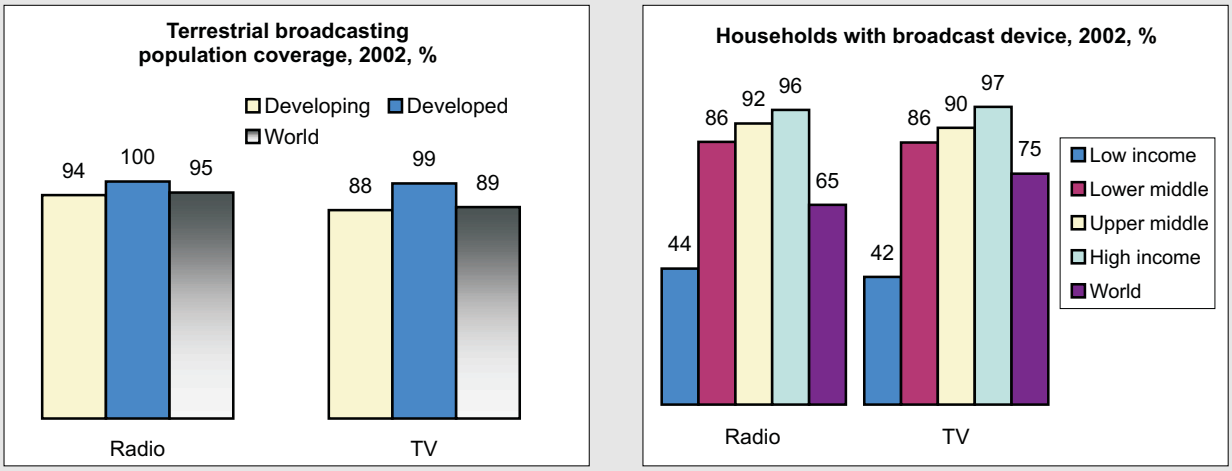
This target is one of the most sensitive. During the WSIS Preparatory Committee meetings, several developed nations expressed uneasiness about their ability to meet the target. If developed countries feel unable to meet this target, what hope is there for developing countries? In reality, this is not a target with an end date but rather a commitment to continually update curricula. The challenges of the information society in 2015 will be much greater than they are now. It will be essential to introduce children to the basic tenets of how to maintain their privacy and apply principles of security. It would also be good to teach them about proper etiquette. And, of course, the basics of computer use should be an important part of any educational curriculum.

Target 8: To ensure that all of the world's population has access to television and radio services.

Target 8 has two aspects: access to broadcast signals and to devices (i.e. radio and television sets). The first of these has already almost been achieved, with terrestrial radio and television coverage figures at 95 and 89 per cent respectively. Access to devices is not far off. Surprisingly, among all income groups except the lowest, more households around the world have a television than a radio.[52] Even in the lowest income groups, the levels are close, with 44 per cent having a radio and 42 per cent having a television. Globally, 75 per cent of households have a television while 65 per

Figure 4.9: Broadcasting coverage

Percentage of population covered by terrestrial radio and television broadcasting (left) and households with a radio or television (right) by income group, 2002



Source: ITU World Telecommunication Indicators database.

cent have a radio. An important factor to bear in mind is that a major barrier to higher levels of television ownership is the lack of electricity, whereas a radio can be battery run.

New technologies impact measurement of this target. Practically all parts of the globe are covered by satellite radio and television signals. However, in practice, in some countries it is not legal to receive the signals. Also satellite television and radio signals are broadcast in a limited number of languages. The cost of receiving satellite services is also higher than for terrestrial services. Worldwide, there are only an estimated 100 million home satellite antennas, or one for every ten households with television. Another consideration is the availability of broadcast services over the Internet. This makes it possible for those with access to the Internet to listen to or watch broadcast services even if terrestrial based coverage is not available. Another ramification is the availability of mobile phones with built-in radios. If this was made a standard feature, it could have a significant impact on increasing access to radio services since mobile phones outnumber fixed ones in developing nations.

In conclusion, the target has been largely reached in the theoretical sense that the majority of the world is covered by radio and television services. In a real sense, the biggest barriers to actual achievement of this target is the lack of electricity for powering television sets, and the lack of income to purchase a set and/or satellite receiving equipment and services.

Target 9: To encourage the development of content and to put in place technical conditions in order to facilitate the presence and use of all world languages on the Internet.

This target contains three separate elements:

- encouraging the development of content;
- establishing the technical conditions for all world languages to be present on the Internet;
- using all world languages on the Internet.

The first of these is not really a "target" as such, but rather a principle.

The second of these elements is more significant as a target and has a number of dimensions. Probably the most important is the coding of all major scripts into computer formats. This is a task that is partly undertaken by the private sector (e.g. when developing computer applications in different languages). However, for language groups that have fewer speakers, the economics of coding are more problematic. Furthermore, there remain many languages that exist in spoken form only. So a more accurate interpretation of this target would be for "all the scripts of the world languages …" A second aspect of this target is to allow all the world's scripts to be used in the uniform resource locator (URL) (e.g. www.itu.int). There are a number of different initiatives to facilitate this, but there is no real agreement on how to do it.[53] Nevertheless, within the next few years, it should be possible. The conversion from Internet Protocol (IP) version 4 (in current use) to version 6 will facilitate this, as it will significantly expand the number of IP addresses available for use.

The third element above—actually using all languages on the Internet—is probably not realistic. There are over 5'000 world languages. Many are non-written languages and others have only a small number of speakers.

Target 10: To ensure that more than half the world's inhabitants have access to ICTs within their reach.

This target refers specifically to coverage of ICTs in terms of both demography (half the world's inhabitants) and geography (within easy reach). But the target is vague about which ICTs are meant and what "easy reach" means. There is some overlap of this target with targets 1-7 that deal with connecting villages and public institutions. Target 8 would already cover radio and television. Thus, this target could be focussed towards fixed and mobile telephones, computers and the Internet.

At one level at least, the target is already met in that more than half the world's *households* have fixed telephone service (57 per cent in 2002*)*. The figure is even higher if those having only mobile phones are included. Wireless communications provides a useful indicator for monitoring this target: the *percentage of the population within range of a mobile cellular signal*. This indicator avoids difficulties surrounding the definition of "within reach" since a mobile phone can in principle be used anywhere there is a signal. Unfortunately, not all countries compile this useful indicator. Extrapolating from the some 100 countries that do, the global mobile population coverage is estimated at 80 per cent at the end of 2002. ITU calculates that over four fifths of the world's

population has theoretical access to telephone service, including 78 per cent of developing nations (65 per cent excluding China and India, Figure 4.10). This estimate is based on various measures depending on availability of data for countries. If mobile population coverage is available, that figure is used. Otherwise either the urban population percentage—on the grounds that considerable research suggests that all urban areas of the world have telephone service—or the percentage of households with a telephone is used.

Another interpretation would be that the target refers specifically to Internet access. The total number of estimated Internet users in 2002 was around 600 million, or just under ten per cent of the world's population. However "having access" to the Internet is not the same thing as actually using it. Data are not widely available on those having access to the Internet. Even the number of Internet users is based on rough estimates for many developing nations. Thus, monitoring of this target will require efforts to enhance existing information through the use of surveys.

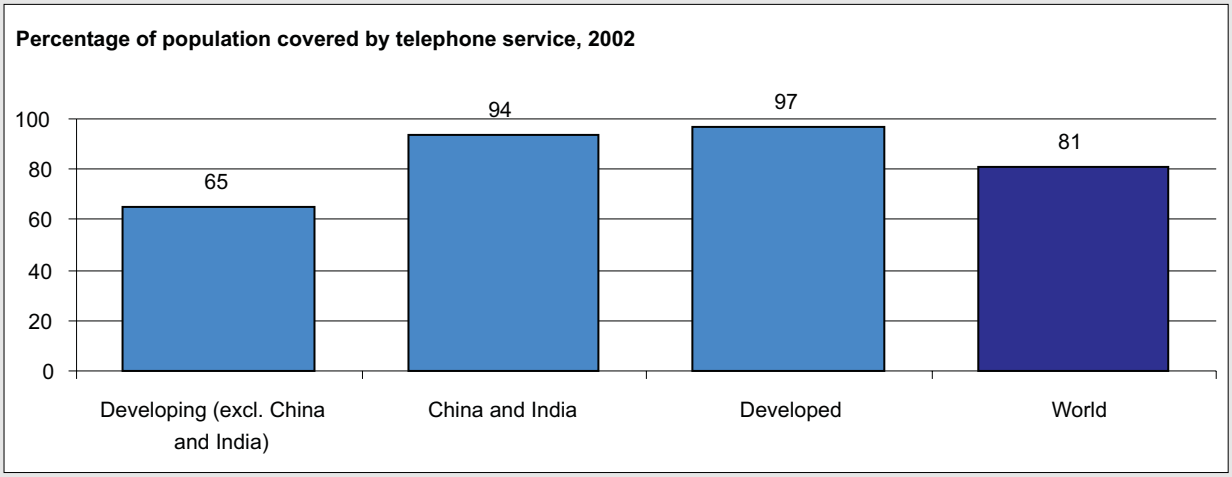
4.5 Conclusions

Information and communication technologies are recognized as playing an important role in achieving the Millennium Development Goals, with target 18 setting the specific objective of making available to all the benefits of ICTs. In this chapter, we have seen how the indicators that have been selected and proposed for the monitoring of this target are of necessity a compromise — chosen because of their wide data availability — and they do not necessarily measure the extent to which individuals have access to or use the technologies. Those indicators also reflect a long-standing tendency to base assessments on availability of infrastructure, which, it is now becoming apparent, often fail to give an accurate picture. More applicable indicators of universal access should therefore be measured, as outlined in the indicative targets established by the World Summit on the Information Society. These provide a broad set of targets for accessibility, connectivity and coverage.

ICTs also have a big role to play in achieving the other MDGs. To begin with, ICTs are indispensable for providing the databases and web-based information for tracking the MDGs. On a deeper level, there is a need for more quantifiable evidence of the impact of ICTs on the MDGs, including well-defined indicators.

Existing data suggest that large strides have been made over the last decade towards enhancing access to ICTs. The MDG indicators for ICT availability show a large increase while many of the indicators proposed for monitoring progress towards the information society are more than half achieved. These indicators suggest that although much progress has been made in infrastructure, there are growing bottlenecks in terms

Figure 4.10: World telephone coverage
Percentage of the world's population with access to telephone service, by income group, 2002



Source: ITU.

Box 4.6: Measuring the information society

The draft World Summit on the Information Society (WSIS) Plan of Action contains a full section on follow-up and evaluation that focuses mainly on benchmarking and indicators. There are several elements under this item:

- Developing and launching a composite information and communication technology (ICT) Development Index.
- Publishing an ICT Development Report.
- Developing measures of the digital divide, including community connectivity indicators.
- Reporting on the universal accessibility of ICTs.
- Developing and measuring gender-specific indicators.
- Developing and launching a website of ICT success stories.
- Developing coherent and international comparable indicators for the information society.

A special workshop just prior to WSIS organized by six international organizations— Monitoring the Information Society: Data, Measurement and Methods—aims to tackle some of these issues.[54]

of actual usage due to knowledge and affordability. For instance, an estimated 800 million of the world's population survive on less than US$ 1 per day. Many more live on less than the annual income of US$ 1'340 per year that is estimated to be the minimum level of affordability for telephone ownership. It is likely that, without a significant and sustained rise in levels of household wealth, this group will never be able to own a telephone, a mobile phone or a computer with an Internet connection.

Much more needs to be done to enhance the capacity of both developed and developing nations to collect the necessary indicators. While the starting point should be indicators for measuring access, the information society is an evolving concept and measurement of it needs to focus on people and how they use ICT tools. The draft WSIS Plan of Action contains a number of suggestions for further work in benchmarking and monitoring (Box 4.5). Beyond that, there is a commitment to develop and present, during the second phase of the WSIS, to be held at Tunis from 16 to 18 November 2005, "a Framework Document for Information Society Measurements and Analysis". For those concerned with indicators, this is the major challenge that lies ahead.

[1] Resolution adopted by the General Assembly. (2000, September 8). "United Nations Millennium Declaration". Available from: http://www.un.org/millennium/declaration/ares552e.htm; accessed November 7, 2003.

[2] For a discussion of this phenomenon, see ITU. "Mobile overtakes fixed". Available from: http://www.itu.int/osg/spu/ni/mobileovertakes/index.html; accessed November 7, 2003.

[3] Minges, M. ITU. (2002, November). "Gender and ICT Statistics". 3rd World Telecommunication/ ICT Indicators Meeting. Available from: http://www.itu.int/ITU-D/ict/WICT02/doc/pdf/Doc07_E.pdf; accessed November 7, 2003.

[4] Millennium Development Goal websites include UNDP available from: http://www.undp.org/mdg/; accessed November 7, 2003; UN available from: http://unstats.un.org/unsd/mi/mi_goals.asp; accessed November 7, 2003 and World Bank available from: http://www.developmentgoals.org; accessed November 7, 2003.

[5] Ministry of Public Management, Home Affairs, Posts and Telecommunications (Japan). (2003). *Information and Communications in Japan. Building a "New Japan-Inspired IT Society"*. Available from: http://www.soumu.go.jp/joho_tsusin/eng/index.html; accessed November 30, 2003.

[6] A 1998 article warns about health risks; see Blackice (Prague). (October 1, 1998). "Mobile Phones Can 'Cook' Your Brain". Available from: www.rfsafe.com/articles/blackice_prague_100198.htm; accessed November 30, 2003. According to a 2002 article a research project in Switzerland found that mobile phone radiation disturbs sleep patterns and an Australian study claimed that mobile phones might cause damage to nerves around ears. In 2000, the World Health Organisation (WHO) advised making short calls and using hands free devices, even though it saw no definite evidence of health risk; see: Guardian Online (UK). (January 25, 2002). "Mobile phones safety fears". Available from: www.guardian.co.uk/theissues/article/0,6512,639561,00.html; accessed November 30, 2003. Today still there is no clear evidence that confirms any health consequences from exposure to low level electromagnetic fields, including mobile phones. According to the WHO, more research is needed. For more information, see: WHO's "International Electro Magnetic Fields Project (EMF)" available from: www.who.int/peh-emf/research/en; accessed November 30, 2003.

[7] Carpal tunnel syndrome, which has been linked to work-related cumulative trauma of the wrist, occurs when tendons or ligaments in the wrist become enlarged, often from inflammation, after being aggravated. See National institute of Neurological Disorders and Stroke. (2001). Available from: http://www.ninds.nih.gov/health_and_medical/disorders/carpal_doc.htm; accessed November 7, 2003.

[8] The Age. (2003, June 30). "Computer Users to be screened for 'Infostress'". Available from: http://www.theage.com.au/articles/2003/06/30/1056825311456.html?from=storyrhs; accessed November 7, 2003.

[9] For a study on the quality of health information, see: Butler, L. and Foster, N. (2003). "Back Pain Online: A Cross-Sectional Survey of the Quality of Web-Based Information on Low Back Pain". *Spine*. Available from: http://ipsapp006.lwwonline.com/content/getfile/1140/178/17/abstract.htm; accessed December 1, 2003. To help people distinguish between "good" and "bad" online information, the National Cancer Institute offers some guidelines. See: National Cancer Institute. (2002, August). "How to evaluate health information on the Internet: Questions and Answers". Available from: http://cis.nci.nih.gov/fact/2_10.htm; accessed November 10, 2003.

[10] It is estimated that by 2005 there will be one obsolete computer for every new one sold. Silicon Valley Toxics Coalition. (June 2002). *Information Technology and Sustainability: Enabling the Future*. Available from: www.svtc.org/cleancc/pubs/it_sustain_natstep.htm; accessed November 30, 2003.

[11] Silicon Valley Toxics Coalition. (June 2001). *Poison PCs/Toxic TVs*. Available from: http://www.svtc.org/cleancc/pubs/pctvexecsum.htm; accessed November 30, 2003.

[12] Wired News. (June 5, 2003). "You make it. You take it: PC law". Available from: www.wired.com/news/print/0,1294,58850,00.html. For an overview of e-waste, see: Silicon Valley Toxics Coalition. *Just say no to e-waste: background document on hazards and waste from computers*, at www.svtc.org/cleancc/pubs/sayno.htm.

[13] MS Swaminathan Research Foundation. (2003, April). "Information Village Research Project". Available from: http://www.mssrf.org/informationvillage/infovil.html; accessed November 10, 2003.

[14] This information might be collected through agricultural surveys like in Australia where the national statistical office compiles data on the number of farms with computers and Internet access. The data could be analyzed to see if farms with ICTs have higher output than those without. Australian Bureau of Statistics. (10 June 2000). "Australian farms are using information technology more". *Media Release*. Available from: http://www.abs.gov.au/Ausstats/abs@.nsf/Lookup/ACD1C9BDF56D6CF9CA25696F0079BED6; accessed November 30, 2003.

[15] Motorola. "The new mobile world". Available from: http://motoinfo.motorola.com/motoinfo/20th_anniversary/docs/six_stories.doc; accessed November 10, 2003.

[16] Bayes, A., von Braun, J. and R. Akhter, R. (1999, June). *Village Pay Phones and Poverty Reduction: Insights from a Grameen Bank Initiative in Bangladesh.* ZEF Discussion Papers on Development Policy Number 8. Bonn (Germany). Available from: http://www.zef.de/publications/publ_zef_dp.htm; accessed November 30, 2003.

[17] "Countries can usually spend more on education as their economies grow. But the poorest countries need to spend more on education to escape their poverty traps—and do not have enough resources to make such basic investments". UNDP. (2003). *Human Development Report*. Available from: http://www.undp.org/hdr2003; accessed November 30, 2003.

[18] "Unit costs have tended to be lower than conventional teachers' courses because of savings in residential costs and economies of scale that can be achieved through distance education. Costs per successful student have often been between one-half and two-thirds of conventional teacher education programmes". Perraton, H. (2000). "Teaching the Teachers". *Imfundo Project Background Paper #5*, UK Department for International Development (DFID). Available from http://www.id21.org; accessed December 1, 2003.

[19] "…e-learning can help to train teachers who then go out to primary and secondary level schools…that will help towards meeting the Millennium Development Goals". See: Rowe, M. (2003). "E for education". *The International Development Magazine*. Issue 22. Available from: http://www.developments.org.uk/data/Issue22/e-for-education.htm; accessed November 30, 2003.

[20] Shrestha, G. (1997, March). *A Review of Case Studies Related to Distance Education in Developing Countries*. Available from: http://www.undp.org/info21/public/review/pb-revke.html; accessed November 11, 2003.

[21] Ministry of Education (Nepal) "Distance Education Centre" webpage at: http://www.moe.gov.np/central/dec.php; accessed November 30, 2003.

[22] Constance, P. (1999,January – February). "1,800 teachers, one classroom". *IDB America*. Available from: http://www.iadb.org/idbamerica/archive/stories/1998/eng/cont.htm; accessed November 30, 2003.

[23] "The South African Radio Learning Programme" at http://www.sn.apc.org/olset; accessed November 11, 2003. OECD/CERT ICT Programme. (2001, May). *A Case Study of ICT and School Reform at School 5*. Available from: http://www.oecd.org/dataoecd/60/21/2740065.pdf; accessed November 11, 2003.

[24] Around half the schools in South Africa have insufficient textbooks. See: "OLSET — SETTING NEW STANDARDS FOR RADIO EDUCATION IN SOUTH AFRICA". Available from: http://www.freeplayfoundation.org/News/NewsItems/CaseOLSET.htm; accessed December 1, 2003.

[25] Axelson, M. and L. Hardy, L. (1999, June). "Learning Online. As web based curriculum grows, are textbooks obsolete?" *Electronic School*. Available from: http://www.electronic-school.com/199906/0699f1.html; accessed November 11, 2003.

[26] "In traditional societies where female enrollment in formal education is faced by unease of conservative cultures, elearning may present a channel of education that is neutral and does not involve direct interaction between the sexes thus facilitating female participation". See: Fillip, B. (2002, September 12). *Gender and Global E-learning*. Available from: http://www.worldbank.org/gender/digitaldivide/020912fillip.ppt; accessed December 1, 2003.

[27] Thompson, M. *Distance Learners in Higher Education*. Available from: http://www1.worldbank.org/disted/Teaching/Design/kn-02.html; accessed December 1, 2003.

[28] Australian Bureau of Statistics. (2001, January 25). "Participation in Education: Home-based higher education". *Australian Social Trends 1995*. Available from: http://www.abs.gov.au/Ausstats/abs@.nsf/0/584124099e6239d1ca2569ee0015d8ab?OpenDocument; accessed November 30, 2003.

[29] Gray, J, et al.(2000, December). "Baby CareLink: Using the Internet and Telemedicine to Improve Care for High-Risk Infants". *PEDIATRICS*. Available from: http://www.yi.com/home/EysenbachGunther/teach/had7001-2003a; accessed December 1, 2003.

[30] "The skilled attendant, working in a continuum of care, is the single most important factor in keeping women healthy and safe in pregnancy". See the "Maternal and newborn health" webpage at http://www.who.int/reproductive-health/mpr/attendants.html; accessed November 30, 2003.

[31] AED "Profiles" webpage at: http://ict.aed.org/portfolio/sectors/health.htm; accessed November 30, 2003.

[32] Dreyfus Health Foundation. (2003, April-June). *Connections*. Available from: http://www.dhfglobal.org/connections/AprJun03/AprJun03_p1.pdf; accessed November 30, 2003.

[33] Musoke, M. "Maternal Health Care in Rural Uganda". *IK Notes*. No. 40. January 2002. Available from: www.worldbank.org/afr/ik; accessed November 30, 2003.

[34] The Dominican Republic campaign combined ICTs by including a telephone number people could call for additional information after hearing or seeing the HIV/AIDS commercial on the radio or television. See Family Health International. *Meeting the Challenge of the HIV/AIDS Epidemic in the Dominican Republic: The AIDSCAP Response, 1992-1997*. Available from: http://www.fhi.org/en/HIVAIDS/Publications/Archive/aidscapreports/DominicanRepublicMeetingTheChallenge/Mtng_Chall_HIV_Epid_DR_Reaching_Youth.htm; accessed November 30, 2003.

[35] Myers, M. (2003, February). "The health benefits of soap". *Insights Education*. Available from: http://www.id21.org/insights/insights-ed01/insights-issed01-art05.html; accessed November 30, 2003.

[36] Vaughan, P., Regis, A. and E. St. Catherine, E. (2000, December). "Effects of an Entertainment-Education Radio Soap Opera on Family Planning And HIV Prevention in St. Lucia". *International Family Planning Perspectives*. Available from: www.agi-usa.org/pubs/journals/2614800.html; accessed November 30, 2003.

[37] One AIDS patient explained, "My online correspondence with friends infected with HIV+/AIDS has given me a basis for comparison, as well as tips for staying healthy". See: Pew Internet Project. (2003, July 16). *Internet Health Resources*. Available from: http://www.pewinternet.org/reports/toc.asp?Report=95; accessed November 30, 2003.

[38] A similar indicator has been used in the US where 88 per cent of those seeking health information online stated that the "*information they found improved the way they took care of their health*". See: Ferguson, T. (2002, 9 March). "From patients to end users". *BMJ*. Available from: http://bmj.bmjjournals.com/cgi/reprint/324/7337/555.pdf; accessed November 30, 2003.

[39] Task Force on Environmental Sustainability. (2003, April 18). *Background Paper*. Available from: http://www.unmillenniumproject.org/documents/tf06_july10.pdf; accessed November 30, 2003.

[40] "ICT and Environment: Friends or Foes" at the Development Gateway web page: http://www.developmentgateway.org/node/133831/sdm/docview?docid=569225; accessed November 30, 2003.

[41] Telework has been defined as "persons who work from home and could not do so without the use of a computer with a telecommunications link". See: Central Statistics Office (Ireland). (20 February 2003). "Module on Teleworking". *Quarterly National Household Survey.* For data on the means of travel to work in Ireland, see (Q1 2000). "Travel to Work". *Quarterly National Household Survey*. Data on greenhouse emissions from private cars are in the *Statistical Yearbook of Ireland 2003*. All these reports are available from: www.cso.ie; accessed November 30, 2003.

[42] A US government agency carried out its 2001 procurement exercise in a paperless environment using only the Internet and CDs. It is estimated that this resulted in a savings of paper equivalent to five stories high. As of 21October 2003, the US Government Paperwork Elimination Act requires all agencies to provide the option of electronic document submission when practicable as a substitute for paper. See: US General Service Administration. "Appendix II to OMB Circular No. A-130". Available from: http://estrategy.gov/omb_appendix.cfm; accessed November 11, 2003.

[43] In Ghana, a water database helped pinpoint a large source of pollution. See: Gamos & Big World Research. (2003)."Kumasi Information Database (KUMINFO)". *Sustainable initiatives*. Available from: http://www.sustainableicts.org/KUMINFO%20F.pdf; accessed November 11, 2003. In Egypt, satellite technology has been used to located new sources of fresh water. See: World Water Vision. (2001, September). *Report of the Thematic Panel on Information and Communication Technology and its Implications for Water Resources*. Available from: http://www.worldwatercouncil.org/Vision/Documents/ICT-report.PDF; accessed November 11, 2003. In Japan, it is estimated that there would be at least a five per cent savings in home energy consumption through household monitoring systems. See: Ministry of Public Management, Home Affairs, Posts and Telecommunications (Japan). (2003).

[44] Walsh, D. (2002, April). *Marketing and Addictive Behaviour — A Neuroscientific Perspective*. Available from: http://www.who.int/health-mktg/presentations/david_walsh.ppt; accessed December 1, 2003.

[45] Schar, E. and Gutierrez, K. (2001, November). *Smoking Cessation Media Campaigns from Around the World: Recommendations from Lessons Learned*. Available from http://www.who.dk/document/e74523.pdf; accessed December 1, 2003.

[46] Lack of appropriate urban planning and design is one of the main factors identified by the Task Force on Improving the Lives of Slum Dwellers. See UN Millennium Project. (2003, April). *Background Paper of the task force on improving the lives of slum dwellers*. Available from: http://www.unmillenniumproject.org/documents/tf08apr18.pdf; accessed November 11, 2003.

[47] For example some 60'000 children living in Brazilian slums have been trained in ICTs. See Baggio, R. (2001, February). "The real Digital Revolution". *CDI*. Available from: http://www.cdi.org.br/midia/midia_20010205.htm; accessed November 11, 2003. In Nairobi, Kenya, slum dwellers create sandals from recycled tires and sell them over the Internet. See INET. (2002, June). *ICT Stories Competition*. Available from: http://inet2002.org/CD-ROM/lu65rw2n/papers/u06-a.pdf; accessed November 11, 2003. In a New Delhi, India slum, young children are acquiring ICT skills via an Internet kiosk. See Barden, R. (2000, September). "The children of a New Delhi Slum and a PC/Internet Kiosk". *Sustain IT*. Available from: http://www.sustainit.org/cases/PDFcases/newdelhi.pdf; accessed November 11, 2003

[48] At the time of writing, the latest version of the draft Plan of Action was document WSIS03/PC-3/DT/5 (Rev. 1). Available from: http://www.itu.int/wsis; accessed November 30, 2003.

[49] The 2002 ITU Plenipotentiary Conference adopted a resolution calling for the development of a new "community connectivity indicator", to measure the number of villages with community access points. A workshop on measuring community access to ICTs including the definition of a digital community centre was held 6-8 October 2003. See "Indicators workshop on community access to ICTs" webpage at http://www.itu.int/ITU-D/ict/mexico03/index.html; accessed November 30, 2003.

[50] This figure is derived from developing country rural population and an estimate of 1'000 inhabitants per village. It also assumes that 80 per cent of villages are not connected. China and India are excluded as most of their villages already have telephone service.

[51] The figures for telephone service are derived from estimates of the cost of connecting Philippine villages using Global Mobile Personal Communication Satellite Systems while the cost for Internet access is derived from estimates for Very Small Aperture Terminals. These are highly general costs, depend to a large extent on economies of scale and would not be applicable to all countries. See ITU. (2002, March). *Pinoy Internet: Philippines Case Study*. Available from: http://www.itu.int/ITU-D/ict/cs/philippines/index.html; accessed November 30, 2002 and Gilat. (2002, April). *Broadband IP over DVB for IP Connectivity*. Improving IP Connectivity in the Least Developed Countries. Available from: http://www.itu.int/osg/spu/ni/ipdc/index.html; accessed November 30, 2003.

[52] One reason for the statistical data showing relatively low household availability of radios may be due to flaws in questionnaire design. For example surveys typically ask if the respondent has a stand alone radio set which may cause confusion about whether this includes radios in stereo systems, alarm clocks or automobiles.

[53] A workshop was held on this topic in December 2001. See "Multilingual Domain Names: Joint ITU / WIPO Symposium" available from: http://www.itu.int/mlds/resources/WIPO; accessed November 30, 2003. For a more recent description of the issues, see the "APT-ITU Joint Workshop on ENUM and IDN" available from: http://www.aptsec.org/seminar/meeting-2003/workshop/default.htm; accessed November 30, 2003.

[54] See "Monitoring the Information Society: Data, Measurement and Methods" website at http://www.unece.org/stats/documents/2003.12.wsis.htm; accessed November 30, 2003.