

PRACTICE POINTS

Application of ICT in strengthening health information systems in developing countries in the wake of globalisation

Daudi O. Simba

Department of Community Health, School of Public Health and Social Sciences, Muhimbili University College of health Sciences.

ABSTRACT

Information Communication Technology (ICT) revolution brought opportunities and challenges to developing countries in their efforts to strengthen the Health Management Information Systems (HMIS). In the wake of globalisation, developing countries have no choice but to take advantage of the opportunities and face the challenges. The last decades saw developing countries taking action to strengthen and modernise their HMIS using the existing ICT. Due to poor economic and communication infrastructure, the process has been limited to national and provincial / region levels leaving behind majority of health workers living in remote / rural areas. Even those with access do not get maximum benefit from ICT advancements due to inadequacies in data quality and lack of data utilisation. Therefore, developing countries need to make deliberate efforts to address constraints threatening to increase technology gap between urban minority and rural majority by setting up favourable policies and appropriate strategies. Concurrently, strategies to improve data quality and utilisation should be instituted to ensure that HMIS has positive impact on people's health. Potential strength from private sector and opportunities for sharing experiences among developing countries should be utilised. Short of this, advancement in ICT will continue to marginalise health workers in developing countries especially those living in remote areas.

Key words: Health, Information Technology, Information System, Developing Countries

African Health Sciences 2004; 4(3): 195-199

INTRODUCTION

Globalisation is today one of the most important processes taking place all over the world influencing all facets of our contemporary life. The present globalisation is both accelerating and increasing in scope and its penetration of our daily lives is reaching all corners of the world. Globalisation is not an "out there" phenomenon but one that affects the daily lives of individuals whatever part of the globe they live in. Many authors have defined this concept variously. To some, globalisation is seen as a process whereby national and international policy makers promote domestic deregulation and external

liberalization.¹ The process of deregulation that was intensified in the 1990s involved the removal of barriers to international trade, foreign direct investment and short term financial flows.

Globalisation is about the transformation of traditional systems, it is about innovations and competition in a global market, at intensified pace, facilitated very significantly by or through the use of Information and Communication Technologies (ICT). Several authors have argued that globalisation has been associated with a number of dialectical effects: On the one hand, globalisation has come from nowhere to be almost everywhere and this represents the thesis of the "global village" This thesis argues for homogenisation of social life across the entire world. The other dialectical effect of globalisation concerns the knowledge economy and who has access to it. Wealth creation in the global village has now shifted from resource based to knowledge based. The global economy is increasingly dependent on brainpower and our ability to process knowledge.² Goods and services of our brainpower will be marketed in an increasingly competitive

Correspondence Author:

Dr Daudi O. Simba

P. O. Box 65015

Dar es Salaam, Tanzania.

e-mail: dsimba@muchs.ac.tz

Fax Number: 255 22 2153 114 / 255 22 2151238

Telephone number: 255 22 2150304 / 5

global village. However the dialectical effect here concerns who has access to the knowledge base and what possibilities exist to apply it to their problems. Communities and nations with historical disadvantages run the risk of further marginalization. The 21st Century is the climax of revolution that of biotechnology and ICT.² Many developing countries have embarked on strategies to utilise Information Communication and Technology (ICT) in generating and communication of data from one level to another. However, many of these countries have managed to modernize the Health Management Information System (HMIS) only at the higher levels (national and provincial) because they do not possess technological, political and legal infrastructure to adequately respond to and manage ICT revolution for their benefit. The poor communication infrastructure in these countries has undermined efforts to spread the technology to the rural areas where majority of the people resides.

Effort to strengthen the HMIS in developing countries goes back to only a decade ago.³ As a result of these efforts enormous amount of data has been generated in many of these countries to the extent that in some of these countries data has become a source of problem. This is because often managers are overwhelmed with lots of data that they cannot analyse effectively and use it for decision-making. The collection, compilation and analyses of data become an end rather than the means of improving health care services.⁴ In addition, data produced continued to be of doubtful quality and untimely, thus ending up being not adequately used for decision-making.⁵ This paper aims at highlighting some of the opportunities and challenges offered by ICT in the strengthening HMIS in the wake of globalisation.

Achievements and opportunities

Tremendous developments in health information technology have been recorded in recent years in the context of globalization. Sharing and comparing health information, increasing communication through the internet, the use of telemedicine are all but some of the far reaching developments in the application of ICT in the health sector. Telemedicine in particular has increased the potential for improving access to care by underserved populations and point the way to a future when distance will no longer impede care. For instance, the last three decades saw the number of transistors

on a chip increasing from 2300 to over 40 million in the Pentium 4 processor.¹ During the same period the cost of computer technology went down from US \$ 760 per MHz of speed and \$ 5257 per Megabyte of storage to a mere US Cents 17. Similarly, tremendous development occurred in communication technology where the cost of transmitting a trillion bits of information went down from US \$ 150,000 in 1970s to US Cents 12 in 1999.²

These developments have brought opportunities for enhancing the quality of life by increasing access of medical knowledge and state of the art medical interventions to health workers. In Europe patients carry a card-sized CD that carry information on medical information ranging from charts, laboratory results and x-rays pictures.³ Personal Digital Assistants (PDA) have been used by nurse midwives in India resulting into the reduction of paperwork, increase data accuracy and ensured availability of data in electronic form.⁷ It is now possible using Personal Digital Assistants (PDA) to transmit data through wireless communication and enter it into database using Internet.⁴

In the US, over 50% of patients have access to e-mail leading to increased communication with their doctors hence improvement in patient-provider relationship.^{5,6} In Japan, over 50 percent of physicians were reported to use Internet to access medical information.⁷ Reports shows that Internet connection in Africa is showing promising growth with a rise from only 12 countries in 1996 to almost all countries now.⁸

The New Africa Initiative (NAI) adopted by OAU aimed at doubling the teledensity to two lines per 100 people by the year 2005 with a focus on developing local content software based on Africa's cultural systems. It seeks to promote cross-border cooperation and connectivity by utilising knowledge currently available in the continent.³

Furthermore, reforms in various sectors have resulted into deregulation and privatization that has created conducive environment for competition thus increasing demand for new services especially ICT.⁹

CHALLENGES

Access to ICT

The distribution of benefits from ICT that created global imbalance is most glaring. Whereas global ICT market has surpassed US \$ 2 trillion in 1999 and expected to reach US \$ 3 trillion by 2004 developing countries accounted for a mere 2% of the revenues.³ In developing countries, communication of information is limited by unavailability of broadband access and where this is available it is too expensive for the majority to afford.⁷

There is a big divide even among developing countries. In Africa, a continent where 12% of the world population (780 million) lives, ICT products and services are scarce and expensive. And where the services exist, they are often erratic and unreliable. Africa is therefore a poor player with little information of its society shared in the world's ICT market. Even within Africa the disparity is very obvious. For example South Africa account for almost 90% Internet hosts of the total in Africa, followed distantly by Egypt (3%) and Botswana (1%).³ Tanzania along with other 46 countries in Africa share only 2% of Internet hosts. It has the less international bandwidth than Sao Paulo, Brazil.¹⁰ Of the 400 million Internet users in the world in the year 2000 less than 500,000 were in Africa.

The same picture applies to telephone line, mobiles and PCs density. Africa has less than 2% of the world's telephone mainlines amounting to 10 million in 1999. Although mobile cellular telephones have grown very fast in the past 5 years and are now available in 42 countries; outside South Africa, they account for only 20% of total phones in the continent.³ The latest edition of the UNDP Human Development report shows that in 1999 coverage of cellular and fixed phones in Ghana, Kenya and Uganda were 15, 11 per 1,000 and 5 per 1,000 respectively. The average was about 6 per 1,000.¹¹ In Tanzania less than 10 per 1,000 have telephone lines.¹²

The enormous social and economic *disparity* between the urban and rural areas where more than 85% of the people resides pose a special challenge in developing countries. Computer and communication technology in urban areas of developing countries is advancing very fast threatening even a wider digital divide internally. In these countries it is not uncommon to find sophisticated technology such as oil refineries and modern aircrafts alongside disease and poverty.¹³ The abject poverty in a country like Tanzania where 38.7% of rural population lives below poverty line makes any attempts to redress this situation a formidable task.¹⁸ In India, a project that attempted to provide access to Internet in 70 villages had cost about US \$ 600,000, which proved to be beyond the capacity of the country to afford.⁷

Political will

ICT occupies poorly defined loci in public policy processes. While the continent of Africa is still grappling with the most basic requirements of life such as food, education and shelter, the developed world is fast heading towards a globally networked information economy and society.¹⁴ Less than 35% of Africa's population has access to basic health or medical care facilities.³ The question that needs to be answered is whether it is fair then for Africa to go global on ICT without first having addressed the basic needs of its people? It is therefore not surprising to find in countries like Tanzania funding for the Commission on Science and technology (COSTECH) was less than US \$ 150,000 while that of Kenya was about US \$ 145,000 in 1999/2000 of which 75% was used for paying office rent and staff salaries.³

Data Quality

The introduction / adoption of ICT in routine data system widen the scope of analyses thus reducing bulkiness of data reported and enable data to reach its destination much faster to the users.^{19,14} Computerisation of the routine data has been reported to facilitate detection of errors if the health information system is programmed to alert the operator on values that are unlikely. In addition, computerisation allows transmission of disaggregated data to the national level. This makes data validation an easy exercise at each level.¹⁵

Several authors have raised concern on the inadequacies of the existing routine health information systems in many of the developing countries.⁴ Data collected in developing countries has been reported to be incomplete, inaccurate and not timely, as a result it is usually not used for various reasons including that of poor quality and unreliable. Therefore, the potential for ICT to improve data quality may not be realised especially in the presence of other contributing factors because many of these problems cannot be reversed by the mere computerisation of the HMIS. There is also a danger that the use of ICT may expedite the dissemination of poor quality data that does not represent the actual situation. Once entered in the computer and disseminated through the Internet, this data of 'doubtful quality' will be automatically transformed to truth.

CONCLUSION

Collaboration among developing countries

Globalisation has brought about some conducive environment for sharing experience and collaboration that poor countries can take advantage of the fact that most

of the African countries share similar problems in the use of ICT for the improvement of health information systems. Poor countries therefore need to develop policies and strategies that facilitate cooperation among them and need not compete in attracting international support for ICT. A typical example of such collaborative efforts is the Health Information Support Programme (HISP) jointly undertaken by the Universities of Oslo (Norway), Cape Town South Africa and Edward Mondlane University in Mozambique, Malawi, India and Cuba.¹⁶

Reducing internal digital divide

The digital divide between industrialised countries and developing countries is wide and continues to widen. As the latter make efforts to close this gap a more threatening divide emerges within the country between the urban minority and the rural majority due to poor communication infrastructure in the rural areas. Therefore, in order to benefit from globalization in ICT, poor countries requires reinforcing the relationship of being an effective user and a capable producer. In the effort to develop ICT developing countries need to start by addressing the basic issues. Several countries have adopted computerisation wholesale but this did not result into significant change in people's health while similar efforts using a simple manual system had better results.¹⁷ The HMIS should be focussed to collect data that is of local relevance and developing capacity for health workers to use data for planning and day-to-day decision making. There is no need of aiming at having a computer for each facility unless we are sure that health workers would make a better use of them in improving the quality of care to the people they serve. Ignoring the requirements of the rural community who are the majority perpetuate the rural urban divide. ICT should not displace but rather supplement and complement other media. Therefore, in the development of communication systems emphasis should be put on the need to utilise traditional media that have potential to reach large numbers of people. As a long term strategy, poor countries should aim for better education to bridge the gap between rural majority and the urban minority in order to bring them on board. ICT courses should be instituted as early as possible in the curriculum of various training and basic education (Molla 2000).

ICT training should be one of the criteria for promotion and employment in order to enhance the urge to acquire more skill among health workers.

Role of private sector:

Increasing penetration of computer and information communication technology to the lower level is of primary importance if poor countries are to bridge the internal digital divide in their countries. Participation of the private sector has been of crucial importance in the establishment, investment and development of ICT when compared to other stakeholders. With the current economic situation the private sector will continue to play major role in the efforts to spread ICT technology. But currently, most investors shy away from investing in rural areas due to unfavourable conditions such as low purchasing power and high investment costs in areas with lack or erratic supply of electricity and shortage of telephone lines. ICT revolution will continue to ignore and marginalise poor countries and its people. The profit motive in the private sector cannot work unless deliberate efforts are taken to create conducive environment for investing through the establishment of favourable Government policies and infrastructure. There is therefore a need for poor countries to exercise strong commitment and political will to bring in favourable conditions for investment in the rural areas by encouraging the development of low cost access technologies that address the need of the rural majority. For example, reducing taxation for solar-power equipment that can be used to run computers in remote areas where there is no electricity.

ACKNOWLEDGEMENT

We wish to acknowledge Prof. Jorn Braa, Humberto Muquingue and Joao Mavimbe for their invaluable comments and critique that helped in the finalisation of this paper.

REFERENCES

1. Cornia, G.A. Globalization and health: results and options. *Bulletin of World Health Organization*. 2001. 79 (9): 834-841
2. ACTS (African Centre for Technology Studies). Report of the 1st round table on Africa, Science and technology in the Age of Globalisation. Organised by the African Centre for Technology Centre (ACTS) in Collaboration with the African technology Policy Studies (ATPS). August 7th – 8th, 2001.
3. WHO. WHO Cooperation in Strengthening National Health Information System: A brief note for WHO Country Representatives and Ministries of Health. 1997. WHO/HST/97.2
4. Opit LJ. How should information on health care be generated

- and used? *World Health Forum* 1987. (8): 409 – 417
5. Finau SA. National health information system in the Pacific islands: In search of a future. *Health Policy and Planning*; 1994. 9(2): 161-170
 6. Chandrasekhar, C. P. and Ghosh, J. Information and communication technology and health in low-income countries: The potential and constraints. *Bulletin of World Health Organisation*. 2001. 79: 850 – 855.
 7. <http://www.intel.com/pressroom/kits/bios/moore.htm> [Accessed 30 September 2003]
 8. Schutze, H. S. Walk with a pen or fly with a computer: Can electronic dentistry work for you? *N Y State Dent J*. 2001. 67 (10): 24 – 29.
 9. Fowler, D. L., Hogle, N. J., Martini, F and Roh, M. S. The use of wireless entry of data into a database via Internet. *Surg Endosc*. 2002. 16 (1): 221 – 223
 10. Moyer, C. A., Stern, D. T., Dobius, K. S., Cox, D. T and Katz, S. J. Bridging the electronic divide: Patients and provider perspective on e-mail communication in primary care. *Am J Manag Care*; 2002. 8 (5): 427 – 433.
 11. Kleiner, K. D., Akers, R., Burke, B. L and Werner, E. J. Parents and physicians attitude regarding electronic communication in paediatric practices. *Pediatrics*. 2002. 109 (5): 954 – 956.
 12. Totsumi, H., Mitani, H., Haruki, Y and Ogushi, Y. Internet usage in Japan: Current situation and issues. *J Med Internet Res* 3. 2001 (1) E12.
 13. Molla, A. Africa and the information Economy: Foundations, Opportunities, Challenges and Research Agenda. A paper presented at the African Knowledge Networks Forum Preparatory Workshop (UNECA). 2000
 14. <http://www.uneca.org/adf99/summaries.htm> [Accessed 30 September 2003]
 15. UNDP. Human Development Report. UNDP, New York. 2001. pg 3.
 16. http://www.uneca.org/aisi/docs/ghana_nici.plan.doc [Accessed 20 September 2003]
 17. United Republic of Tanzania. Economic Survey, 2000. President's Office, Dar es Salaam. Tanzania. 2002.
 18. Kholy, A. E. and Mandil, S. H. Microcomputers and Health Improvement in Developing Countries. *WHO Chronicle* 1983. 37(5): 163 – 165.
 19. Wang, Q., Zhang, Z. and Zheng, S. Computers against diseases. *World Health Forum*. 14 (3): 1993. 298 – 300.
 20. Braa, J., Mavimbe, J. C., Nhampossa, J. L., da Costa, J. L. and Jose, B. The Electronic Journal on Information Systems in Developing Countries. <http://www.ejisd.org>. 2001. 5 (2): 1 – 29.
 21. Nhampossa, J.L. Globalisation and Localisation of Information Systems for District Health. Case study from Mozambique. 2000. Downloaded from <http://www.ifi.uio.no> [Accessed September 20 September 2003]
 22. Bryant, J.H. Management information system for primary health care: hopes and cautionary notes. In: *Management Information Systems and microcomputers in Primary Health Care*. 1988. pp 27-30.