CHAPTER V

THE NET AND HEALTH INFORMATICS

What Advantages Does the Use of the Internet Bring in the Health Area and Medicine?

5.1 Medicine

During the last two decades or so the **life expectancy** for people living in the Developing Countries has increased, on average, from 42 to 62 years. The most rapid progress in the improvement occurred in Oman, Yemen, Saudi Arabia and in Vietnam; while in Uganda, Zimbabwe and Zambia the same factor has decreased to less than 50 years, primarily because of the spread of the HIV virus. The **infant mortality rate** in the Developing Countries has halved during the same period, passing from 149 deaths every 1000 babies born alive in 1960 to just 65 in 1996 [Undp 98].

The above progress has been reached mainly as a result of improved larger **access** to the health services, and drinkable water, improvement of the hygienic conditions, the diffusion of vaccination, and most significantly, to a broader diffusion of the medical and health information. The need for rapidity and easy access to medical and health information are essential conditions for the quality of the help rendered to patients, and for the medical researchers who must keep abreast of developments in the health service and profession. In many areas of the Developing Countries, however, it is an uphill struggle, if not impossible, to obtain some information because of the poor telecommunications infrastructure in most of the countries, the weak economic conditions in some of the countries and the frequent occurrence of natural disasters in some of the countries.

Many doctors, nurses, and scientific researchers in the Developing Countries work in a context where access to information is one of several problems: the partial or total **lack of technical means,** sometimes even

basic requirements, such as rubber gloves, medical equipment, or the **inadequate availability** of medicines, such as aspirins, **lack of specialist courses** and **insufficient remuneration** to the best doctors, nurses and paramedics.

In the report by *Panos Institute* [Pano 98b] Dr Ruhakana Rugunda, an ex-Minister for Health in Uganda, declared that the information service in these countries is really poor: *'the textbooks are out-of-date, and access to information on the latest scientific discoveries, on the development and sale of new medicines, or preventive practices is really limited. The doctors are isolated as they cannot receive advise about the way a diagnosis can be done, or they cannot find detailed information on the nature of treatments already applied for a determined kind of case'.*

From the very beginning the Internet gave rise to the potential for resources that are amenable for use in providing solutions to pertinent problems in these countries. In particular, the health area has been one of the first sectors to use the Net in order to have access to new information sources. The change has been radical and to date, through the use of inexpensive methods, such as e-mail and newsgroups, human lives can be saved, isolation can be reduced, doctors can take more informed decisions.

5.2 HealthNet

The American non-profit organisation *SatelLife/HealthNet* was founded in 1989 with the aim to promote computer networking in the Developing Countries through the application of the new information and communications technologies in health, medicine and environment [Sate 98]. The aim has been realised by collecting funds that were sufficient to launch into orbit two small satellites: **HealthSat I** (UoSAT-3) in 1991 and **HealthSat II** in 1993, both belonging to a family of 12 microsatellites designed and built by *Surrey Satellite Techology Limited* (SSTL).

HealthNet is a telecommunications system composed of: a system of Low Earth Orbit (LEO) satellites, a simple ground station and a network of computers connected via radio and telephone. This system without 'links' works really well and with low cost even in areas where there are no telecommunications infrastructure at all or where their presence is limited [Heal 98a]. The users are connected to the Net through the *HealthNet* nodes, and Terminal Node Controllers (TNCs) in every country where

the organisation works. TNCs are electronic distribution centres: computers sending and receiving messages from or to every point of the network, for instance, in a post office, which receives and distributes mail.

The strategy of *SatelLife* is based on the principle of off-line communication, since in geographically or topographically dispersed areas communications infrastructure is lacking, deficient or inadequate, is of low quality or very expensive, and the most efficient way to communicate is by using digital messages, rather than by direct voice in real time or by fax connectivity. *SatelLife* has used two other means in order to implement its own telecommunications system in the most effective way [Heal 98c]:

- **The Telephone:** *Fidonet* has developed a very cheap alternative to complete connection via the Internet. The FIDO networks transfer e-mail through a series of plannned telephone calls. The nodes are connected just in time to transfer the messages. The evolution of *HealthNet* has made it possible to create a big network of FIDO network nodes: some of them use the LEO satellites of *SatelLife* and others are directly connected to the corporate office of the organisation in Boston, where a central Internet gateway is operating. This service is considered to be very reliable in the Developing Countries, as the cost of the calls to the office in Boston is treated as American - local. The organisation, however, is transforming these telecommunication costs and related costs into independent costs of *HealthNet.*

- **The Internet:** In 1994 *SatelLife* tried to join the e-mail service between *HealthNet* and the Internet, by enabling its users to send and to receive e-mail to and from the users on the Net. This has been made possible owing to the diffusion of the new information and communications technologies and of the Internet worldwide including their manifestations in the Developing Countries. The high costs of connectivity, however, made it possible to have the priority of the service limited to the private sector and in the state financial institutions. *SatelLife* has, however, had the best

opportunity to help institutions working in the public sector, in particular health and education, by providing secure connectivity. In fact, the community of *HealthNet* users has access to the Internet as a group through a single access point, and in this way it can negotiate more successfully with commercial ISPs. *SatelLife* has also introduced an easier solution for Net-surfing, called *GetWeb,* with enables those users who do not have a direct connection to the Internet to acquire texts from Web documents simply through e-mail.

In conclusion, *HealthNet* is the telecommunications system based on the *SatelLIfe* computers, which makes it possible to connect health operatives and professionals all over the world and to have access to the latest medical and health information,through e-mail connection, to Web conferences and to other services conceived for its users. *HealthNet* is also a network of people serving about 4,000 health operatives and professionals, doctors, nurses and scientific researchers, in more than 30 countries worldwide, 22 of which are in Africa (see TABLE 7).

Continent	Countries where *HealthNet works*
Africa	Botswana, Burkina Faso, Cameroon, Eritrea, Ethiopia, Gabon, The Gambia, Ghana, Kenya, Malawi, Mali, Mozambique, Nigeria, South Africa, Senegal, Sierra Leone, Sudan, Tanzania, Uganda, DRC, Zambia, Zimbabwe.
Asia	China, Indonesia, Myanmar, Nepal, The Philippines.
Latin America	Bolivia, Colombia.
Next activation	Bangladesh, Cambodia, Haiti, Madagascar.

TABLE 7: Countries where *HealthNet* is operating, HealthNet, 1998

Which are the services *HealthNet* provides the scientific community with? When the potential users, namely, hospitals, nursing homes, doctors, nurses, medical researchers, universities, health organisations and libraries, subscribe to *HealthNet*, they are supplied with the following services:

- **Greater Information Access:** *HealthNet* makes it possible to broaden access to the various information sources through the availability of online medical bulletins, online libraries, and

electronic conference facilities. Subscription to the service enables users to receive *HealthNet News*, the electronic publications by *SatelLife*, which report the latest medical researches of relevance to the Developing Countries *(AIDS Bullettin, CBR News, Child Health Dialogue, Emerging Infection Diseases, Morbidity and Mortality Weekly Report*, and so on). The Net makes it possible also to have access to the database of the *US National Library of Medicine;*

- **Saving Human Lives:** The reports of the organisation say that *HealthNet* helps save many human lives and that it helps supply the best medical treatments in isolated areas;

- **Connectivity to Libraries:** *The Library Partnership Program* promoted by *SatelLife* makes it possible for users to subscribe to libraries of both the Developed Countries and the Developing Countries, by helping the users receive the complete or detailed texts of medical research and practice articles. Furthermore, the program enables the libraries of the Developing Countries to gain new knowledge and share relevant experiences;

- **More Rapid Response in case of Epidemics and Emergencies:** The greater access to the information sources enables doctors and paramedics to react more rapidly in case of an epidemic. Also, *SatelLife* encourages the giving and the sharing of information about emerging diseases through a Web conference entitled ProMED - *Program for Monitoring Emerging Diseases* and other newsgroups, opened to anybody through e-mail, such as ProCAARE - *Program for Collaboration Against AIDS and Related Epidemics.*

- **Affordable Costs:** *HealthNet* uses a technology for which all scientific operatives and professionals in medicine and related areas and medical institutions can pay, as and when the ground station is installed. The operational costs are only a small portion of the costs of a telephone or fax connection. At the moment the world health community uses the services provided by *HealthNet* in various ways. Some concrete examples of the numberless applications of the Internet in the health area include the following [Heal 98b]:

❑ Surgeons in Mozambique, Tanzania and Uganda use *HealthNet* to exchange opinions about treatments for patients and surgery techniques of reconsrtuction;

❑ Through *HealthNet* scientific operatives in The Gambia no longer have to travel over 700 km in order to collect data on medical tests; this information is transferred from one computer to another another in seconds;

❑ Doctors in Ethiopia use *HealthNet* in order to plan consultants and references, which are necessary for potentially critically-ill people who cannot travel through long distances or are not sure to find a doctor;

❑ The medical operatives of Vanga Hospital in DRC use *HealthNet* to send regularly news to other parts of Africa, to South America and to institutions of the North about progress of research on Trypanosomiasis[1];

❑ In order to fight the epidemic of cholera in Zambia, the University library of the University of Zambia was able to obtain relevant books through a partner university in the United States, the University of Florida, then provided relevant information to all *HealthNet* users of the region;

❑ In the North of Ghana, researchers on malaria have daily communicated through *HealthNet* with the *London School of Hygiene and Tropical Medicine* and the *Tropical Disease Research Centre* in Geneva, enabling a sharing of knowledge and experiences in critical areas of medical theory and practice;

❑ Researchers, in co-operation with the *Dain Fosse Gorilla Foundation* in Rwanda, routinely use *HealthNet* to take gorillas back to their natural environment. The data collected by these researchers are accordingly made accessible further afield;

❑ Mailing lists over *HealthNet* keep users up-to-date about the latest developments in many areas. ProMED mailing list, for instance, aims at keeping the doctors up-to-date on the

eventual outburst of infectious diseases, from the very beginning, and aims at providing early warnings in respect of concerned areas [Prom 98];

❑ The *Health Professional Database* enables *HealthNet* users to search for the profiles of thousands of medical and health operatives and professionals that have common concerns and interests for a sharing of the lessons of experience within the context of communities of interest, communities of expertise, or communities of interdependence.

The website for *HealthNet* (http://www.healthnet.org) provides more information about the profile of the organisation, the way it started operating in every country, the way the various services are used and about the future of *HealthNet.*

The eventual decision to subscribe to HealthNet must take into consideration the figures reported in TABLE 8, which shows the typical costs in Africa, valued in US$ for the health expenditure and for some new technologies, if they were exploited in the various health contexts.

TYPE OF SERVICE	**COSTS (US$)**
Average Medical Service Received Per Person per Year	10
Average Monthly Service Rendered Per Doctor	150
Three-Minuite Telephone Call from Burundi to Botswana	23
Six fax pages from Mali to Zambia	180
Individual Monthly Connection to the Internet	100
Monthly Connection to *HealthNet* (local tariff for connection plus a nominal tax for subscription)	10

TABLE 8: Comparisons among Some Costs in Africa - HealthNet, 1998

From the examples of the various uses of *HealthNet* the great advantages offered by the Internet in this sector can be understood. Nevertheless, the points of view about the services provided by *HealthNet* and making use of the Internet in the health area are really different: some people think that rapid and cheap access to the various medical sources has completely

changed the way of working in the hospitals; others more skeptically consider the Net just a waste of energy and resources. Talking about this argument, Dr Peter LeJacq, M M., of *Bugando Hospital* in Mwanza, Tanzania, [Pano 98b], has stated that *'cheap access to the communication network and e-mail service has made the fortune of one of the hospitals in Tanzania. In fact, our 800 beds of the Catholic Teaching Hospital were once used for about 7 million people; we had to search for funds, donations and materials through the telephone or fax. At the end of every year the expenditures for these services cost about US$ 5,000. Since beginning* ***HealthNet*** *we have increased our ability to find funds, recruit staff and buy goods'.*

HealthNet reaches people in the remotest places of the planet. Mohan Pradhan, the operative responsible for the *HealthNet* program in Nepal, in an interview by Panos Institute [Pano 98b] explains that this kind of service has been thought right for the developing countries, as the information that can be found on the Net through the commercial ISP deal with health information, such as the curative aspects of modern medicine, in an incomplete way.

The services of *HealthNet* have been criticised for being not so reliable and flexible, but Dr. Buddha Basnet, specialist in mountain diseases in Nepal, replies that *'HealthNet offers its services at a low price and enables [users] to have access to several information, which are useful for the Developing Countries'.* He connects with mountain medicine experts in the United States and exchanges opinions with them about the research he is carrying out: 'The effects of the altitude on the porters carrying trekking equipment and the ones for the expeditions to the mountains in Nepal' [Pano 98b].

5.3 Further Examples

Even if *HealthNet* is maybe the best example in which E-mail and Internet have been successfully applied to the health sector in the South, we must not forget other facilities, such as, for instance, *The Latin American Health Information Centre* (BIREME), operating in Sao Paulo, Brazil. It has been created in order to make it easier for the scientific operatives of Latin America to have access to the information and to the best literature in health and medicine and also to promote the diffusion and the application of the scientific productivity of these countries. BIREME was one of the first health organisations in the world to

introduce the CD ROM technology into the productivity sector.

In Latin America there are four other innovations geographically covering the whole that have been promoted in order to solve the specific situation of a nation or for inter-national aims with Latin America:

- **BELRANO HOSPITAL SYSTEM:** *The Belgrano Hospital System* comprises a computer-controlled system aimed at the promotion of a self-governed group. The systems are relatively known and are habitually deployed in the industrialised countries. The situation in the Developing Countries, however, is completely different, especially for the public institutions helping the poor in environments with insufficient or no national health service. The situation of *Belgrano Hospital* demonstrates how the introduction of a computer-controlled system into an average institution has been part of a process that has both sociological engineering implications. The aim of the idea has been to offer the best possibilities of treatment to the patients of the centre and to improve the efficiency and the efforts of the groups of workers and professionals. This goal has been realised with very limited resources, but with a high degree of diligence and enthusiasm.

- **SMED-BITNIS:** *SMED-BITNIS* affordably links Chile, Brazil and Argentina to world-class medical knowledge. Over the years the countries of Latin America have had many difficulties in keeping pace with progress in medicine because of several reasons, amongst which are the high costs of access and utilisation of the telecommunications systems. Nevertheless, the lack of resources has positively contributed to the stimulation of the creativity of human vitality. This has been an impetus for the creation of the *SMED-BITNIS* system, which combines the recent diffusion of the Internet in these countries with the very generous policy of the *US National Library of Medicine*, which has offered *MEDLARS,* the biggest 'store' of medical knowledge, to the professionals of Latin America. The SMED software and the BITNIS code have been created at the University of Chile in order to provide medical information at the cost of a local call all over Latin America. *Medical Informatics Foundation (FIM)* - is one of the three distributors of the service.

- **CLAP:** *Latin American Perinatology Center (CLAP) in*

Montevideo specialises in perinatology medicine and medical treatment during pregnancy. This is very significant in Latin America, where birth and childhood are fundamental in the context of the predominantly large young population living in social and economic conditions that are not satisfactory. *CLAP* is a centre situated in the *University Hospital of Montevideo in the capital of Uruguay.* It has been one of the pioneers of the development of standardised medical methods to provide pregnant women with adequate treatment. *CLAP* is the first centre in Latin America to use computers to analyse available perinatological data and is an international leader in the training of scientific operatives for the research of informatics and telematics-controlled methods in perinatology.

FIGURE 5-2: HealthNet in South America - HealthNet, 1998.

- **HEALTH TELEMATICS:** The development of informatics and of telematics in the health area in Peru has taken provenance from existing national projects of the health and medical authorities and the work done by *Cayetano Heredia University* and building on electronic connectivity with regard to hospitals, comprising varied capacity building initiatives ranging from the introduction of the e-mail to the installation of computers in the libraries of medicine.

5.4 How to Value Support by the Internet

The importance of the use of the Internet for medical and health purposes is the main theme of the researches carried out by the *Health On the Net Foundation (HON)* every six months for the purpose of estimating the level, the value and the degree of easiness of using the Net.

The researches on *'Use of the Internet for Medical/Health Purposes'* have been carried out through the help of a form filled-in on-line by the participants who have been interviewed through e-mail, newsgroups and related methodologies. The questions are about the possibility and the degree of easiness with which to find medical information on the Internet, about their quality and the actual use of the Net by doctors or nurses [Hon 98a].

The third research, carried out in May/June 1998, showed that 93% of those interviewed had found really interesting information on the Net. The results confirm the usefulness of the Internet and the quality of the information, including information in languages other than their own. A total of 68% find access to information on the Net "easy", against 60% in the previous survey. The results concerning the usefulness of Internet for doctors and nurses are similar to the 1997 results, save that in this survey research more patients had filled-in the survey form (64% against 40%). A total of 1863 people responded to the survey questionnaire. The users connect to the Net mainly from home, nearly 73%, of whom 42% are professional doctors who habitually look for information both for their patients (53%) and for themselves (68%); there is a significant presence of women on the Net, about 58%, of whom about 40% are recorded as having been using the Internet for less than one year [Hon 98b].

The *World Health Organisation (WHO)* has recently launched a new project to control a condition termed *Management of Tropical Education and Understanding (MANTEAU). MANTEAU* focuses on the learning and on the improvement, even through the use of electronic networks, of the abilities of the scientific operatives and of the administrators, both at a national and international level, to prepare and spread concrete, technical knowledge in the medical field. The WHO has also founded *The Association for Health Information and Libraries in Africa Networks (AhilaNet),* which has promoted various on-line activities among its members all over the African continent - such as the newsgroups through e-mail.

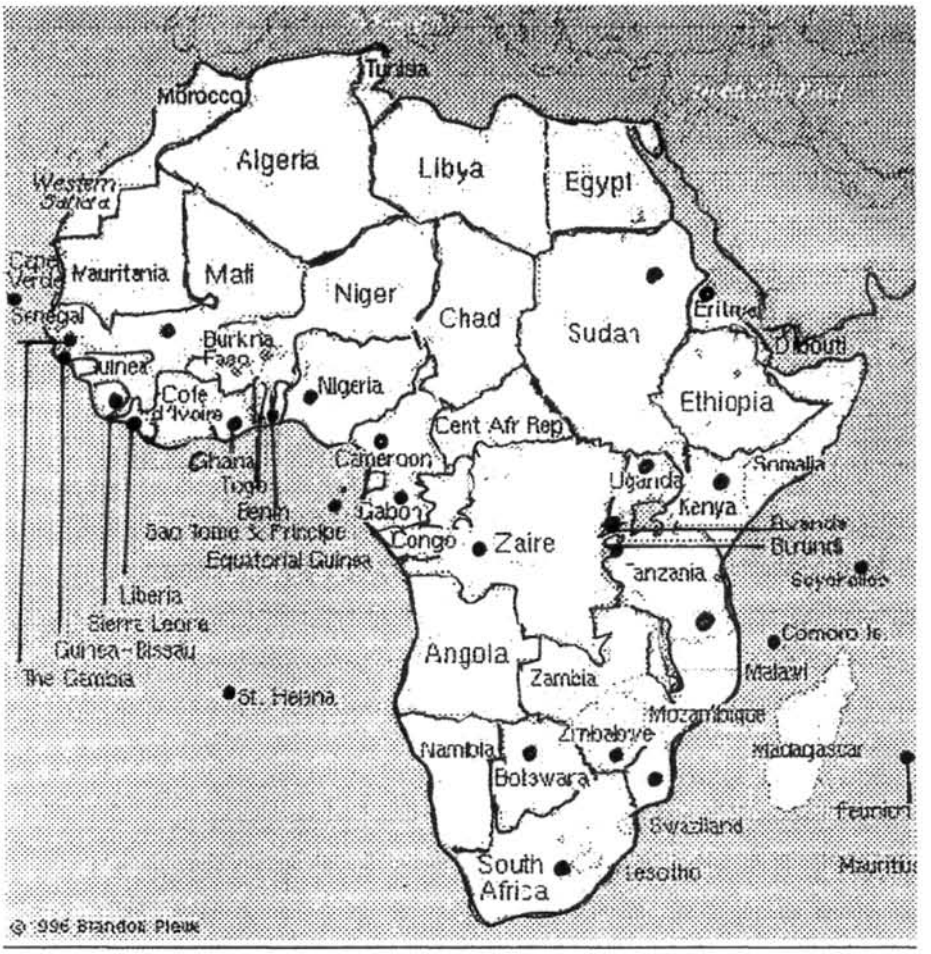

FIGURE 5-3: HealthNet in Africa - HealthNet, 1998.

The Internet and medicine in the Developing Countries, as we have seen, are not two completely different worlds. The list of information and communications technology activities in the health sector of all Developing Countries is very significant. When we take into consideration the introduction of the Internet into this sector we have to remember that 40% of medicine arises from an initial exchange of information. The main point is not to decide whether the Internet and the science of computing should be introduced into these countries or not; the main problem is to decide how to adjust the resources between information and communications technology initiatives on the one hand and medicines and medical equipment and other related paraphernaliae on

the other. According to the WHO - *World Health Organisation - the priority of investing in the information technology is clear: 'The development of an adequate and reliable telecommunications infrastructure can help fill in the gap between those countries having the necessary medical treatments and the ones that do not have them'* [Whop 97].